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Distressed Debt Restructuring in the Presence of Credit Default Swaps

The availability of credit insurance via credit default swaps has been closely associated with the emergence of *empty creditors*. We empirically investigate this issue by looking at the debt restructurings (distressed exchanges and bankruptcy filings) of rated, nonfinancial U.S. companies over the period January 2007–June 2011. Using different proxies for the existence of insured creditors, we do not find evidence that the access to credit insurance favors bankruptcy over a debt workout. However, we document higher recovery prices following a distressed exchange in firms where empty creditors are more likely to emerge.

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WHAT DETERMINES A DISTRESSED FIRM'S CHOICE between in- and out-of-court debt renegotiation? A large body of theoretical and empirical research,

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thoroughly reviewed in the survey by Hotchkiss et al. (2008), has addressed this question. Direct bankruptcy costs, leverage, short-term liquidity, and debt structure are widely acknowledged as key determinants of the restructuring method. Although these findings are well consolidated, the explosive growth of the credit insurance market in the last decade, mainly in the form of credit default swaps (CDSs), has renewed interest in the topic. The availability of credit insurance via CDSs has been closely associated with the emergence of *empty creditors*, that is, insured debtholders who may find it convenient to force distressed firms into bankruptcy, even when a debt workout would be the most efficient choice. In this paper, we revisit the initial question from this perspective, and empirically investigate whether and how the presence of CDSs affected, in practice, distressed debt restructurings over the period January 2007–June 2011.

In a CDS contract, the protection buyer pays a periodic premium to the protection seller and receives a settlement equal to the difference between the par and market value of the underlying debt of the reference entity, should a default event occur. Typical default events include the bankruptcy of the debtor or the failure to pay principal/interests on the debt. Out-of-court debt renegotiations, instead, formally constitute credit events only for investment-grade and financial reference entities, under specific CDS restructuring clauses. In particular, the rules that define the set of deliverable obligations in case of out-of-court restructuring for CDS contracts on U.S. reference entities are so restrictive that no debt workout in the U.S. corporate segment has ever triggered a CDS payment (Altman and Karlin 2009), and this possibility has been formally ruled out by the Big Bang protocol released by International Swaps and Derivatives Association (ISDA) in April 2009.

In this context, legal scholars Hu and Black (2008a, 2008b) advance the empty creditor hypothesis, according to which insured creditors of a financially distressed firm have a strong incentive to exercise their voting rights to favor bankruptcy over a debt workout, as long as the CDS payoff in bankruptcy is larger than the postrenegotiation value of debt. Along the same line, Yavorsky et al. (2009) explain why bondholders with CDS protection are more likely to take a "hard-line" in debt renegotiations with the issuer. The concerns regarding the distortive effects of CDSs on debt restructuring may, however, be excessive. Bolton and Oehmke (2011) argue that the presence of insured creditors can have positive or negative effects. On the positive side, CDSs raise the creditors' bargaining power and enable lenders to extract more in debt renegotiations. CDSs then act as a commitment device and help to reduce the incidence of strategic default, which enables debtors to increase their debt capacity. On the negative side, CDSs can yield a market equilibrium characterized by overinsurance of bondholders and an inefficiently high incidence of bankruptcy filings compared to the optimum. Ultimately, whether and how the presence of CDSs affects debt restructuring remains, to a large extent, an empirical question.

This study provides, to the best of our knowledge, the first detailed empirical investigation of the role played by the access to credit insurance on the debt

restructuring choices of distressed firms.[1] Our sample consists of all bankruptcy filings and out-of-court renegotiations initiated by nonfinancial U.S. rated companies over the period January 2007–June 2011. This period represents a good laboratory for looking at distressed debt restructuring in reference entities, as it includes the first generalized crisis since CDS contracts have become liquid. Furthermore, in contrast to other crisis periods in which bankruptcy was the predominant restructuring choice, the selected period is characterized by a relatively large incidence of out-of-court distressed exchanges, which makes the comparison between the two restructuring methods more meaningful.

The first part of our analysis aims at testing whether distressed firms that may be affected by the presence of empty creditors show a larger probability of filing for bankruptcy (as opposed to restructuring out of court) than other firms, once we control for the traditional determinants of the restructuring outcome. Contrary to the empty creditor argument, we do not find evidence that companies whose bondholders might be insured via CDSs are more likely to restructure their debt in court. In fact, the restructuring choice is driven by essentially the same variables in both reference entities and nonreference entities. Specifically, firms that file for Chapter 11 report higher leverage and short-term debt ratios, and a lower number of debt tiers than companies that reorganize out of court. In addition, out-of-court renegotiations become more popular following the introduction of a tax relief on distressed exchanges. We also investigate whether the presence of empty creditors may undermine the debt restructuring attempts of a company at an earlier stage than the actual default. If a significant proportion of debtholders are insured via CDSs, they may be reluctant to renegotiate the debt following the first signs of financial trouble, thus pushing the company into further distress. Again, we find no evidence supporting such claims in our sample.

In the second part of our analysis, we perform additional tests of the impact of credit insurance on distressed debt restructuring by looking at the recovery rates of the issues in default. Even though the presence of insured creditors does not seem to directly affect the restructuring outcome in our sample, it may still interfere with the restructuring process and distort recovery rates. This is the case, for example, when firms choose to offer better conditions to tendering debtholders to ensure their participation to the (out of court) distressed exchange and win the resistance of empty creditors. Our evidence supports this prediction: We document higher recovery values from distressed exchanges in firms that are more vulnerable to the empty creditor threat relative to other firms. Taken together, our findings indicate that insured creditors exist and are able to extract more in debt renegotiations. However, at least on average, their presence does not seem to distort the final restructuring outcome toward a higher incidence of bankruptcy. In this respect, our results are consistent with the theoretical predictions of Bolton and Oehmke (2011) who argue

1. Some anecdotal evidence in favor of the empty creditor hypothesis has been produced by Hu and Black (2008a, 2008b), Bolton and Oehmke (2011), and the financial press (Economist 2009, Risk 2009). On the contrary, Mengle (2009) and Aspeli and Iden (2010) provide preliminary analyses of the empty creditor issue, and question its validity due to the lack of compelling evidence.

that the presence of CDSs does not inevitably lead to an inefficient restructuring outcome.

We shall emphasize that our analysis does not provide a direct empirical test of the empty creditor hypothesis: Such verification is unfeasible, as it would require data on the proportion of the firm's unsecured debt which is insured through CDSs, and these data are not available.[2] In line with related literature (Peristiani and Savino 2011, Danis 2012, Saretto and Tookes 2013, Subrahmanyam, Tang, and Wang 2014), we first use the existence of a CDS contract on the firm's debt as a proxy for the presence of insured creditors. While the use of the CDS dummy seems appropriate to identify companies that have *some* insured creditors, the question remains as to whether the number of the insured creditors as well as the level of the credit insurance purchased are *sufficient* to materially affect restructuring in case of distress. To better single out companies where empty creditors may play a significant role, we suggest four additional proxies. Two of the measures (reference entities in top tercile for intangible assets and reference entities in top tercile for bond dispersion) are inspired by the predictions of the empty creditor theory. Bolton and Oehmke (2011) argue that overinsured creditors are more likely to emerge when there is a high probability of an ample renegotiation surplus upon default and when the firm raises debt from multiple creditors. The other two proxies (reference entities in top tercile for senior unsecured debt ratio and reference entities with liquid CDS contracts) intuitively identify those firms where empty creditors are more likely to emerge from a practical viewpoint. Specifically, for unsecured creditors (irrespective of whether they are insured or not) to have significant bargaining power in debt restructuring, the proportion of unsecured debt in the firm must be sizeable. Furthermore, we expect the volumes of credit insurance to be particularly significant in firms with liquid CDSs, as liquidity enables debtholders to easily create and unwind insured positions.

Our findings directly enrich the scarce, but fast-growing, empirical literature on empty creditors. Two recent papers by Peristiani and Savino (2011) and Subrahmanyam, Tang, and Wang (2014) investigate, from an *ex ante* perspective, the effect of the introduction of CDSs on the probability of bankruptcy/downgrade of firms. Both studies document a decline in the credit quality and an increase in the probability of bankruptcy of reference entities following the introduction of CDSs and take this finding as evidence supporting the empty creditor theory. Our analysis differs from theirs under several aspects. First, we look at the impact of CDSs from an *ex post* perspective and assess whether, once a firm is in distress, the availability of credit insurance distorts the debt restructuring process. For the empty creditor issue to arise, the presence of insured creditors must ultimately affect the restructuring procedure, hence our approach provides a more immediate test of the potential distortive impact of CDSs in this respect. Second, we focus on the restructuring process of rated firms in financial distress, hence our subsamples of reference entities and other firms are closely matched in terms of size, credit quality, and debt structure. As a result,

2. Information on the 1,000 most liquid single name CDS volumes outstanding has been provided by the Depository Trust and Clearing Corporation (DTCC) since November 2008, but the breakdown of the CDS volumes between covered and naked CDS positions is not available.

our analysis helps avoid most of the endogeneity issues that typically arise when investigating the effects of the introduction of CDSs.

Other related contributions investigate the empty creditor predictions by comparing distressed exchange offers in reference entities and other firms and report mixed results. Danis (2012) documents a lower participation rate to distressed exchanges in reference entities, while Narayanan and Uzmanoglu (2012) argue that firms successfully respond to the resistance of empty creditors by restructuring their debt strategically. We complement these studies by looking at the full set of in- and out-of-court renegotiations, which enables us to directly assess the impact of credit insurance on the final restructuring choice. Moreover, by including bankruptcy filings, we also account for those instances where the pressure from the empty creditors might have discouraged the firm from attempting a debt exchange.

We also add to the empirical literature on the costs and benefits of CDSs for firms, which is still in its infancy as highlighted by Stulz (2010). In this respect, notable contributions on the effects of CDSs on the cost and supply of credit are provided by Hirtle (2009) who shows that the presence of CDSs yields an increase in bank credit supply and an improvement in credit terms, by Ashcraft and Santos (2009) who suggest that the introduction of CDSs may reduce the cost of borrowing for safe and transparent firms, and by Saretto and Tookes (2013) who document an increase in leverage and debt maturity following the introduction of CDSs on a company's debt. At a broader level, our study is related to the more established literature on the determinants of in- and out-of-court debt restructuring (see Gilson, John, and Lang 1990, Asquith, Gertner, and Scharfstein 1994, Franks and Torous 1994, Chatterjee, Dhillon, and Ramírez 1996, Brunner and Krahnen 2008, Jostarndt and Sautner 2010).

Our research has also interesting policy implications in terms of regulation of the CDS market. Various measures have been suggested to limit the distortions introduced by CDSs on the debt renegotiation process, such as a revision of the bankruptcy law, or the disclosure of CDS positions held by bondholders. Our results indicate that a change in the bankruptcy law would probably be excessive given the lack of evidence, at an aggregate level, of negative effects on the restructuring outcome arising from the presence of insured creditors. However, more transparency on who holds the CDS positions is essential for a deeper interpretation of our findings. This is also in line with the more general recommendations of the Dodd–Frank act regarding disclosure requirements for the CDS market.

The rest of this paper is organized as follows. Section 1 describes data and sample collection. In Section 2, we review the determinants of distressed exchange and bankruptcy. We discuss the methodological steps and the main findings in Section 3. In Section 4, we present further evidence and perform some robustness checks. Section 5 concludes.

1. DATA AND SAMPLE SELECTION

To investigate if the availability of insurance on a company's debt may affect the debt restructuring process, we first need to identify a full set of in- and out-of-court

renegotiations undertaken by distressed firms. Our initial sample includes all bankruptcy filings (under either Chapter 7 or Chapter 11) and distressed exchanges completed by U.S. rated companies over the period January 2007–June 2011, as reported by Moody's *Default and Recovery Database*. Bankruptcy filings include prepackaged Chapter 11 cases, which constitute regular credit events in CDS contracts.

According to Moody's (2000), a distressed exchange is a debt restructuring where (i) the issuer offers creditors a new or restructured debt, or a new package of securities, cash or assets, that amount to a diminished financial obligation relative to the original obligation and (ii) the exchange has the effect of allowing the issuer to avoid a bankruptcy or payment default. In this respect, distressed exchanges represent the out-of-court alternative to Chapter 11 filings for the purpose of debt reorganization.

The definition of distressed exchange excludes, in principle, debt exchanges arranged by financially healthy issuers to reduce their debt levels at attractive market conditions. Following Mooradian and Ryan (2005), we assess whether this is also the case in practice through a detailed search for news on the debt exchanges in Factiva. The search confirms that all events classified as distressed exchanges in our sample actually refer to financially distressed firms and are therefore relevant to our analysis.[3] Furthermore, to ensure that no substantial debt renegotiations are excluded from the sample, we adopt an approach similar to Franks and Torous (1994). We run a search in Factiva on all companies with corporate rating of Caa1 or lower in the selected period, to determine whether those firms restructure their debt, informally by reaching an agreement with the creditors, or formally through Chapter 11 or 7. Our search returns 24 additional renegotiations, mainly completed by firms no longer covered by Moody's following a rating withdrawal. At this point, our sample includes comparable restructuring methods only, that is, bankruptcy filings and out-of-court renegotiations that are aimed at avoiding bankruptcy. Instead, we ignore less severe reorganization measures (e.g., minor amendments to bank loans) undertaken to prevent the firm from sliding into further distress. This issue will be investigated in detail in Section 4.2.[4]

Debt exchanges followed by a bankruptcy filing within 1 year are treated as bankruptcies, while multiple distressed exchanges that occur during the same 1-year period are combined together, to avoid overestimating the number of out-of-court restructurings. A potential concern with our approach is the misclassification of the restructuring choice. If a distressed exchange is followed by a bankruptcy filing not recorded in the sample (either because the company rating was withdrawn or bankruptcy occurred after the end of the sample period), and such instances are more frequent in reference entities, then our analysis may underestimate the number of

3. As a further check, we compare mean and median values of interest coverage ratio and Earnings Before Interest, Taxes, Depreciation and Amortization (EBITDA)-to-total assets ratio at year-end before default for both distressed exchanges and bankruptcy filings, and we find them not to be significantly different at 5% confidence level.

4. In a recent paper, Hotchkiss, Smith, and Strömberg (2011) adopt similar sample selection criteria to investigate the role of private equity firms in the debt restructuring of distressed companies. Unlike alternative methods that identify financially distressed companies by looking at their stock performance over a certain period (see Gilson, John, and Lang 1990, Asquith, Gertner, and Scharfstein 1994), our approach allows us to retain private companies, which represent a significant part of our sample.

in-court restructuring in the presence of CDSs. We carefully track the history of all distressed exchanges in our sample until September 2012 (i.e., 15 months after the end of the sample period) through Factiva and find that about 25% are followed by a bankruptcy filing, with an average time to bankruptcy of 15.6 months. However, about two thirds of these cases are already included in the sample (and 55% of them refer to CDS firms), while only five cases (one of which concerning a reference entity) have not been accounted for. As further evidence against the claim that most companies that complete a distressed exchange end up in bankruptcy shortly afterward, we observe that, on average, at the end of the sample period, the rating of companies that renegotiated out of court (and did not later filed for bankruptcy) is 1.68 notches higher than that at the time of default.

We limit our sample to rated companies to ensure a more meaningful comparison between CDS reference entities, which are typically rated, and other firms. As a result, the companies in our sample are matched (although imperfectly, as we will discuss later) in terms of credit quality, size, and debt structure.[5]

The choice of the sample period is dictated by two considerations. First, the CDS market has been very liquid only since 2005–06, and the proportion of corporate defaults where the obligor is a CDS reference entity was negligible before then. Second, the defaults recorded in 2007–11 are characterized by an unusually large recourse to distressed exchanges (Altman and Karlin 2009), only comparable to the debt workouts boom observed in the late 1980s. This can be partly explained with the approval, in February 2009, of the American Recovery and Reinvestment Act, which allowed companies to defer the income arising from debt cancelations arranged in 2009 and 2010 until 2014, and to amortize it over the following 5-year period.

The overall number of in- and out-of-court restructurings for U.S. rated firms over the period January 2007–June 2011 is equal to 285. Since the composition of capital and debt structure plays a major role in explaining debt restructurings, and detailed information on these variables is available from the annual 10-K filings, we exclude those firms which did not file a 10-K report at the fiscal year-end prior to the default event.[6] Furthermore, we eliminate companies that underwent major reorganizations (M&A, spin-offs) between the last 10-K report date and default. We also drop all financial companies, given the peculiarities of their capital structure. Our final sample includes a total of 163 default events, which is a size comparable to that of existing related empirical studies (Gilson, John, and Lang 1990, Asquith, Gertner, and Scharfstein 1994, Franks and Torous 1994): 40% of the defaults are distressed exchanges, and 60% are Chapter 11 filings, while there are no Chapter 7 filings left in our final sample.

One may argue that our final sample of defaults might have been biased by the filtering procedure and, as a result, may not be representative of the entire universe of

5. As for size, 53% of the firms in our sample belong to the third size quartile, and 42% to the fourth size quartile, of all nonfinancial Compustat firms at year-end 2006.

6. The average number of days between the last report date and the default event is 182 for distressed exchanges and 184 for Chapter 11 filings. Using the last available 10-Q quarterly report prior to default would provide a more accurate picture of the financial and economic conditions of the distressed firm but is unfeasible due to the lack of details on the debt structure for most 10-Q filings.

TABLE 1

SUMMARY STATISTICS ON DEFAULT EVENTS

	Number of defaults			Percentages		
	Overall defaults (N =163)	Out of court (N = 65)	Chapter 11 filings (N = 98)	Overall defaults	Out of court	Chapter 11 filings
Year						
2007	5	2	3	3%	40%	60%
2008	34	10	24	21%	29%	71%
2009	99	45	54	61%	45%	55%
2010	20	7	13	12%	35%	65%
2011 (first semester)	5	1	4	3%	20%	80%
Industry						
Mining and construction	11	6	5	7%	55%	45%
Manufacturing	82	27	55	50%	33%	67%
Transportation, communication and utilities	25	17	8	15%	68%	32%
Trade: Retail and wholesale	18	7	11	11%	39%	61%
services	27	8	19	17%	30%	70%
Company type						
Public	90	31	59	55%	34%	66%
Private with public debt	73	34	39	45%	47%	53%
Presence of CDS						
Nonreference entities	94	38	56	58%	40%	60%
Reference entities:	69	27	42	42%	39%	61%
- liquid CDS	25	12	13	15%	48%	52%
- less liquid CDS	44	15	29	27%	34%	66%

NOTES: This table reports summary statistics on the default events recorded over the period January 2007–June 2011 for nonfinancial U.S. rated companies with 10-K filings available at year-end prior to default. Data on the default events are obtained from the Moody's *Default and Recovery Database*. Information on which defaulted companies are CDS reference entities is provided by MarkIt. Liquid CDS reference entities refer to firms whose CDS was part of the CDX North America High Yield index in the year prior to default.

the default events prescreening. We find this not to be the case, as the proportions of distressed exchanges and Chapter 11 filings for the default events excluded from our sample are very similar (39% and 61%, respectively) to the corresponding proportions in-sample (40% and 60%, respectively). In fact, the defaults of the reference entities included in the sample seem to be biased toward bankruptcy, as 61% correspond to Chapter 11 filings, against only 54% for the reference entities excluded from the sample. In this respect, it is worth noticing that two thirds of the reference entities not included in the sample are financial companies with widely traded CDSs, most of which benefited from government aid during the crisis.

Finally, we need to identify the default events concerning CDS reference entities. For this purpose, we match the firms in our sample with the list of reference entities provided by MarkIt, which is a standard source of CDS data for both academics and practitioners. We identify 69 matches, which account for 42% of all defaults. More than one third of those reference entities are part of the CDX North America High Yield (CDX.NA.HY) index in the year before default and, therefore, have actively traded CDSs on their debt. In the remaining cases, the CDSs are more illiquid.

The composition of our sample of in- and out-of-court restructurings is reported in Table 1. Most default events (61% of the total) occur in 2009, at the peak of the

economic crisis. Due to the favorable tax treatment, distressed exchanges become more popular in 2009 and 2010, when they account for 45% and 35% of the default events, respectively. The industry classification of defaults reveals that the sample covers all sectors, with a concentration in manufacturing industries. Around 55% of the default events are associated with public firms, while the remaining 45% refer to privately held firms with public debt, most of which had been taken private during the leveraged buyout boom of 2004–07.

When looking at the restructuring outcome, we find the incidence of in- and out-of-court restructurings in CDS reference entities to be almost identical to the one observed in other firms: 61% of all defaults of reference entities are represented by bankruptcy filings, against 60% for other companies. The frequency of bankruptcies among reference entities with very liquid CDSs is even lower (52%), partly due to the fact that around 85% of the defaults of these firms occur in 2009–10 (when distressed exchanges are relatively more frequent), against a corresponding percentage of 60% for reference entities with less liquid CDSs.

Throughout our investigation, we focus on distressed exchanges and bankruptcies, while dismissing the default events due to missed payments that sometimes precede debt renegotiations. After the expiry of a grace period, missed payments of interests or principal are considered default events by Moody's and reported in the Default and Recovery Database. A missed payment also produces a credit event ("failure to pay") under CDS specifications and may therefore have an impact on our analysis. Once a failure to pay occurs, insured bondholders can claim from protection sellers the payment of the face amount of debt, net of the recovery value, upon delivery of the bonds. If all bondholders with a position in CDSs claim their payoffs, the protection sellers become the new bondholders who participate to the renegotiation talks. At this stage, in the absence of insured creditors with an incentive to file for Chapter 11, the firm becomes essentially comparable to a nonreference entity. One way to correct our sample to take this issue into account would be to remove, for reference entities, all debt workouts and bankruptcy filings that were preceded by a missed payment. However, since the percentage of such bankruptcies is higher than the corresponding percentage of the distressed exchanges (30% against 9%), this would bias the remaining sample of reference entity defaults toward debt workouts. Alternatively, one could remove all renegotiations preceded by missed payments for both reference entities and other firms, but the size of the residual sample would be too small. Hence, we decide not to apply any correction in this respect: This is unlikely to introduce biases in our study, as the percentages of debt workouts and bankruptcy filings anticipated by missed payments are not significantly different between reference entities and other companies.

2. TRADITIONAL DETERMINANTS OF DEBT RESTRUCTURING

In assessing whether distressed reference entities are more prone to bankruptcy than other firms, we need to control for a set of variables that former literature has

found to be significant determinants of the restructuring choice, that is, operating performance, leverage, and debt structure.[7]

Data on those variables at the fiscal year-end prior to default are collected manually from the 10-K filings available from the EDGAR database. Specifically, data on operating income and leverage are obtained from the consolidated financial statements, while the debt structure is detailed in the notes to the financial statements.

2.1. Financial and Economic Distress

Indicators of financial and economic distress have been included in most empirical analyses of the determinants of the restructuring method. However, while high indebtedness and poor performance are essential ingredients for pushing a company into distress, it is not clear whether and how they should play a role in determining the restructuring choice. We can expect highly leveraged companies with a large proportion of debt due in the short run to face time constraints in attempting to reorganize their debt out of court, which can lead to a higher chance of filing for bankruptcy. In addition, we can foresee this effect to be particularly strong during times of generalized liquidity shortage in the economy. The existing empirical findings on the link between restructuring choice and financial/economic variables are mixed (see Gilson, John, and Lang 1990, Asquith, Gertner, and Scharfstein 1994, Franks and Torous 1994, Chatterjee, Dhillon, and Ramírez 1996).

We measure firm leverage with the ratio of total debt to total assets, and operating performance with the ratio of EBITDA-to-total assets. To correct for industry-specific effects, we also compute industry-adjusted indicators of firm's leverage and EBITDA, by subtracting the industry median leverage and the industry median EBITDA-to-total assets from the raw measures. The industry medians are based on three-digit SIC codes provided that there are at least five firms in the industry, excluding the sample firm. When there are less than five companies at the three-digit SIC level, industry adjustments are made at the two-digit SIC level. The industry constituents, as well as their values of leverage and operating performance, are taken from Compustat. The ratio of debt due within a year (short-term debt) to total debt is adopted as a measure of a firm's immediate liquidity needs.

2.2. Debt Structure

The most relevant determinant of the choice between in- and out-of-court restructuring is the firm's debt structure, in the form of both debt seniority and debt composition.

Debt seniority. The priority structure of debt claims plays a crucial role in the debt restructuring process. Secured creditors are unlikely to become significantly impaired in bankruptcy, while they may be worse off in a distressed exchange when new issues

7. We have not included other variables, such as direct bankruptcy costs or market-based solvency measures, due to data unavailability for the firms in our sample.

with similar priority are offered to more junior creditors. As a result, they tend to express a preference for in-court reorganizations (Asquith, Gertner, and Scharfstein 1994, Chatterjee, Dhillon, and Ramírez 1996). On the contrary, senior unsecured and subordinated creditors may be more likely to agree to the debt exchange offer, given their nature of residual claimants in the bankruptcy process.

Based on the information provided in the financial footnotes on the debt structure, we classify each debt issue into one of three groups, following Rauh and Sufi (2010): (i) secured, if any firm's assets were pledged as collateral for the debt issue, (ii) senior unsecured, (iii) subordinated (which includes junior subordinated, subordinated, or senior subordinated). For each firm, we compute the percentages of total debt represented by secured, senior unsecured, and subordinated debt. We also record the total number of tiers in the debt structure as a proxy for the complexity of the priority structure of the company.

Debt composition. In the presence of a single lender, complete debt contracts and symmetric information, a distressed exchange is always more efficient than a costly bankruptcy. In a more realistic setting, severe information asymmetries between creditors and firm's managers may undermine attempts to renegotiate out of court (Mooradian 1994). In addition, when the firm's debt is held by a multitude of creditors, successful debt workouts may become more problematic due to both holdout problems and conflicts of interest (Gertner and Scharfstein 1991). In this respect, a strand of the existing literature (Gilson, John, and Lang 1990, Brunner and Krahnen 2008) argues that a large proportion of bank debt is beneficial in avoiding bankruptcy, given that banks are better informed than other creditors, and can coordinate their response more efficiently in case of financial distress.

This claim, however, is debatable for a number of reasons: (i) virtually all the bank debt of financially distressed firms is secured, hence banks have no incentive to make concessions in favor of an out-of-court restructuring; (ii) when bank loans are syndicated, coordination problems may arise among the participants to the syndicate; (iii) the distressed conditions of financial institutions can adversely affect bank-dependent borrowers in a financial crisis. Therefore, the direction in which debt composition affects the restructuring outcome remains unclear from an empirical standpoint.

We analyze the debt structure by looking at the composition of total debt between public debt and bank debt, which jointly represent, on average, 95% of the total debt of the companies in the sample. The 10-K financial notes are generally not very helpful in identifying public debt issues. For this purpose, we consider both the debt issues that were originally registered with the SEC, and those issued under Rule 144A and subsequently registered with the SEC.

Data on the securities registrations are available from the SEC's EDGAR database. We also record, for each company in the sample, the number of public issues outstanding at the time of default, as a further proxy of potential creditors' coordination problems.

As a final measure of the overall complexity of the debt structure, we include firm's size, computed as the natural logarithm of total assets. Large firms are likely to experience more severe creditors' coordination problems. However, very large companies can benefit from the *too big to fail* effect in times of crisis.

3. EMPIRICAL FINDINGS

3.1. Univariate Analysis

Table 2 contrasts mean and median values of size, leverage, operating performance, and debt structure for firms that restructure out of court against those that file for bankruptcy: Panel A reports the findings for the entire sample, while Panel B refers to reference entities only, and Panel C to nonreference entities only. The last two columns report the values of the *t* test for difference in means and the nonparametric Wilcoxon test for difference in medians. In discussing the findings, we mainly focus on the medians due to the skewed distribution of most variables.

Looking at Panel A of Table 2, we observe that companies that file for bankruptcy are more financially distressed and face more immediate liquidity needs than those that manage to restructure their debt out of court. The high proportion of short-term debt in bankrupt firms is largely explained by the covenant violations recorded on some companies' debt before default: Following a covenant violation, the debt often becomes due immediately and is then reported as short-term debt in the SEC filings.[8] Instead, no significant differences arise between the two groups in terms of operating performance.

In line with both our predictions and previous empirical findings, firms that renegotiate their debt under Chapter 11 are characterized by a higher proportion of secured debt to total debt (and a lower proportion of senior unsecured debt to total debt), than companies that complete a debt workout. More in general, we find that firms with a larger number of debt priority tiers have better chances to restructure their debt out of court.

In contrast with earlier research according to which banks are more likely to overcome lender coordination problems, we do not find the proportions of bank debt or public debt to differ significantly across firms that restructure in court or out of court. In fact, we observe that successful debt workouts seem more likely if the debt structure is diversified, as suggested by the higher number of public issues outstanding and the larger size of companies that restructure out of court in our sample. These findings are investigated more in depth in Appendix D, which provides a detailed analysis of the characteristics of bank debt of the firms in the sample.

8. To assess whether the covenant structure may be a significant determinant of debt restructuring, we compare the number of financial covenants on bank debt and on bond issues in companies that filed for bankruptcy and in those that restructured out of court. Information on the financial covenants imposed on bank debt and bond issues is obtained from Dealscan and Mergent *Fixed Income Securities Database* (FISD), respectively. We do not find significant differences, either in mean or in median, in the covenant structure of firms with a different restructuring outcome. Furthermore, we do not find the number of financial covenants to vary significantly between reference entities and other firms. The results are available from the authors upon request.

TABLE 2

DEBT WORKOUT VS. CHAPTER 11: UNIVARIATE ANALYSIS

	Out of court		Chapter 11 filings			
	Mean	Median	Mean	Median	*t* Test	Wilcoxon
Panel A: Overall sample						
Size	7.33	6.94	6.76	6.51	2.57**	2.53**
Leverage	0.75	0.70	0.99	0.81	−3.33***	−2.51**
Leverage—industry adjusted	0.43	0.40	0.68	0.52	−3.52***	−2.97***
Operating income	0.07	0.09	0.11	0.09	−1.74*	−0.80
Operating income—industry adjusted	−0.00	−0.02	0.02	0.00	−1.14	−0.52
Short-term debt/Total debt	0.09	0.02	0.44	0.15	−6.72***	−4.74***
Bank debt/Total debt	0.38	0.39	0.42	0.40	−1.00	−0.83
Public debt/Total debt	0.59	0.57	0.53	0.57	1.27	0.95
Secured debt/Total debt	0.48	0.51	0.61	0.60	−2.67***	−2.66***
Senior unsecured debt/Total debt	0.38	0.40	0.23	0.11	2.76***	2.82***
Subordinated debt/Total debt	0.14	0.03	0.16	0.00	−0.52	0.22
Number of tiers	2.88	3.00	2.45	2.00	2.70***	2.58**
Number public issues outstanding	4.23	2.00	2.66	2.00	1.59	2.48**
No. observations	*65*	*65*	*98*	*98*		
Panel B: CDS reference entities						
Size	8.50	8.25	7.57	7.50	2.75***	2.85***
Leverage	0.77	0.72	1.01	0.79	−1.72*	−1.68*
Leverage—industry adjusted	0.45	0.40	0.68	0.48	−1.69*	−1.66*
Operating income	0.05	0.07	0.10	0.09	−1.44	−1.01
Operating income—industry adjusted	−0.02	−0.02	0.02	0.00	−1.32	−0.98
Short-term debt/Total debt	0.08	0.02	0.37	0.11	−4.11***	−2.63***
Bank debt/Total debt	0.38	0.39	0.42	0.48	−0.62	−0.95
Public debt/Total debt	0.58	0.60	0.54	0.48	0.70	0.95
Secured debt/Total debt	0.47	0.48	0.52	0.56	−1.76*	−1.68*
Senior unsecured debt/Total debt	0.44	0.44	0.34	0.31	1.38	1.62
Subordinated debt/Total debt	0.09	0.03	0.14	0.01	−1.33	0.41
Number of tiers	3.26	3.00	2.86	3.00	1.43	1.53
Number public issues outstanding	7.78	5.00	4.55	3.00	1.51	2.65**
No. observations	*27*	*27*	*42*	*42*		
Panel C: Nonreference entities						
Size	6.50	6.44	6.14	6.06	2.06**	1.97**
Leverage	0.73	0.68	0.97	0.86	−3.27***	−2.63***
Leverage—industry adjusted	0.42	0.40	0.68	0.60	−3.63***	−3.04***
Operating income	0.09	0.10	0.11	0.09	−1.01	−0.31
Operating income—industry adjusted	0.01	0.00	0.02	0.00	−0.42	0.15
Short-term debt/Total debt	0.09	0.01	0.49	0.18	−5.35***	−4.03***
Bank debt/Total debt	0.38	0.40	0.42	0.33	−0.77	0.30
Public debt/Total debt	0.59	0.55	0.53	0.63	1.04	−0.43
Secured debt/Total debt	0.50	0.53	0.67	0.67	−2.72***	−2.68***
Senior unsecured debt/Total debt	0.33	0.18	0.15	0.00	2.55**	2.62***
Subordinated debt/Total debt	0.18	0.04	0.18	0.00	0.05	0.35
Number of tiers	2.61	3.00	2.14	2.00	2.84***	2.72***
Number public issues outstanding	1.71	1.00	1.25	1.00	2.18**	1.99**
No. observations	*38*	*38*	*56*	*56*		

NOTES: This table presents average and median values of firm characteristics for companies that restructured out of court or filed for Chapter 11. The last two columns report the *t* test for difference in means and the Wilcoxon test for difference in medians. Panel A reports findings for all companies in the sample, Panel B only includes CDS reference entities, and Panel C only includes nonreference entities. *Size* is the log of total assets. *Leverage* is computed as the ratio of total debt to total assets, and *Operating income* as the ratio of EBITDA-to-total assets. Industry-adjusted measures are computed by subtracting the industry median (based on three-digit SIC codes) leverage and EBITDA-to-total assets from the raw measures. *Short-term debt* is debt due within 1 year. *Public debt* includes both debt issues originally registered with the SEC and Rule 144A issues later registered. Data on firm characteristics are obtained from the 10-K filings at year-end before default. Information on which defaulted companies are CDS reference entities is provided by MarkIt. *, **, and *** indicate statistical significance at the 10%, 5%, and 1% levels, respectively.

In Panels B and C of Table 2, we replicate the comparison between restructuring methods for both CDS reference entities and nonreference entities. The purpose is to highlight differences in the two groups that could help to shed some light onto any peculiarities that may characterize the restructuring choice of reference entities. The underlying intuition is the following: If we observed significant differences in the degree of economic/financial distress, or in the debt structure, between firms that complete a distressed exchange and firms that file for Chapter 11 within nonreference entities, but no significant differences within reference entities, then additional factors not included in our analysis would be responsible for the restructuring choice of the latter, and the presence of empty creditors may be one of those. If the proportion of insured creditors in CDS reference entities was sufficiently high to influence the debt renegotiation, we would not expect such choice to depend significantly on the company's fundamentals, as bankruptcy would be primarily the (inefficient) result of the presence of empty creditors.[9] Furthermore, we would not expect the debt priority structure to be a significant determinant of the restructuring method, as a substantial portion of unsecured creditors would behave like secured debtholders, finding it convenient to force the company into Chapter 11.

Our findings suggest that most of the significant determinants of the restructuring choice are common to both reference entities and nonreference entities. In both cases, companies that file for bankruptcy are more financially distressed than those that renegotiate out of court, are smaller, have more immediate liquidity needs in order to repay short-term debt, a higher proportion of secured debt, and a less diversified debt structure. All in all, the traditional determinants of debt restructuring remain significant also for CDS reference entities, and we do not find evidence suggesting that the presence of empty creditors may be an important omitted variable in this respect.

In order to legitimate, from a methodological perspective, both the comparative study presented in Panels B and C, and the probit analysis that follows, we contrast in Table 3 the mean and median characteristics of CDS reference entities and nonreference entities at year-end prior to default.

Although all the companies in our sample are rated and, therefore, fairly similar in terms of size and debt structure, we find reference entities to be significantly larger than other firms, as CDSs are typically available on large companies with widely traded bond issues, for the purpose of hedging or trading positions in those securities. Reference entities also have a larger proportion of senior unsecured debt, given that it is the standard class of reference obligations underlying CDS contracts. Moreover, we record a significantly higher number of debt tiers and of public issues outstanding for reference entities compared to other firms. The overall proportions of bank debt and public debt are not significantly different between the two groups, and reference

9. It is worth reminding that when bankruptcy represents the efficient restructuring outcome (e.g., when justified by poor economic fundamentals, or low bankruptcy costs), the presence of insured creditors becomes irrelevant and no empty creditor issue arises.

TABLE 3

CDS Reference Entities vs. Nonreference Entities: Univariate Analysis

	CDS reference entities		Nonreference entities			
	Mean	Median	Mean	Median	*t* Test	Wilcoxon
Size	7.94	7.97	6.29	6.22	8.59***	7.44***
Leverage	0.92	0.76	0.87	0.78	0.46	−0.51
Leverage—industry adjusted	0.59	0.41	0.57	0.50	0.20	−0.98
Operating income	0.08	0.09	0.10	0.09	−0.74	−0.86
Operating income—industry adjusted	0.00	−0.01	0.02	0.00	−0.74	−0.99
Short-term debt/Total debt	0.26	0.04	0.33	0.05	−1.10	−0.50
Bank debt/Total debt	0.41	0.41	0.40	0.35	0.07	0.52
Public debt/Total debt	0.55	0.54	0.55	0.58	0.02	−0.47
Secured debt/Total debt	0.50	0.54	0.60	0.61	−2.27**	−2.13**
Senior unsecured debt/Total debt	0.38	0.37	0.22	0.04	3.29***	4.22***
Subordinated debt/Total debt	0.12	0.03	0.18	0.00	−1.86*	0.28
Number of tiers	3.01	3.00	2.33	2.00	4.59***	4.49***
Number public issues outstanding	5.81	3.00	1.44	1.00	4.54***	6.84***
No. observations	*69*	*69*	*94*	*94*		
Recovery prices						
Overall	0.37	0.32	0.44	0.42	−2.26**	−2.31**
Out of court	0.45	0.40	0.53	0.55	−1.83*	−1.73*
Chapter 11 filings	0.32	0.15	0.39	0.39	−1.95*	−2.18**
No. observations (Overall)	*342*	*342*	*123*	*123*		

Notes: This table presents average and median values of firm characteristics and recovery prices for CDS reference entities and nonreference entities included in our sample of defaulted firms. The last two columns report the values of the *t* test for difference in means and the Wilcoxon test for difference in medians. For a description of the variables, see Table 2. Data on firm characteristics are obtained from the 10-K filings at year-end before default. Recovery prices are from the Moody's *Default and Recovery Database*. The identification of CDS reference entities is based on information provided by MarkIt. *, **, and *** indicate statistical significance at the 10%, 5%, and 1% levels, respectively.

entities do not seem to be significantly more leveraged or economically distressed than nonreference entities.

In Table 3, we also provide some preliminary statistics on the recovery values of the debt securities in default for reference entities and other firms to gain some insights on whether CDSs may have an impact on creditors' recoveries. We present mean and median recovery prices for all default events and separately for out-of-court renegotiations and Chapter 11 filings. At first sight our results suggest that, in all instances, creditors of nonreference entities seem to be able to extract more than insured creditors, which is in contrast with the predictions of the empty creditors theory. However, as discussed, nonreference entities on average rely on a larger proportion of secured debt which, by nature, enjoys higher recovery values in default. A multivariate framework is then necessary to uncover the effect of the presence of CDSs on the recovery values that debtholders are able to extract.

3.2. Distressed Exchange versus Bankruptcy: Probit Analysis

To assess whether CDS reference entities experience a higher probability of filing for bankruptcy, we estimate a simple probit model where the dependent variable

TABLE 4

DEBT WORKOUT VS. CHAPTER 11: PROBIT ANALYSIS

Independent variables	Entire sample	Entire sample	CDS reference entities (a)	Non reference entitites (b)	Coefficient equality in (a) and (b)
Size		−0.054	−0.186	0.202	2.04
		(0.12)	(0.15)	(0.22)	(0.15)
Leverage—industry adjusted		0.834**	0.679*	1.527***	2.07
		(0.34)	(0.40)	(0.53)	(0.15)
Secured debt/Total debt		0.717*	0.526	0.774	0.09
		(0.39)	(0.65)	(0.49)	(0.76)
Short-term debt/Total debt		1.771***	1.915**	1.765***	0.04
		(0.37)	(0.60)	(0.46)	(0.84)
Number of tiers		−0.310**	−0.103	−0.528***	2.66
		(0.14)	(0.18)	(0.19)	(0.11)
Taxation dummy		−0.548**	−0.306	−0.777**	0.73
		(0.27)	(0.40)	(0.39)	(0.39)
CDS reference entity dummy	0.034	0.479			
	(0.20)	(0.32)			
Constant	0.242*	0.425	1.519	−0.888	1.54
	(0.13)	(0.82)	(1.17)	(1.55)	(0.21)
No. observations	163	163	69	94	
Pseudo R^2	1.00E-04	0.270	0.211	0.350	
Chow test of coeff. equality in (a) and (b)—chi-square (7)				5.254	
p Value				0.512	
% correct predicted probabilities of Chapter 11 filings for nonreference entities (in-sample)				83%	
% correct predicted probabilities of out-of-court restructurings for nonreference entities (in-sample)				72%	
% correct predicted probabilities of Chapter 11 filings for reference entities (out-of-sample)				78%	
% correct predicted probabilities of out of court restructurings for reference entities (out-of-sample)				66%	

NOTES: This table presents estimates of probit models, where the dependent variable equals 1 if the company files for Chapter 11 and equals 0 if the company restructures out of court. For a description of the variables, see Table 2. *Taxation* dummy equals 1 for default events occurring in February 2009–December 2010, following the introduction of the Recovery Act. *CDS Reference Entity* dummy equals 1 if the firm is a reference entity, according to MarkIt. Robust standard errors are reported in brackets. The last column reports values of chi-square test of individual coefficient equality between regressions (a) and (b), with *p* values in brackets. *, **, and *** indicate statistical significance at the 10%, 5%, and 1% levels, respectively.

equals zero if the company restructures out of court and equals one if it renegotiates under Chapter 11. A dummy variable indicates whether the firm is a reference entity. In a first specification, we regress the dependent variable only on the CDS dummy. The estimates (Table 4, column 1) confirm that the presence of CDSs *per se* does not significantly affect the final debt restructuring choice.

In a second specification, we include a number of variables to control for the effects of leverage and debt structure on the restructuring method. Specifically, we

include the size of the firm, the industry-adjusted leverage, the ratio of secured debt to total debt, the proportion of debt due within a year, and the number of tiers in the debt structure. We also add a taxation dummy that equals one for default events over the period February 2009–December 2010, and zero otherwise, to control for the presence of tax incentives for distressed exchanges. Given the small sample size, we limit the controls to a restricted set of variables that turned out to be significant at the univariate level and are not too collinear.

The results from the probit regression are reported in Table 4, column 2. In line with the findings from the univariate analysis, we observe that the probability of restructuring in court is higher for firms with higher leverage, more severe short-term financing needs, a larger fraction of secured debt, and a lower number of debt tiers. As expected, out-of-court renegotiations become more likely when the tax relief for distressed exchanges is in place. Again, we do not observe a significantly higher likelihood of filing for bankruptcy in reference entities.[10]

To assess whether the determinants of debt restructuring are the same for both CDS reference entities and nonreference entities, we reestimate the probit model on the two subsamples (Table 4, columns 3–4). Leverage and short-term funding needs are significant bankruptcy determinants in both groups, while the number of debt tiers and the taxation dummy remain statistically significant only for nonreference entities. However, the hypothesis that the coefficients of the two regressions are not significantly different at the 5% level cannot be rejected either at a pairwise level (Table 4, column 5), or at a joint level according to a likelihood-ratio Chow test.[11]

Based on the model estimates for the subsample of nonreference entities in column 4, we derive predicted probabilities of distressed exchange and bankruptcy, both in-sample for nonreference entities, and out-of-sample for CDS reference entities. If the latter were more prone to bankruptcy due to the pressure of empty creditors, we would expect to observe larger errors in predicting debt workouts for those firms. Specifically, a company would be forced into bankruptcy even though the financial and economic fundamentals were sound enough to yield a forecast of distressed exchange. Our findings (Table 4, column 4) do not support this claim. In CDS reference entities, the percentage of correct predictions of debt workouts (i.e., the ratio between correctly predicted distressed exchanges and total number of predicted distressed exchanges) is lower than the percentage of correct predictions of Chapter 11 filings (66% against 78%). However, this also occurs in-sample for nonreference entities, and the ratios of the percentage of correctly predicted workouts to the percentage of correctly predicted

10. The average marginal effects of each variable on the probability of filing from bankruptcy confirm that the presence of CDSs on the firm's debt plays a less significant role, also from an economic perspective, than the other variables. In detail, we report average marginal effects equal to −15, 20, 23, and 49 percentage points for the tax relief dummy, the proportion of secured debt, the leverage ratio, and the proportion of short-term debt, respectively, while being a reference entity increases the probability of bankruptcy by 11 percentage points (from 54% to 65%).

11. The comparison of probit coefficients across groups is biased if there are significant differences in the degree of residual variation. The estimates from a heteroskedastic probit model reveal that, in our sample, the residual variance of the nonreference entities group is only 20% lower than the residual variance of reference entities, and the two are not significantly different.

bankruptcies are essentially the same for both reference entities and nonreference entities. A number of recent default events have gained considerable attention from the press, to quickly become anecdotal evidence in favor of the empty creditor theory. Some of those defaults are included in our sample, specifically the bankruptcies of Lear Corp., LyondellBasell Industries, General Motors, R.H. Donnelley, and Six Flags Inc. From the estimates of the probit model, we derive predicted probabilities of filing for Chapter 11 for these companies. In all cases but one (R.H. Donnelley), we find bankruptcy probabilities larger than the standard threshold of 50% which suggests that, even in those cases, the restructuring choice was actually in line with the prediction based on firms' fundamentals.

3.3. Alternative Proxies for the Presence of Insured Creditors

A key concern in our analysis is the correct identification of companies that may be affected by empty creditors. In line with related literature (Peristiani and Savino 2011, Danis 2012, Saretto and Tookes 2013, Subrahmanyam, Tang, and Wang 2014), we use the CDS dummy as a first proxy for the presence of insured creditors under the assumption that, when CDSs are traded on a company's debt, at least some CDS investors are also debtholders. This assumption is indeed realistic: Major institutional investors of corporate bonds such as banks and insurance companies regularly report that credit risk hedging accounts for a significant portion of their activities in CDSs (see the *Quarterly Report on Bank Derivatives Activities* and the *Capital Markets Special Report on the Insurance Industry Derivatives Exposure*—various issues). In addition, Danis (2012) and Adam and Guettler (2011) provide evidence that fixed income mutual funds routinely purchase protection through CDSs to hedge the credit risk associated with the underlying bond portfolios.

While the use of the CDS dummy seems appropriate to identify companies that have *some* insured creditors, the question remains as to whether the number of the insured creditors as well as the level of the credit insurance purchased are *sufficient* to materially affect the firm's restructuring choice in case of distress. In an attempt to better single out companies where empty creditors may play a significant role, we suggest four additional proxies.

The empty creditors theory of Bolton and Oehmke (2011) predicts that inefficient overinsurance by creditors is more likely to emerge when there is a high probability of an ample renegotiation surplus upon default and when the firm raises debt from multiple creditors. We proxy for the probability of a large renegotiation surplus (relative to the company's liquidation value) with asset intangibility, computed as one minus the ratio of net property, plant, and equipment to total assets: All else equal, the renegotiation value of distressed firms is expected to be positively related to asset intangibility, given that intangible assets would be more heavily discounted in liquidation (Davydenko and Strebulaev 2007). Following Gilson, John, and Lang (1990), we proxy for the presence of multiple creditors with an indicator of dispersion of bondholders, computed as the logarithm of the number of outstanding bond issues divided by the logarithm of the book value of a firm's total debt.

As a further proxy for the likelihood that insured creditors affect the restructuring process, we use the proportion of senior unsecured debt over total debt: If most of the company's debt is secured, unsecured creditors (irrespective of whether they are insured or not) will have very little bargaining power in the debt restructuring. We classify the companies in our sample into terciles according to their values of asset intangibility, proportion of senior unsecured debt, and bond dispersion, and we construct three proxies for the presence of empty creditors based on whether a firm has CDSs traded on its debt and is in the top tercile for asset intangibility, senior unsecured debt, or bond dispersion.[12]

We derive a fourth proxy for the existence of empty creditors based on CDS liquidity, by creating a CDS liquidity dummy which equals one if the CDS of the firm is part of the CDX.NA.HY index in the year before default, and zero otherwise. The CDX.NA.HY index constituents are the 100 most liquid single-name CDSs on North American subinvestment grade companies, hence our approach should be accurate in capturing CDS liquidity. We expect the volumes of credit insurance to be particularly significant in firms with liquid CDSs as liquidity enables debtholders to easily create and unwind insured positions. A potential objection to our argument is that the activity in liquid CDSs may mostly reflect offsetting naked positions held by market dealers, rather than credit portfolio hedges. To address this critique, we compute the ratio of CDS net notional amounts outstanding to total debt for all North American high-yield reference entities included in the DTCC list at December 2008. We then compare average and median values of this ratio for the reference entities whose CDSs were also included in the CDX.NA.HY index at that date, and for the ones not included in the index. Given the lack of data on naked and covered CDS positions, the net notional amounts outstanding provided by the *DTCC Warehouse CDS Data* represent the best available proxy for covered CDS volumes.[13] We find the average and median ratio of CDS net notional amounts to total debt for firms in the index to be significantly larger at the 5% level (mean: 0.44 against 0.30, median: 0.20 against 0.14) than that for high-yield firms not included in the index. We interpret this as evidence that CDS liquidity is likely to be positively associated with the presence of insured creditors.[14]

We reestimate the probit model for the probability of in-court versus out-of-court restructuring by augmenting the baseline specification based on the CDS dummy with our four empty creditor measures. The results are reported in Table 5. The coefficients

12. CDS reference entities account for 36%, 46%, and 70% of the companies in the top tercile for asset intangibility, proportion of senior unsecured debt, and bond dispersion, respectively.

13. Unlike gross notional amounts which include offsetting intradealer trades, net amounts accurately capture the stock of credit risk transferred in the CDS market. Oehmke and Zawadowski (2012) document that firms with larger net notional CDSs are those with more insurable credits outstanding and a more negative CDS-bond basis, which suggests a higher likelihood of emergence of empty creditors (Yavorsky et al. 2009). We are unable to use the net amounts outstanding as a direct proxy for empty creditors, given that they are available only for 19 reference entities in our sample.

14. In addition, the proxy for CDS liquidity relates to our measure of multiple creditors (88% of reference entities with liquid CDSs are in the top tercile for bond dispersion) and, to a lesser extent, to the proportion of senior unsecured debt (64% of reference entities with liquid CDSs are in the top tercile for senior unsecured debt ratio).

TABLE 5

ADDITIONAL PROXIES FOR THE PRESENCE OF EMPTY CREDITORS

Independent variables	Top intangible assets	Top sen. unsec. debt	Top bond dispersion	CDS liquidity
Size	−0.046	−0.052	−0.039	−0.085
	(0.13)	(0.13)	(0.13)	(0.14)
Leverage—industry adjusted	0.883**	0.837**	0.850**	0.806**
	(0.35)	(0.34)	(0.35)	(0.34)
Secured debt/Total debt	0.656*	0.955	0.646	0.757*
	(0.40)	(0.63)	(0.40)	(0.39)
Short-term debt/Total debt	1.747***	1.788***	1.779***	1.763***
	(0.37)	(0.37)	(0.38)	(0.37)
Number of tiers	−0.323**	−0.304**	−0.283**	−0.306**
	(0.13)	(0.14)	(0.14)	(0.14)
Taxation dummy	−0.521*	−0.562**	−0.555**	−0.540**
	(0.27)	(0.27)	(0.27)	(0.27)
CDS reference entity dummy (*a*)	0.246	0.558	0.457	0.477
	(0.36)	(0.36)	(0.38)	(0.32)
Top intangible	−0.487			
	(0.32)			
CDS * Top intangible (*b*)	0.518			
	(0.51)			
Top senior unsecured debt		0.267		
		(0.45)		
CDS * Top senior unsecured debt (*b*)		−0.212		
		(0.48)		
Top bond dispersion			−0.358	
			(0.39)	
CDS * Top bond dispersion (*b*)			0.245	
			(0.54)	
CDS liquidity dummy (*b*)				0.153
				(0.43)
Constant	0.619	0.185	0.354	0.599
	(0.84)	(0.88)	(0.87)	(0.94)
No. observations	163	163	163	163
Pseudo R^2	0.281	0.272	0.273	0.271
Chi-square test: $(a) + (b) = 0$	2.63	0.56	2.33	1.62
p Value	(0.11)	(0.46)	(0.13)	(0.20)

NOTES: This table presents estimates of probit models, where the dependent variable equals 1 if the company files for Chapter 11 and equals 0 if the company restructures out of court. We proxy firms that are more likely to be affected by empty creditors with the following measures: (i) availability of CDSs and intangible assets ratio in top tercile; (ii) availability of CDSs and senior unsecured debt ratio in top tercile; (ii) availability of CDSs and bond dispersion in top tercile; (4) CDS liquidity, that is, the firm CDS was part of the CDX North America High Yield index in the year prior to default. *Taxation* dummy equals 1 for default events occurring in February 2009–December 2010, following the introduction of the Recovery Act. *CDS Reference Entity* dummy equals 1 if the firm is a reference entity, according to MarkIt. For a description of the other variables, see Table 2. Robust standard errors are reported in brackets. *, **, and *** indicate statistical significance at the 10%, 5%, and 1% levels, respectively.

of the empty creditor proxies (*CDS * Top intangible*, *CDS * Top senior unsecured debt*, *CDS * Top bond dispersion*, *CDS liquidity dummy*) capture the effect on the probability of bankruptcy of firms more likely to be affected by insured creditors compared to other reference entities. The sum of the CDS dummy coefficient and the coefficients of the empty creditor proxies capture instead the impact on the probability of bankruptcy of firms more likely to be affected by insured creditors compared to firms without CDSs traded on their debt. Neither the individual proxy coefficients nor the sums of the CDS dummy and the proxy coefficients are statistically significant,

which suggests that the debt restructuring outcome in our sample does not differ significantly across the three subsets of firms.

3.4. Evidence from Recovery Rates

Another avenue for the empty creditor issue to manifest itself is through the recovery rates of the debt securities in default. Even though the presence of insured debtholders does not seem to affect the restructuring outcome, it may still translate into higher recovery rates for reference entities than for other companies. This may occur in both: (i) distressed exchanges, given the better conditions that tendering debtholders might be able to negotiate to grant their participation to the restructuring; (ii) bankruptcy, if the pressure of empty creditors forces bankruptcy to occur prematurely, when the asset value is still sufficient to ensure satisfactory recoveries.

In order to test whether the presence of CDSs has an impact on recovery rates, we run two sets of OLS regressions to explain recoveries following distressed exchanges and Chapter 11 filings.

Our measure of recovery rate is the price of the defaulted security recorded 30 days after default. In addition to the CDS dummy and the empty creditor proxies described above, we include some control variables that the existing literature (see, e.g., Acharya, Bharath, and Srinivasan 2007) has found to be significant determinants of recovery rates. We expect the seniority of the security in default to be positively associated with recovery rates. To account for seniority, we define a variable that equals zero for secured debt, one for senior unsecured and two for subordinated. All else equal, the size of the issue in default can also have a positive impact on recoveries, given the higher bargaining power of debtholders of large issues. We include the ratio of EBITDA-to-total assets as an indicator of the operating profitability of the firm, which may have a positive effect on recovery rates, through an increase in the overall firm's value. We control for leverage, measured as the ratio of total debt to total assets, since debt restructuring may be harder to achieve in highly leveraged firms, and recoveries may be lower. Firm's size can have a negative impact on the amount recovered due to coordination problems that may arise among creditors. Asset tangibility, measured as the ratio of net property, plant and equipment to total assets, is instead expected to increase recovery rates. Finally, we include the median industry Tobin's Q to account for the potential effect of growth prospects of firm's assets on the recovery value. The median industry Q is computed as median of the ratio of market value of the firm (estimated as book value of total assets $-$ book value of total equity $+$ market value of equity) to the book value of the firm, and is taken over all firms (excluding the one in default) in the same three-digit SIC code. Industry dummies, defined according to the first-digit SIC code, are also added to capture any residual industry-related effects. Information on recovery rates, seniority, size, and number of the securities in default is taken from the Moody's *Default and Recovery Database*. Firm-specific variables are obtained from the 10-K filings, while industry characteristics are taken from Compustat.

TABLE 6

DETERMINANTS OF RECOVERY PRICES: OUT-OF-COURT RESTRUCTURING

Independent variables	Baseline	Top intangible assets	Top sen. unsec. debt	Top bond dispersion	CDS liquidity
Log (Issue size)	0.006	0.008	0.010	0.013	−0.005
	(0.01)	(0.01)	(0.01)	(0.01)	(0.01)
Seniority class	−0.086*	−0.079*	−0.080*	−0.082*	−0.099**
	(0.04)	(0.04)	(0.04)	(0.04)	(0.05)
Size	−0.031	−0.040*	−0.047***	−0.060***	−0.090***
	(0.02)	(0.02)	(0.02)	(0.02)	(0.02)
Leverage	−0.252***	−0.307***	−0.209**	−0.290***	−0.385***
	(0.09)	(0.11)	(0.09)	(0.09)	(0.10)
Operating income	−0.036	−0.044	−0.165	0.135	0.403
	(0.32)	(0.29)	(0.29)	(0.31)	(0.32)
Asset tangibility	0.075		0.218	0.046	0.036
	(0.18)		(0.17)	(0.17)	(0.15)
Median industry Q	0.240**	0.234**	0.177	0.248**	0.146
	(0.12)	(0.12)	(0.12)	(0.11)	(0.11)
Taxation dummy	0.099	0.102	0.137**	0.123*	0.087
	(0.07)	(0.06)	(0.07)	(0.07)	(0.07)
CDS reference entity dummy (a)	0.020	0.115	−0.101	−0.129	−0.014
	(0.09)	(0.13)	(0.10)	(0.08)	(0.07)
Top intangible		0.077			
		(0.10)			
CDS * Top intangible (b)		−0.173			
		(0.16)			
Top senior unsecured debt			−0.090		
			(0.09)		
CDS * Top senior unsecured debt (b)			0.264**		
			(0.10)		
Top bond dispersion				0.045	
				(0.11)	
CDS * Top bond dispersion (b)				0.251*	
				(0.13)	
CDS liquidity dummy (b)					0.351***
					(0.09)
Constant	0.490	0.568*	0.591*	0.633*	1.177***
	(0.32)	(0.33)	(0.32)	(0.32)	(0.35)
Industry dummies	Yes	Yes	Yes	Yes	Yes
No. observations	189	189	189	189	189
Adj. R^2	0.232	0.240	0.294	0.308	0.313
Chi-square test: $(a) + (b) = 0$		0.25	3.34	2.89	9.28
p Value		(0.62)	(0.07)	(0.09)	(0.00)

NOTES: This table presents OLS estimates of determinants of recovery prices for out-of-court debt workouts according to a baseline model and four additional specifications with refined proxies for the existence of empty creditors. *Seniority class* equals 0 if the issue in default is secured, 1 if it is senior unsecured, 2 if it is subordinated. *Median industry Q* is the median of the ratio of market value of the firm to book value, for all firms in the three-digit SIC code of the defaulted firm. For a description of the other variables, see Tables 2 and 5. All regressions include industry dummies. Standard errors (in brackets) are clustered at firm level. *, **, and *** indicate statistical significance at the 10%, 5%, and 1% levels, respectively.

We estimate the model separately for distressed exchanges and bankruptcy filings and report the results in Tables 6 and 7, respectively. Column 1 presents estimates of the baseline model, where the presence of insured creditors is proxied by the existence of CDSs. Columns 2–5 present estimates of the richer specifications that include more refined empty creditor proxies. The findings in Table 6, column 1, suggest that recovery prices associated with out-of-court restructuring are not significantly

TABLE 7

DETERMINANTS OF RECOVERY PRICES: CHAPTER 11 FILINGS

Independent variables	Baseline	Top intangible assets	Top sen. unsec. debt	Top bond dispersion	CDS liquidity
Log (Issue size)	0.004	0.005	0.003	0.003	0.004
	(0.01)	(0.01)	(0.01)	(0.01)	(0.01)
Seniority class	−0.270***	−0.267***	−0.280***	−0.266***	−0.271***
	(0.03)	(0.03)	(0.03)	(0.03)	(0.03)
Size	−0.046***	−0.046***	−0.050***	−0.032	−0.024
	(0.02)	(0.02)	(0.02)	(0.02)	(0.02)
Leverage	−0.061**	−0.049*	−0.061**	−0.064**	−0.051
	(0.03)	(0.03)	(0.03)	(0.03)	(0.03)
Operating income	0.202	0.189	0.198	0.204	0.245
	(0.16)	(0.15)	(0.16)	(0.18)	(0.16)
Asset tangibility	0.022		0.000	0.040	0.034
	(0.10)		(0.10)	(0.10)	(0.10)
Median industry Q	−0.097	−0.102*	−0.087	−0.104	−0.114*
	(0.06)	(0.06)	(0.06)	(0.06)	(0.06)
Taxation dummy	−0.023	−0.021	−0.030	−0.014	−0.019
	(0.05)	(0.05)	(0.05)	(0.05)	(0.05)
CDS reference entity dummy (a)	0.068	0.084	0.088	0.084	0.067
	(0.06)	(0.08)	(0.07)	(0.06)	(0.06)
Top intangible		−0.019			
		(0.06)			
CDS * Top intangible (b)		−0.049			
		(0.09)			
Top senior unsecured debt			0.098		
			(0.08)		
CDS * Top senior unsecured debt (b)			−0.060		
			(0.10)		
Top bond dispersion				−0.135**	
				(0.06)	
CDS * Top bond dispersion (b)				0.051	
				(0.08)	
CDS liquidity dummy (b)					−0.094
					(0.07)
Constant	1.034***	1.048***	1.065***	1.030***	0.897***
	(0.17)	(0.17)	(0.17)	(0.18)	(0.21)
Industry dummies	Yes	Yes	Yes	Yes	Yes
No. observations	276	276	276	276	276
Adj. R^2	0.438	0.441	0.440	0.444	0.441
Chi-square test: $(a) + (b) = 0$		0.18	0.11	1.14	0.10
p Value		(0.68)	(0.75)	(0.29)	(0.75)

NOTES: This table presents OLS estimates of determinants of recovery prices for Chapter 11 filings according to a baseline model and four additional specifications with refined proxies for the existence of empty creditors. *Seniority class* equals 0 if the issue in default is secured, 1 if it is senior unsecured, 2 if it is subordinated. *Median industry Q* is the median of the ratio of market value of the firm to book value, for all firms in the three-digit SIC code of the defaulted firm. For a description of the other variables, see Tables 2 and 5. All regressions include industry dummies. Standard errors (in brackets) are clustered at firm level. *, **, and *** indicate statistical significance at the 10%, 5%, and 1% levels, respectively.

different between CDS reference entities and other firms. However, when we use more sophisticated proxies for the existence of insured creditors (*CDS * Top senior unsecured debt*, *CDS * Top bond dispersion*, or *CDS liquidity dummy*) we find that firms more likely to be affected by empty creditors report significantly higher recovery prices in out-of-court renegotiations than other reference entities and, more in general,

than companies without CDSs traded on their debt.[15] No significant differences arise for the recovery prices of Chapter 11 filings irrespective of the empty creditor proxy used.

Taken together, our results suggest a number of interesting observations. First, we find evidence of the presence of insured creditors and of their impact on the debt restructuring process. Second, contrary to the predictions formulated by Hu and Black (2008a, 2008b), we argue that empty creditors (at least on average) do not seem to distort the final restructuring outcome toward a higher incidence of bankruptcy. Instead, as a result of their increased bargaining power, they are generally able to extract more in debt renegotiations. In this respect, our evidence is consistent with the theoretical predictions of Bolton and Oehmke (2011) who maintain that the presence of CDSs does not inevitably lead to an inefficient restructuring output. Third, we document higher recovery values for firms potentially affected by empty creditors only when we proxy for the presence of insured creditors by means of more refined measures, while we do not find any significant difference when using a simple indicator variable for the presence of CDSs on a firm's debt. This justifies the adoption of more sophisticated measures which are likely to better capture the existence of empty creditors.

Our findings can be also reconciled with recent evidence on the role of empty creditors in distressed exchange offers. Danis (2012) documents a lower participation rate to distressed exchange offers in CDS reference entities, which he ascribes to the presence of insured creditors. Such evidence is consistent with our results as long as the lower participation rate does not lead to a higher incidence of bankruptcy filings in CDS firms. This is plausible for at least two reasons. First, as reported by Danis (2012), distressed exchange offers in reference entities are often unconditional, while the corresponding offers in nonreference entities have tighter participation thresholds: The lower participation rate in CDS firms can then simply reflect the classic holdout problem, rather than the presence of empty creditors. Second, our evidence on the recovery prices of distressed exchanges suggests that firms can successfully respond to the resistance of empty creditors in distressed exchange offers by restructuring their debt strategically, thus avoiding bankruptcy (see also Narayanan and Uzmanoglu 2012).[16]

4. FURTHER EVIDENCE AND ROBUSTNESS CHECKS

In this section, we provide some robustness checks to our findings regarding the lack of impact of insured creditors on the debt restructuring outcome.

15. One may argue that our proxies for senior unsecured debt, bond dispersion, and CDS liquidity might mask a nonlinear firm size effect. We control for this by replicating all specifications that include these proxies with the addition of a size-squared term. The results are reported in Appendix B.

16. A third possibility is that lower participation rates in CDS firms can lead to bankruptcy filings *after* the end of our sample period. The analysis carried out in Section 1 rules out this explanation.

4.1. Sample Matching

A potential concern with our analysis is the presence of omitted variables: If reference entities differ from nonreference entities in ways which are systematically related to the restructuring choice, then the estimates of coefficients and standard errors from the probit model in Tables 4 and 5 may be biased. To address this issue, we propose a matching exercise. The aim is to identify a set of companies without CDSs traded on their debt that share similar characteristics with the reference entities in our sample. This will help isolate differences in the restructuring choice that can be more closely linked to mechanisms associated with the existence of CDS contracts, such as the presence of empty creditors.

We employ the bias-corrected Abadie and Imbens (2011) matching estimator that minimizes the distance between a vector of observed covariates across treated and nontreated firms, and returns a set of control firms based on the matches with the smallest distance. The set of covariates must include both characteristics which are directly associated with the likelihood of having insured creditors and more general indicators of financial distress, to ensure that treated and control firms are as close as possible in terms of determinants of the restructuring choice, except for the presence of empty creditors. Given our choice of empty creditor proxies, we match by asset tangibility, proportion of senior unsecured debt, and bond dispersion. In addition, we include size, industry-adjusted leverage ratio, and the proportion of short-term debt to control for the severity of distress. In Table 8, Panel A, we report mean and median values of the covariates for the two samples of treated companies (reference entities) and controls, together with the robust p value corresponding to the average effect of the treatment on the treated (ATT). We find the ATT not to be statistically significant and hence, the probability of filing for bankruptcy not to be significantly higher for companies potentially exposed to the threat of insured creditors. Unsurprisingly, we cannot successfully match treated and control firms on all covariates: Reference entities remain significantly larger (in mean and median), more leveraged and with a higher bond dispersion (in mean) than control firms.

A better match can be achieved by restricting the treated companies to the subsample of reference entities with less liquid CDSs, which are more closely comparable to firms without CDSs traded on their debt. As Table 8, Panel B, illustrates, the matching procedure in this case returns a sample of control firms with no statistically significant differences in means and medians of the selected covariates. The average effect of the treatment on the treated remains nonsignificant.

4.2. Presence of CDSs and Default Frequency

So far our analysis has examined whether the presence of CDSs affects the restructuring decision of severely distressed companies that have experienced some type of default, defined according to Moody's criteria. A potential objection to our approach is that the presence of empty creditors can in fact undermine the debt restructuring attempts of a company at an earlier stage. In practice, most companies initiate talks

TABLE 8

SAMPLE MATCHING

	Treated		Control			
	Mean	Median	Mean	Median	*t*-Test	Wilcoxon
Panel A: Treated (all reference entities) vs. Control						
Size	7.93	7.97	7.30	7.41	3.15***	2.70***
Leverage—industry adjusted	0.59	0.41	0.41	0.40	2.03**	1.17
Short-term debt/Total debt	0.26	0.04	0.24	0.10	0.27	−0.31
Senior unsecured debt/Total debt	0.43	0.41	0.43	0.45	0.01	−0.17
Asset tangibility	0.31	0.31	0.28	0.20	1.05	1.22
Bond dispersion	0.16	0.17	0.13	0.17	1.94*	1.64
Matching estimator (ATT) p Value = 0.12						
Panel B: Treated (less liquid reference entities) vs. Control						
Size	7.23	7.40	7.13	7.40	0.52	0.53
Leverage—industry adjusted	0.60	0.50	0.49	0.46	1.27	0.86
Short-term debt/Total debt	0.26	0.04	0.25	0.04	0.13	0.01
Senior unsecured debt/Total debt	0.36	0.34	0.40	0.38	−0.68	−0.76
Asset tangibility	0.30	0.29	0.29	0.21	0.20	0.58
Bond dispersion	0.12	0.14	0.11	0.12	0.64	0.35
Matching estimator (ATT) p Value = 0.22						

NOTES: This table provides average and median values of firm characteristics for subsamples of *Treated* and *Control* firms. *Treated* firms in Panel A are all 69 CDS reference entities. *Treated* firms in Panel B are the 44 reference entities with less liquid CDS contracts. The *Control* samples are the matched samples of nonreference entities obtained from the bias-corrected, heteroskedasticity-consistent version of the Abadie–Imbens (2011) matching technique. Since matching is done with replacement, we have 30 unique firms in the control groups. Treated and control firms are matched by firm size, industry-adjusted leverage ratio, proportion of short-term debt, proportion of senior unsecured debt, asset tangibility, and bond dispersion. The last two columns report the values of the *t*-test for difference in means and the Wilcoxon test for difference in medians. *, **, and *** indicate statistical significance at the 10%, 5%, and 1% levels, respectively.

with debtholders aimed at restructuring or refinancing their debt at the onset of financial distress. However, if a significant proportion of debtholders are insured via CDSs, they may be reluctant to renegotiate the debt, thus pushing the company into more severe distress: All else equal, this would translate into a higher frequency of defaults (either distressed exchanges or bankruptcy filings) among reference entities.

To test this hypothesis, we define a sample of distressed firms which includes all U.S. companies that have been assigned a Moody's rating of Caa1 or lower at any time between January 2006 and June 2010. Specifically, a company enters the sample if its rating is equal to, or lower than, Caa1, and leaves the sample following an upgrade to B3 or higher, or a rating withdrawal. We then compute 1-year ahead default frequencies for the companies in the sample, based on whether a firm completes a distressed exchange or files for bankruptcy within a year. Information on defaults is retrieved from Moody's for rated firms and from Factiva for those firms whose rating had been withdrawn by Moody's in the year prior to default and are therefore no longer covered by the rating agency. Contrary to the predictions of the empty creditor theory, 1-year ahead default frequencies are very similar for reference entities (26%) and nonreference entities (23%), and not significantly different in statistical terms.

TABLE 9

RATING HISTORY BEFORE DEFAULT

Panel A: Reference entities vs. nonreference entities

	CDS reference entities Mean	Nonreference entities Mean	*t* Test	Wilcoxon
Company rating before default	8.30	8.30	0.03	−0.03
Rating change	−1.36	−1.67	2.19**	1.29
Days in rating	186	160	0.73	−0.46
Number of downgrades in year before default	1.49	1.23	1.59	1.31
Notches changes in year before default	−2.19	−2.03	−0.61	−0.52
No. observations	53	135		

Panel B: Liquid reference entities vs. nonreference entities

	Liquid CDS reference entities Mean	Nonreference entities Mean	*t* Test	Wilcoxon
Company rating before default	8.06	8.30	−0.79	−0.83
Rating change	−1.00	−1.67	2.27**	1.98**
Days in rating	202	160	0.64	0.09
Number of downgrades in year before default	1.31	1.23	0.30	0.06
Notches changes in year before default	−1.81	−2.03	0.54	0.41
No. observations	18	135		

NOTES: This table reports average values of variables that characterize the rating history of all U.S. Moody's rated companies that defaulted (in-court or out-of-court) over the period January 2007–June 2011, in the year before default. The *Company rating* is taken at year-end prior to default, where ratings are assigned a numeric value ranging from 1 (Ba1) to 10 (Ca). The *Rating change* (in notches) is the change that resulted in this company rating. *Days in rating* indicate the number of days in which the firm has had this company rating. The last two columns report the *t*-test for difference in means and the Wilcoxon test for difference in medians. *, **, and *** indicate statistical significance at the 10%, 5%, and 1% levels, respectively.

We also analyze the rating dynamics for those firms that ultimately experience a default and investigate whether they differ in the period before default depending on whether CDSs are traded or not on the company's debt. Intuitively, if rating agencies anticipate that an empty creditor problem may threaten the company's refinancing plans, we can expect to observe a faster downgrade of those firms following the first signs of financial distress. In Table 9, we report mean values of a number of variables that characterize the rating history of the defaulted companies in the year before default. In particular, we consider (i) the corporate rating of the firm at year-end prior to default, where ratings are assigned a numeric value ranging from 1 (Ba1) to 10 (Ca); (ii) the rating change (in notches) that resulted in the rating in (i); (iii) the number of days for which the company has had the rating in (i), as a measure of rating persistence; (iv) the number of rating downgrades in the year before default; (v) the overall net change in rating over the same year, measured in notches. Information on the rating history of the firms in the sample is obtained from Moody's. Panel A compares all CDS reference entities to nonreference entities, while Panel B restricts the sample of reference entities to those with liquid CDSs, to better proxy for the presence of empty creditors. Our findings, based on *t* test on the means and Wilcoxon test on the medians, fail to highlight any significant differences in the rating path of reference

TABLE 10

DETERMINANTS OF DEFAULT

Independent variables	(1)	(2)
Company rating before default	0.075	
	(0.05)	
Rating change	−0.088	−0.037
	(0.05)	(0.09)
Ln(days in rating)	−0.235***	−0.205**
	(0.05)	(0.08)
Number of downgrades in year before default	−0.017	−0.024
	(0.08)	(0.12)
Leverage		0.881***
		(0.21)
Operating income		−0.266
		(0.71)
Size		0.049
		(0.09)
Bank debt/Total debt		0.145
		(0.31)
CDS reference entity dummy (*a*)	−0.020	0.173
	(0.12)	(0.21)
CDS liquidity dummy (*b*)	0.321	0.272
	(0.21)	(0.29)
Constant	−0.769	−1.369
	(0.47)	(0.84)
Year dummies	Yes	Yes
No. Observations	790	310
Pseudo R^2	0.137	0.203
Chi-square test: $(a) + (b) = 0$	2.46	1.98
p Value	(0.12)	(0.16)

NOTES: This table presents estimates of probit models, where the dependent variable equals 1 if a company defaults (in-court or out-of-court) in a given year and zero otherwise. The sample in model (1) includes all U.S. rated companies that have a corporate rating of Caa1 or lower over the period January 2006–June 2010. The sample in model (2) includes only the companies in (1) with 10-K filings available. For a description of the variables, see Tables 2 and 9. *CDS Reference Entity* dummy equals 1 if the firm is a reference entity, according to MarkIt. *CDS Liquidity* dummy equals 1 if the firm CDS was part of the CDX North America High Yield index in the year prior to default. Standard errors (in brackets) are clustered at firm level. *, **, and *** indicate statistical significance at the 10%, 5%, and 1% levels, respectively.

entities and other companies while approaching default. In fact, nonreference entities seem to experience more severe downgrades before default, which is the opposite of what we would expect if the threat of empty creditors had an impact on the rating agencies' decisions.

Finally, we formally assess whether the presence of insured creditors has played a significant role in explaining the default frequency in our sample of distressed firms. We estimate a probit model where the dependent variable, which equals one if a firm defaults (either in- or out-of-court) in the following year and zero otherwise, is regressed on a number of control variables, on a dummy variable that indicates whether the company has CDSs traded on its debt at the time of default and on a dummy variable that indicates whether the CDS was part of the CDX.NA.HY index. The results are shown in Table 10. In a first specification (model 1), the set of control variables only includes information on the rating history of the firm prior to default, which enables us to retain all the companies in the sample. In a second specification (model 2), we add a set of indicators of firm's distress (leverage ratio and EBITDA

over total assets), and of complexity of the debt structure (proportion of bank debt over total debt and firm size), computed at year-end before default.[17] The financial variables are obtained from the 10-K filings, which are however available only for 35% of the companies originally included in the sample. As a result, this specification can be estimated only on a limited sample. Both models include yearly dummies to capture annual variations in default rates due to market conditions. According to our findings, the likely presence of insured creditors (proxied by the CDS reference entity dummy and the CDS liquidity dummy) is not significantly associated with an increased probability of experiencing a default, which is instead positively linked to the firm's leverage and negatively associated with the persistence of the company's rating in the period before default.

5. CONCLUDING REMARKS

Recent contributions from both the legal and the financial literature have described the availability of credit insurance via CDSs as detrimental to efficient debt renegotiations in conditions of financial distress. In this paper, we investigate this claim by assessing whether the presence of CDSs has, in fact, had an impact on the debt restructuring of distressed firms over the period January 2007–June 2011. Our findings indicate that firms where empty creditors are more likely to emerge are not characterized by a higher probability of filing for bankruptcy than other firms. In fact, the main determinants of the restructuring method are essentially the same for both reference entities and nonreference entities. However, we document higher recovery prices following a distressed exchange in firms more exposed to the insured creditors threat, which suggests that such firms are prepared to offer more to tendering bondholders in order to avoid bankruptcy.

The lack of a significant evidence linking credit insurance to the debt restructuring outcome allows us to conclude that, although the negative impact of empty creditors might have represented a specific concern for some companies, it was not a phenomenon of significant proportions for the generality of reference entities. We suggest two potential explanations. First, the proportion of overinsured bondholders may not be sufficiently large to affect the restructuring process. Second, even though the proportion of insured creditors is large enough to impede the negotiation of a workout, creditors may choose to support it, instead of forcing the company into bankruptcy. This behavior can be ascribed to several factors, such as reputational issues for the creditors, or the uncertainty related to the bankruptcy process (ECB 2009). In this respect, it is worth reminding that involuntary bankruptcy cases initiated by creditors can be challenged by the debtor. Furthermore, when disputes between creditors and obligors are taken to court, judges can investigate in detail the economic

17. These variables are slightly different from the ones used to explain the restructuring outcome, and, in our opinion, more appropriate as potential determinants of the probability of experiencing a default. For robustness, we have also estimated the model by substituting the overall measures of leverage and operating income with the corresponding industry-adjusted indicators, and the proportion of bank debt with the proportion of secured debt. The results are essentially unchanged.

interests of bondholders by requiring, for example, to disclose their positions in credit derivatives on the firm's debt, as in the LyondellBasell bankruptcy.

The unavailability of data on CDS positions held by firms' creditors makes it unfeasible to empirically verify which of the two conjectures applies in practice, hence we leave this exercise for future research. In this respect, we contribute to the current policy debate regarding the regulation of the CDS market following the enactment of the Dodd–Frank Act, by highlighting the need for the introduction of measures aimed at increasing transparency on CDS transactions.

APPENDIX A: BOOTSTRAPPED STANDARD ERRORS

Our overall sample includes 163 default events, and thus has a size comparable to that of related empirical studies on the determinants of debt restructuring (Gilson, John, and Lang 1990 [169 observations], Asquith, Gertner, and Scharfstein 1994 [102 observations], Franks and Torous 1994 [161 observations]). Albeit small, the sample size enables us to uncover the significant impact of leverage, debt structure, and tax incentives on the restructuring outcome during the recent crisis but does not provide empirical support to the empty creditor theory. As a result we argue that, if insured creditors exist, their impact on debt restructuring choices of the average company in our sample must be marginal compared to the effect of other determinants.

Yet the effect may still be statistically significant but hard to detect in our sample due to its small size. The issue cannot be easily solved, given that our sample already includes the entire population of distressed rated firms with accounting information available. To check whether the estimates of the standard errors in the probit models are biased by the small sample size, we bootstrap the standard errors for our main probit specification (Table 5) from the original sample. The results are shown in Table A1, and confirm that the presence of CDSs (liquid or less liquid) traded on a company's debt does not have a statistically significant impact on the restructuring outcome in our sample.

TABLE A1

BOOTSTRAPPED STANDARD ERRORS (VARIOUS REPLICATIONS)

	Coefficient	Robust S.E.	S.E. Bootstrap (100)	S.E. Bootstrap (300)	S.E. Bootstrap (500)	S.E. Bootstrap (1,000)
Size	−0.085	0.145	0.166	0.172	0.165	0.173
Leverage—industry adjusted	0.806	0.345	0.396	0.431	0.410	0.404
Secured debt/Total debt	0.757	0.393	0.421	0.439	0.427	0.448
Short-term debt/Total debt	1.763	0.373	0.396	0.596	0.601	0.658
Number of tiers	-0.306	0.137	0.163	0.163	0.157	0.158
Taxation dummy	-0.540	0.268	0.275	0.295	0.295	0.298
CDS reference entity dummy (*a*)	**0.477**	**0.317**	**0.329**	**0.355**	**0.367**	**0.355**
CDS liquidity dummy (*b*)	**0.153**	**0.431**	**0.508**	**0.508**	**0.505**	**0.493**
Test (*a*) + (*b*)=0	**0.630**	**0.496**	**0.599**	**0.563**	**0.570**	**0.565**

NOTES: *, **, and *** indicate statistical significance at the 10%, 5%, and 1% levels, respectively.

APPENDIX B: NONLINEAR EFFECTS OF FIRM SIZE

Our proxies for the presence of insured creditors based on the proportion of senior unsecured debt, bond dispersion, and CDS liquidity might mask a nonlinear effect in firm size. We control for this by replicating all specifications that include these proxies with the addition of a size-squared term. The results are reported in Table B1: Panel A refers to the specification in Table 5, while Panels B and C replicate the estimates presented in Tables 6 and 7. For conciseness, we only report the coefficients for the size squared, the CDS reference entity dummy and the empty creditor proxies. The results are in line with our previous findings and confirm that the presence of insured creditors seems to have a significant impact only on the recovery prices of out-of-court renegotiations.

TABLE B1

NONLINEAR EFFECTS OF FIRM SIZE

Independent variables	Top sen. unsec. debt	Top bond dispersion	CDS liquidity
Panel A: Debt workout vs. Chapter 11			
Size squared	−0.007	−0.009	−0.009
	(0.04)	(0.04)	(0.04)
CDS reference entity dummy (a)	0.543	0.437	0.460
	(0.36)	(0.39)	(0.33)
CDS * Top senior unsecured debt (b)	−0.205		
	(0.49)		
CDS * Top bond dispersion (b)		0.262	
		(0.54)	
CDS liquidity dummy (b)			0.176
			(0.45)
Control variables from Table 5	Yes	Yes	Yes
Chi-square test: $(a) + (b) = 0$	0.54	2.31	1.64
p Value	(0.46)	(0.13)	(0.20)
Panel B: Determinants of recovery prices—Out of court			
Size squared	0.010	0.008	0.011
	(0.01)	(0.01)	(0.01)
CDS reference entity dummy (a)	−0.038	−0.068	0.050
	(0.12)	(0.11)	(0.09)
CDS * Top senior unsecured debt (b)	0.240**		
	(0.11)		
CDS * Top bond dispersion (b)		0.212*	
		(0.13)	
CDS liquidity dummy (b)			0.319**
			(0.09)
Control variables from Table 6	Yes	Yes	Yes
Chi-square test: $(a) + (b) = 0$	4.43	1.67	11.06
p Value	(0.04)	(0.20)	(0.00)

(Continued)

TABLE B1

CONTINUED

Independent variables	Top sen. unsec. debt	Top bond dispersion	CDS liquidity
Panel C: Determinants of recovery prices—In-court			
Size squared	0.003	0.005	0.005
	(0.01)	(0.01)	(0.01)
CDS reference entity dummy (a)	0.097	0.106	0.088
	(0.07)	(0.06)	(0.06)
CDS * Top senior unsecured debt (b)	−0.062		
	(0.10)		
CDS * Top bond dispersion (b)		0.028	
		(0.09)	
CDS liquidity dummy (b)			−0.102
			(0.07)
Control variables from Table 7	Yes	Yes	Yes
Chi-square test: $(a) + (b) = 0$	0.19	2.78	0.03
p-Value	(0.66)	(0.10)	(0.86)

NOTES: *, **, and *** indicate statistical significance at the 10%, 5%, and 1% levels, respectively.

APPENDIX C: CONTROLLING FOR 2009 EVENTS

Most of the default events occur in 2009 and one may argue that this specific year may be driving the results. To assess whether this is the case, we replicate the analysis first on a subsample of defaults that excludes the 2009 events and, second, on the entire sample by replacing the taxation dummy with year dummies. The results for the specification that proxies the presence of insured creditors with liquid CDSs are reported in Table C1: Panel A refers to the model in Table 5, while Panels B and C replicate the estimates presented in Tables 6 and 7. The findings are essentially unchanged, thus confirming that the results are not specific to the year 2009.

TABLE C1

CONTROLLING FOR 2009 EVENTS

Independent variables	No 2009 events	Year dummies
Panel A: Debt workout vs. Chapter 11		
CDS reference entity dummy (a)	0.074	0.483
	(0.56)	(0.32)
CDS liquidity dummy (b)	−1.260	0.187
	(0.88)	(0.43)
Control variables from Table 5	Yes	Yes
Chi-square test: $(a) + (b) = 0$	1.17	1.83
p Value	(0.28)	(0.18)
No. observations	64	163

(*Continued*)

TABLE C1

CONTINUED

Independent variables	No 2009 events	Year dummies
Panel B: Determinants of recovery prices—Out of court		
CDS reference entity dummy (a)	−0.047	0.004
	(0.11)	(0.07)
CDS liquidity dummy (b)	0.712***	0.357***
	(0.16)	(0.09)
Control variables from Table 6	Yes	Yes
Chi-square test: $(a) + (b) = 0$	8.87	10.54
p Value	(0.01)	(0.00)
No. observations	39	189
Panel C: Determinants of recovery prices—In-court		
CDS reference entity dummy (a)	0.105	0.056
	(0.09)	(0.04)
CDS liquidity dummy (b)	−0.106	−0.072
	(0.20)	(0.08)
Control variables from Table 7	Yes	Yes
Chi-square test: $(a) + (b) = 0$	0.00	0.03
p Value	(0.99)	(0.86)
No. observations	94	276

NOTES: *, **, and *** indicate statistical significance at the 10%, 5%, and 1% levels, respectively.

APPENDIX D: BANK DEBT CHARACTERISTICS

Contrary to the theoretical prediction that banks help avoid formal bankruptcy by solving information asymmetries and lenders' coordination problems, we do not find the composition between bank and public debt to play a significant role in determining the restructuring outcome. In this appendix, we attempt to provide an explanation by looking in more detail at the structure of bank debt of the firms in the sample. Our findings can be ascribed to various factors. First, virtually all the bank debt of financially distressed firms is secured (James 1995), hence banks have no incentive to make concessions in favor of an out-of-court restructuring (see, for example, Asquith, Gertner, and Scharfstein 1994, Chatterjee, Dhillon, and Ramírez 1996). Second, the nature of bank debt in our sample is very different and much more complex than that reported by most related studies (which date back to the mid-1990s), following the impressive growth of the syndicated loan market in the past 20 years, that has introduced coordination issues among bank lenders.[18] Third, since the 2007–09 crisis originated in the financial sector, the distressed conditions of banks might have had an impact on the restructuring outcome of their borrowers (Khwaja and Mian 2008, Chava and Purnanandam 2011).

18. Demiroglu and James (2013) document that traditional bank loans are easier to restructure out of court than loans from institutional lenders.

The notes to the SEC financial statements report the overall amount of bank debt, the proportion of bank debt which is secured, and how bank loans are divided between revolving lines of credit and term loans but do not provide information on lenders. To better investigate the structure of bank debt, we restrict our attention to the loans covered by the DealScan's database, which includes 99.3% of all bank loans in our sample. The following indicators are computed to proxy for loan complexity and lenders' coordination problems: (i) proportion of bank debt in the form of institutional term loans (B-term, C-term, or D-term), which are designed to be placed with nonbank institutional investors, such as investment banks, pension funds, hedge funds, insurance companies; (ii) number of lead arrangers, that is, number of banks that establish a relationship with the firm and organize the loan; (iii) number of participants, that is, number of banks and/or institutional investors that join the lead arrangers to fund part of the syndicated loan.

To assess whether the distressed conditions of bank lenders during the financial crisis might have affected their ability to refinance their borrowers and, ultimately, might have played a role in their restructuring process, we compute measures of both profitability and profitability shocks, that is, the annual return-on-assets (ROA) and the change in annual ROA, of the lead arranger at the end of the fiscal period prior to the borrower's default. Average values are calculated when there are multiple lead arrangers. Other indicators of distress, such as Tier 1 capital ratios or net charge-off ratios, were considered, but had to be excluded due to the lack of data for a significant number of the lead arrangers in our sample. Data on banks' ROA are taken from BankScope.

Table D1 reports mean and median values of the bank debt characteristics for firms that restructure out of court against those that file for bankruptcy (Panel A for the entire sample, Panel B for reference entities only, and Panel C for nonreference entities only), and for reference entities against nonreference entities (Panel D). We find the proportion of secured bank debt to be significantly higher in firms that restructure in court compared to those that complete a debt workout, which suggests that the seniority of the claim plays an important role in the renegotiation process also for bank lenders. Instead, we do not find the complexity of the loan syndicate to undermine out-of-court renegotiations which seem, in fact, more likely when the syndicate has a higher number of participants or lead arrangers.

No significant differences arise in terms of seniority of bank debt or profitability of lead arrangers between CDS reference entities and other firms. As expected, syndicated loans arranged for reference entities involve a significantly larger number of lead banks and participants, given that firms with CDSs available on their debt are typically larger in size.

TABLE D1

BANK DEBT CHARACTERISTICS

Panel A: Overall sample

	Out of court		Chapter 11 filings			
	Mean	Median	Mean	Median	*t* Test	Wilcoxon
Secured bank debt/Bank debt	0.91	1.00	0.98	1.00	−2.04**	−2.83***
Term loans B/Bank debt	0.49	0.65	0.49	0.53	0.05	0.33
Number lead arrangers	1.81	2.00	1.61	1.00	1.48	1.68*
Number participants	6.54	4.00	5.37	3.00	0.84	1.02
Profitability lead arranger	0.14	0.48	−0.04	0.30	1.00	0.42
Δ Profitability lead arranger	−0.19	−0.28	−0.48	−0.29	1.63	1.04
No. observations	*59*	*59*	*87*	*87*		

Panel B: CDS reference entities

	Out of court		Chapter 11 filings			
	Mean	Median	Mean	Median	*t* Test	Wilcoxon
Secured bank debt/Bank debt	0.94	1.00	0.96	1.00	−0.52	−1.65*
Term loans B/Bank debt	0.57	0.74	0.50	0.72	0.65	0.83
Number lead arrangers	2.16	2.00	1.88	2.00	1.13	1.08
Number participants	8.92	5.00	6.83	4.50	0.70	−0.44
Profitability lead arranger	0.04	0.49	0.06	0.35	−0.07	−0.09
Δ Profitability lead arranger	−0.30	−0.28	−0.49	−0.31	0.83	0.51
No. observations	*25*	*25*	*40*	*40*		

Panel C: Nonreference entities

	Out of court		Chapter 11 filings			
	Mean	Median	Mean	Median	*t* Test	Wilcoxon
Secured bank debt/Bank debt	0.89	1.00	1.00	1.00	−2.19**	−2.75***
Term loans B/Bank debt	0.43	0.00	0.47	0.52	−0.43	−0.31
Number lead arrangers	1.56	1.50	1.38	1.00	1.38	1.60
Number participants	4.79	4.00	4.13	3.00	0.70	2.00**
Profitability lead arranger	0.20	0.45	−0.12	0.29	1.30	0.84
Δ Profitability lead arranger	−0.11	−0.29	−0.47	-0.29	1.35	0.90
No. observations	*34*	*34*	*47*	*47*		

Panel D: Overall Sample

	CDS Reference entities		Nonreference entities			
	Mean	Median	Mean	Median	*t* Test	Wilcoxon
Secured bank debt/Bank debt	0.96	1.00	0.95	1.00	0.30	0.12
Term loans B/Bank debt	0.53	0.74	0.45	0.51	1.09	0.77
Number lead arrangers	1.99	2.00	1.46	1.00	3.96***	3.81***
Number participants	7.63	5.00	4.41	4.00	2.45**	2.42**
Profitability lead arranger	0.05	0.37	0.02	0.30	0.21	−0.35
Δ Profitability lead arranger	−0.42	−0.28	−0.32	−0.29	−0.53	−0.66
No. observations	*65*	*65*	*81*	*81*		

NOTES: *, **, and *** indicate statistical significance at the 10%, 5%, and 1% levels, respectively.

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