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Finance Working Paper N° 655/2020
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ECGI Working Paper Series in Finance

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## Abstract

The average difference between the court value and post-emergence market value of newly issued stocks in Chapter 11 reorganizations exceeds 50%. We show that public dissemination of transactions in defaulted bonds reduces this difference by 23% and largely eliminates inter-claimant wealth transfers. The effects of dissemination are only significant when the bonds are sufficiently traded around the court valuation date, and when they receive significant amounts of post-emergence equity, indicating that the bond's value is sensitive to the size and allocation of the pie. These findings imply that security prices have real effects: They improve the valuations of bankruptcy participants.

Keywords: Bankruptcy, Chapter 11, TRACE, Transparency, Bond, Dissemination

JEL Classifications: G14, G18, G33, G34, K22

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Forthcoming Journal of Finance

**ABSTRACT**

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*Cem Demiroglu is at Koç University. Julian Franks is at London Business School. Ryan Lewis (corresponding author) is at the University of Colorado-Boulder. We thank the Editor (Philip Bond) and two anonymous referees for very helpful comments that substantially improved the paper. We are also grateful to Barry Adler, Ian Ayres, András Danis, Peter Feldhütter, Francisco Gomes, Vidhan Goyal, Christopher Hennessy, Edith Hotchkiss, Ralph Koijen, Han Ozsoylev, Michael Schwert, Janis Skrastins, Robert Stark, Beril Ünal, Cihan Uzmanoglu, and Vikrant Vig for helpful comments and suggestions. We also thank seminar participants at the 2017 Law & Banking/Finance Conference in Frankfurt, European Finance Association Annual Meetings, European Union Single Resolution Board, Finance Down Under Conference, Financial Management Association Annual Meetings, Hebrew University, National Bureau of Economic Research Summer Institute, Society for Financial Studies Cavalcade, and Western Finance Association Annual Meetings for questions and comments. We are grateful to Lynn LoPucki at UCLA for sharing his bankruptcy database and Wei Jiang, Kai Li, and Wei Wang for sharing their data set on hedge fund participation in the Chapter 11 process. We have read the *Journal of Finance* disclosure policy and have no conflicts of interest to disclose.

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A large body of literature emphasizes the role of security prices in aggregating and disseminating market information and thereby guiding economic and financial decisions.[1] This has led to the creation of markets solely for the purpose of assimilating different views before final pricing decisions. For example, pre-IPO grey markets have been established to reduce the uncertainty about a company's valuation and improve the pricing efficiency of an IPO (Chang, Chiang, Qian, and Ritter (2017)). Market prices are also used as reference points in mergers (Baker, Pan, and Wurgler (2012)), and they have been proposed in setting "haircuts" by resolution authorities on banks' bail-in-able bonds (Avgouleas and Goodhart (2015)).

One area where markets have not been widely used is in Chapter 11 bankruptcy, where distributions received by pre-petition creditors and equityholders are based upon hypothetical valuations of reorganized firms. Gilson, Hotchkiss, and Ruback (2000) argue that the absence of market forces and the administrative nature of the court process in Chapter 11 make valuations more complex and less precise—a problem exacerbated by conflicting incentives of competing claimholders to manipulate the court value (see also Ayotte and Morrison (2009)). Consistent with these views, Butler (2003) documents substantial misvaluations of newly issued stocks in Chapter 11 reorganizations between 1990 to 1997, averaging 55% (see also Lehavy (2002)). These misvaluations are usually calculated as the difference between the agreed court value, as voted on by the different creditor classes and the prepetition equityholders, and the market value on emergence from Chapter 11. To reduce misvaluations and improve the distributional efficiency of Chapter 11, past theoretical studies have suggested a number of market-based mechanisms which assume that capital markets are better equipped to value a debtor than bargaining and judicial determination.[2] However, those policy proposals require

[1] For a comprehensive review of this literature, see Bond, Edmans, and Goldstein (2012).

[2] Mechanisms include (i) settling reorganization outcomes through the distribution of option-like securities to creditors (Aghion, Hart, and Moore (1992), Bebchuk (1988, 2002)); (ii) the direct auction of a firm's assets following bankruptcy filing (Baird (1993), Eckbo and Thorburn (2009)); (iii) the public listing of a small portion of newly issued equity before emergence to serve as an efficient price signal of the true reorganization value (Roe (1983)). Also, Adler and Ayres (2001) suggest that different classes of creditors be allowed to bid for newly issued

issuing new instruments or changing the Chapter 11 process in ways that have proved difficult to implement.

In this paper, we examine the effectiveness of an alternative market-based mechanism—improving the transparency of transaction prices of defaulted bonds—in reducing misvaluations. Specifically, we use the introduction of the Trade Reporting and Compliance Engine (TRACE), which publicly disseminates over-the-counter (OTC) corporate bond transactions, as a quasi-random shock that increases the availability of market-based pricing and trade information to bankruptcy participants. We find that dissemination substantially reduces both median misvaluations and the size of resulting inter-claimant wealth transfers by about 80%.[3] Our results are consistent with the conjecture in Gilson, Hotchkiss, and Ruback (2000) that the limited availability of market-based information guiding bankruptcy participants is the primary reason behind large misvaluations in Chapter 11 bankruptcy.[4]

The link between increased transparency of bond transactions and reductions in misvaluations is ambiguous. On the one hand, dissemination may not add to the information available to the bankruptcy participants if the court and creditors can reliably access prices of all trades in the OTC market even in the absence of dissemination. On the other hand, regardless of the level of transparency,

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equity. Those creditors who believe the court plan undervalues the equity would bid for new shares at a premium. Moreover, Ayotte and Morrison (2018) propose that bankruptcy courts place greater reliance on markets and make recommendations on how judges might use market data to improve their valuations.

[3] For firms with publicly traded debt, the outstanding amount of traded debt is a significant fraction of the overall enterprise value of firms in Chapter 11 (about 55%, according to Demiroglu and James (2015)). Thus, bond prices can be used to determine not only the fair value of their claims but also the implied market values of non-traded securities and other claims.

[4] They are also consistent with Edward Altman's testimony before the American Bankruptcy Institute's Chapter 11 Reform Commission:

> *All parties involved can now continuously and clearly observe the market's assessment of the debtor's liabilities so as to determine whether to sell or retain their interests and those prices provide important benchmarks for negotiating. This enhanced price discovery, compared to pre-1990 experience, helped to provide a more liquid market for the debt as the debtor works its way through the restructuring. Price discovery is not only important for the major stakeholders in the bankruptcy process, it also makes markets more efficient and provides important benchmarks for the future value of those securities and the debtor.*

bankruptcy participants may choose to ignore market prices entirely due to bias arising from investor manipulation, as well as fire sale (or illiquidity) discounts or control premiums, any of which might be difficult to separate from fundamental value.[5] If one or more of these factors simply made bond prices noisier during bankruptcy, then this might have the effect of making them less informative and mitigate against finding significant reductions in misvaluations due to dissemination, even where bankruptcy participants pay more attention to disseminated market prices.[6] Appendix B provides a more detailed discussion of how bias, control premiums, and fire sale discounts can influence misvaluations. Nevertheless, we provide strong evidence that these alternative explanations cannot be the driving force behind our results.

Our sample consists of 130 Chapter 11 bankruptcy reorganizations completed during 1995 to 2013. To minimize differences between disseminated and non-disseminated firms, we require that all our sample firms have publicly traded bonds during the bankruptcy process. We measure misvaluation as the difference between the hypothetical court value of the newly issued common stocks and the market value of those stocks on emergence from Chapter 11 (in absolute value), scaled by the average of the two values.[7] Since we need post-emergence market values to calculate misvaluations, we restrict our sample to those firms that emerge from Chapter 11 as a publicly listed company. Overall, consistent with previous literature, misvaluations in our sample are substantial, averaging 51.8% with more than

[5] Anecdotal evidence suggests that some courts pay attention to market prices in their valuations. For example, in VFB LLC v. Campbell Soup Co., 482 F.3d 624 (3d Cir. 2007), the court accepted a valuation analysis based on market prices and explained that: "Absent some reason to distrust it, the market price is a more reliable measure of the stock's value than the subjective estimates of one or two expert witnesses." In contrast, in two other cases, Exide Techs (303B.R. 2003) and Mirant Corporation (331 B.R. 800), the courts refused valuations based on market prices and noted that the taint of bankruptcy reduced the usefulness of post-petition trading prices of a debtor's securities as an indication of value, because markets tend to undervalue entities in bankruptcy.

[6] Another hypothesis proposed by Bond and Goldstein (2015) is that increased reliance by courts on bond prices after dissemination may reduce their informativeness.

[7] Newly issued common stocks, on average, account for approximately half of the plan enterprise value.

a third of the sample exceeding 50%. Such large misvaluations result in deviations from absolute priority based on market values of distributed claims in the final plan of reorganization, which we call "unintended wealth transfers". We find unintended wealth transfers in 52% of the bankruptcies; the average unconditional (conditional) transfer is 8.2% (15.8%) of the total value of newly issued common stocks.

In our sample, there are 54 disseminated and 76 non-disseminated firms. Firms are classified as disseminated if transactions in their outstanding bonds are disseminated via the TRACE system before the court valuation is set. The average (median) misvaluation is 38.2% (23.0%) in the dissemination subsample and 61.5% (46.5%) in the non-dissemination subsample; the difference between the two samples is economically large, 23.3% (23.9%), and statistically significant at the 1% level. The evidence is consistent with dissemination reducing misvaluations, and that reduction is of sufficient size to largely eliminate inter-claimant wealth transfers.

There are, however, two important challenges for a causal interpretation of this relation. First, differences in the characteristics of disseminated and non-disseminated firms can drive the differences in their misvaluations (cross-sectional heterogeneity). Second, time-series changes in judicial efficiency or confounding events that overlap with a higher incidence of dissemination can drive the effect of dissemination on misvaluations (time-series heterogeneity). We employ a large number of tests to alleviate these concerns.

We begin by addressing cross-sectional heterogeneity. As part of the three phases of the rule-based TRACE rollout between July 1, 2002 and February 7, 2005, large, actively traded bonds were disseminated before smaller, thinly traded, high-yield bonds. Thus, there are significant differences in bond (and firm) characteristics between the disseminated and non-disseminated firms that emerged from Chapter 11 during the rollout period. To show that these differences cannot explain the reduced misvaluations in the dissemination sample, we first estimate misvaluation regressions which include TRACE's selection criteria in various dissemination phases as well as proxies for bargaining complexity and valuation uncertainty based on firm and bankruptcy characteristics. We find that the economic importance or statistical significance of dissemination is not sensitive to the inclusion of those controls.

Second, we simulate placebo TRACE rollouts for our sample of non-disseminated firms where we assign placebo treatments for those firms that would be disseminated during the Chapter 11 process had TRACE been implemented earlier. If differences in bond characteristics that are used by TRACE in different dissemination phases drive misvaluation differences between disseminated and non-disseminated firms, we would expect to find a significant negative effect of placebo treatments on misvaluation in simulated samples. However, we find that the effect of placebo treatments is, on average, zero and never significantly negative, which further alleviates selection concerns.

Third, we document that dissemination reduces misvaluations only when the bonds are sufficiently traded around the date when the court valuation is set, that is, they are not stale, and they also receive significant amounts of post-emergence equity, that is, the bond's value is sensitive to the size and allocation of the pie. The evidence suggests that dissemination is an important informational channel for reducing misvaluations. Consistent with this information story, we also find that, where bond prices are disseminated, they impound earlier in time the expected recovery rates in the final plan of reorganization compared with those plans with non-disseminated securities; as a consequence, the average absolute returns at the announcement of a court plan or plan confirmation is significantly lower for disseminated securities.[8]

We acknowledge that despite an extensive set of controls in our empirical specifications, uncontrolled differences between disseminated and non-disseminated firms might remain and, those differences might be correlated with both dissemination and misvaluation.[9] However, it is unlikely that

[8] There are, however, concerns in the literature that designing rules or policies that are explicitly based upon market prices may harm the aggregation of information into market prices (see, for example, Bond, Goldstein, and Prescott (2009) and Bond and Goldstein (2015)).

[9] Throughout the paper, we assume that the post-emergence market price of equity is the "fair" price and therefore we attribute misvaluations entirely to valuation errors in the court plan. However, if dissemination reduces the uncertainty about enterprise value, it could increase the accuracy of the firm's security valuations both during and after bankruptcy. As a result, reduced misvaluations due to dissemination might be explained not only by the improved accuracy of court valuations but also by the improved efficiency of post-emergence stock prices. In

such differences can explain the placebo and cross-sectional findings summarized above. Moreover, the differences in misvaluations between disseminated and non-disseminated firms range from 20% to 45%; these are large differences by any standards of empirical work.

After addressing cross-sectional heterogeneity, we turn to time-series heterogeneity. Since the frequency of disseminated firms increases during our sample period, dissemination might serve as a proxy for improvements in judicial efficiency over time. We conduct three separate tests to mitigate this concern. First, we estimate misvaluation regressions using a subsample of firms that were in Chapter 11 during the TRACE implementation window; the idea is that the shorter the sample period the lower is the likelihood of significant judicial learning or confounding events. Second, we estimate regressions that include filing and emergence year fixed effects, which help isolate the effect of dissemination from unobserved time effects. Finally, we estimate regressions that include a linear time trend (based on emergence years) accounting for potential time-series variations in judicial efficiency. In all three tests, the effect of dissemination increases in size relative to our baseline estimate and remains statistically significant, mitigating concerns about judicial learning.

Misvaluations are more significant if they lead to wealth transfers between different claimants. These wealth transfers have the potential to affect recovery rates of distressed bonds and their valuation (Leland (1994)). For example, Baird and Bernstein (2006) assert that the uncertainty in the valuation of the debtor in Chapter 11 bankruptcy proceedings presents a significant challenge in maintaining the priority structure of both debt and equity claims upon emergence from Chapter 11.

We find that dissemination reduces the frequency and average size (relative to the total value of newly issued common stocks) of inter-claimant wealth transfers. In particular, dissemination reduces the likelihood of an inter-claimant wealth transfer by half from 66% to 33% (significant at the 1% level).

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unreported results, we test this hypothesis using the absolute difference between market prices 1-month versus 3-months after emergence (scaled by the average of the two prices) as a crude measure of stock price efficiency (or valuation uncertainty). We find that dissemination is associated with improved stock price efficiency, which can explain about 22% of the reduction in misvaluations due to dissemination. The remaining 78% can be attributed to improved accuracy of court valuations.

Also, while the average (unconditional) size of inter-claimant wealth transfers in the dissemination subsample is only 2.6%, the average (unconditional) size of transfers in the non-dissemination subsample is 12.3%; the difference is economically large and statistically significant at the 1% level. Overall, we find a significant reduction in misvaluations for firms with disseminated bond prices; those misvaluations are sufficiently small that they substantially reduce wealth transfers between claimants and APR violations associated with valuation uncertainty.

Our paper relates to the literature on the effects of increased market transparency. It provides evidence of a large benefit to increased transparency through dissemination of bond prices. Recent studies investigate the benefits and costs of publicly reporting corporate bond transactions through the TRACE system. With respect to the benefits, the evidence suggests that (i) dissemination has led to substantial reductions in both trade execution costs and price dispersion (Asquith, Covert, and Pathak (2019), Bessembinder, Maxwell, and Venkataraman (2006), Bessembinder and Maxwell (2008), Goldstein, Hotchkiss, and Sirri (2007)); (ii) with dissemination, bond prices incorporate new information more rapidly (Chen and Lu (2017)); and (iii) dissemination reduces information gaps in the marketplace and increases investors' reliance on market prices (Badoer and Demiroglu (2019)). However, these benefits could be reduced by the smaller incentives to collect private information by informed traders (see, for example, Madhavan (1995), Pagano and Roell (1996), and Lewis and Schwert (2018)). These reduced incentives might extend to activist investors who it has been argued make bargaining more efficient by consolidating smaller claims into the hands of larger holders through claims trading (see Ivashina, Iverson, and Smith (2016)).

## I. Institutional Background on TRACE

In this section, we provide a brief history of TRACE. More detailed discussions are available in a number of sources, including Bessembinder and Maxwell (2008) and Asquith, Covert, and Pathak (2019).

In the late 1990s, the Securities and Exchange Commission (SEC) requested the National Association of Securities Dealers (NASD) to take the necessary steps to increase the transparency of

the corporate debt markets. The idea was (i) to create a platform to assemble and disseminate information on all secondary market corporate bond trades; (ii) to create a database of corporate bond transactions that would allow regulators to supervise the market activity; and (iii) to establish a surveillance system that would enable detection of misconduct and enhance investor confidence.

The NASD introduced TRACE on July 1, 2002. The TRACE system assembles all OTC bond transactions facilitated by brokers and dealers registered with the NASD and publicly disseminates them. Until January 9, 2006, when real-time transaction reporting was activated, there was a short delay between the transaction and dissemination which became progressively shorter over time. Most U.S. dollar-denominated corporate debt securities registered with the SEC are TRACE-eligible.

TRACE has collected transaction data for all eligible corporate bonds since its inception in July 2002. However, instead of disseminating the data immediately for all reported bond trades to public investors, the NASD implemented the dissemination in phases. This phasing allowed NASD to examine the impact of increased transparency on bond liquidity before introducing dissemination for high-yield securities whose liquidity could be relatively more sensitive to changes in transaction reporting.

Phase 1, which was implemented on July 1, 2002, involved dissemination of trading information for large (that is, original issue size $1 billion or greater) investment-grade bonds, as well as 50 actively traded high-yield bonds that are referred to as High Yield 50. As Hotchkiss and Ronen (2002) explain, High Yield 50 bonds were chosen by the NASD advisory committee from among the most liquid high-yield issues; specifically, they were chosen based on volume, price, name recognition of the issuer, research-following, and representation from diverse industry groups. In the first phase, the NASD disseminated transaction information for approximately 520 bonds that satisfied the criteria for selection.

Phase 2 was initiated on March 3, 2003 and became fully implemented on April 14, 2003. It expanded dissemination to include smaller investment-grade bonds (that is, original issue size between $100 million and $1 billion). By the time the second phase was completed, the number of disseminated bonds had increased to 4,650.

Phase 3 expanded TRACE to cover almost all corporate bonds and was initiated in two stages, Phase 3A and 3B. The distinction between the 3A and 3B centered around liquidity. To be included in

Phase 3A, the bond must have traded in quantities greater than $1 million (par value) "an average of one or more times per day over the last 20 business days of a 90-day period determined each quarter by NASD." Phase 3A was introduced on October 1, 2004, at which point 9,558 new bonds started having their trade information disseminated. Phase 3B was initiated on February 7, 2005, when dissemination began for an additional 3,016 bonds. According to the NASD at that point, there was "real-time dissemination of transaction and price data for 99% of corporate bond trades."[10]

In March 2010, Financial Industry Regulatory Authority or FINRA (formerly known as NASD) released a data set, which included both disseminated and non-disseminated historical bond transactions between July 1, 2002, and February 7, 2005. This data set allows us to collect prices of bonds that were not available at the time of the transaction and during Chapter 11 proceedings. Consequently, it enables us to identify two groups of companies with TRACE-eligible bonds, those with disseminated bond prices, and those without.

## II. Sample and Data

### *A. Sample*

Our main data source for Chapter 11 bankruptcy reorganizations and bankruptcy characteristics is the UCLA-LoPucki Bankruptcy Research Database (BRD). We use a January 2013 extract from BRD. The database contains information on the filing (petition) date, emergence date, and bankruptcy court, the presence of a committee of creditors or equityholders, whether the reorganization plan was prepackaged or pre-arranged, and whether the debtor took out a debtor-in-possession (DIP) loan. We supplement BRD with data obtained from Bankruptcydata.com and Mergent's Fixed Income Securities Database.

None of these data sources provides detailed information about considerations received by different classes of creditors and pre-petition equityholders in court plans of reorganizations. Thus, we hand collect information on court-determined valuations of the debtors and the consideration given to claimholders from the final plan of reorganization and the related disclosure statement, downloaded

[10] For additional details, see *Trace Fact Book 2005*.

either from Public Access to Court Electronic Records (PACER) or firms' 8-K and 10-K reports on the SEC's Electronic Data Gathering, Analysis, and Retrieval (EDGAR) system. We obtain "fresh start" equity values and information on rights offerings (including capital injections by third-party investors) from post-emergence firm 10-K reports on EDGAR.[11]

Our source of data on prices, liquidity, and transaction dissemination status of outstanding bonds of debtors is the Enhanced TRACE Database. Data on post-emergence hedge fund equity ownership comes from distressed-debt-investing.com supplemented by hedge fund data provided by Wei Jiang, Kai Li, and Wei Wang (see Jiang, Li, and Wang (2012)) as well as institutional ownership data provided in 13-F filings on EDGAR. We obtain data on sell-side analyst coverage from I/B/E/S and firm financial characteristics from Compustat Annual Industrial Files. Finally, we obtain post-emergence common stock prices from Compustat Daily Securities Files and Bloomberg.[12]

Our sample of reorganizations is restricted to those companies which have publicly traded bonds eligible for TRACE transaction reporting. Since we need market values of the common stocks distributed by the court in the plan of reorganization to calculate misvaluation, we require that, upon emergence from Chapter 11, the debtor's common stock is publicly traded. Finally, we exclude the firms that emerge from bankruptcy with a fully reinstated capital structure.

We consider a firm as disseminated if transactions on one or more of the firm's outstanding bonds are actively disseminated via TRACE (that is, the dissemination flag in the TRACE data set is set equal to "Y" for transactions involving those bonds) between the filing date and the emergence date. For the non-disseminated cases, transactions in the debtor's bonds were recorded by TRACE—those

[11] Reporting standards for firms in Chapter 11 require they report the fair value of assets and liabilities in the opening balances in the reorganization plan upon emergence (called 'fresh start reporting'), provided that more than 50% of newly issued equity is received by creditors in the organization (see Lehavy (2002)).

[12] During our sample period, common stocks of firms that emerge from Chapter 11 generally trade OTC. Since the CRSP universe is restricted to NYSE, AMEX, and NASDAQ stocks, we do not rely on CRSP for post-emergence stock prices.

transactions became publicly available with the release, in March 2010, of the Enhanced TRACE Database which includes historical bond transactions.

As shown in Table I, the 130 firms that make up our sample include (i) 33 that emerged from Chapter 11 in the pre-TRACE period (between January 1, 1995 and June 30, 2002), when bond prices were not publicly disseminated, (ii) 49 that emerged from Chapter 11 during the TRACE implementation period (between July 1, 2002 and February 6, 2005), and, (iii) 48 that emerged in the post-TRACE period (after February 7, 2005) where the bonds were all disseminated, except for two cases where emergence date was in the first quarter of 2005 and, the bonds were not traded between February 7, 2005 and the emergence date.

Of the 130 firms in our sample, 54 are disseminated and 76 are non-disseminated.[13] The 54 includes 10 firms disseminated in Phase 1, 12 in Phase 2, 32 in Phase 3 (17 in 3A and 15 in 3B). Nine of those disseminated firms emerged from bankruptcy prior to Phase 3B, and the remainder emerged subsequently. Of the 48 firms that emerged from bankruptcy in the post-TRACE period, 30 had bonds that were disseminated in Phase 3A or before.

### *B. Key Events During the Chapter 11 Process*

Figure 1 illustrates the key events during the Chapter 11 process. The firm files for bankruptcy protection and if accepted by the court proceeds to submit a plan of reorganization which is likely to be amended a number of times after discussions with creditors. The final plan of reorganization comes with a disclosure statement which generally includes court valuation of the debtor, recovery rates of different claimants, and the types of securities they will receive. The plan is subject to a vote of the various impaired classes and if approved is then confirmed by the court, and the plan will become

[13] Table IAI in the Internet Appendix provides the list of 54 disseminated firms, as well as the dissemination phase and the reason for selection by TRACE for each firm. Table IAII provides a breakdown of the sample by filing and emergence year, as well as dissemination status. The Internet Appendix is available in the online version of this article on the *Journal of Finance* website.

effective shortly thereafter. Subsequently, the company emerges from Chapter 11 and the new securities begin trading.

Figure 1 shows the main events in the Chapter 11 valuation process and the time gap between the main events. As shown, the average number of days between the filing and emergence date of the final court plan is 380 days. The minimum is one month and the maximum is around six years. While not shown, the bankruptcy process (filing to effective) is much longer for the dissemination sample (534 versus 338 days, the difference being statistically significant at the 1% level).[14]

Also relevant is the interval between the confirmation of the reorganization plan by the court and first trading of the newly issued stocks since the longer the interval the greater the probability of arrival of new information about the enterprise value. The average for the whole sample is 80 days, and it is very similar for both the disseminated and non-disseminated samples (75 and 83 days, respectively).

### *C. Bond Trading Activity in Chapter 11*

The effect of dissemination on misvaluations in Chapter 11 likely depends upon sufficient liquidity in the bond market before the disclosure of the final court plan of reorganization, which reveals to market participants both the value placed by the court plan on the enterprise and how it is shared among the different claimants.

Figure 2 reports bond liquidity during the (-10, +10) calendar weeks centered on the week of Chapter 11 filing (Panel A) or the week the final court plan of reorganization is disclosed (Panel B). Because we do not have weekly transactions data before the introduction of TRACE, the analysis is based on the subsample of 96 bankruptcies during the TRACE and post-TRACE periods.

In Panel A, we examine weekly mean turnover. We define turnover at the firm level as the total weekly dollar volume of trades in an issuer's outstanding bonds, expressed as a proportion of the total face value of those bonds; we average turnover across firms. We have two important findings. First,

[14] One might expect a longer process to reflect more bargaining and therefore a greater incidence of multiple plans with dissemination and, smaller misvaluations. However, as shown in Table IAVI in the Internet Appendix, the length of bankruptcy process is not significantly related to misvaluations.

during the 10 weeks following filing and the weeks around the plan disclosure, turnover is similar to the pre-bankruptcy levels, mitigating the concern that liquidity may dry up and thus bond prices may become less informative during Chapter 11. Second, there is a considerable spike in turnover in the weeks on either side of filing where average turnover increases from 7% to 15%, then falling back gradually to around 5% thereafter. These numbers are largely consistent with the results from Lewis (2016), which shows that high levels of turnover around filing reflect in part the compelling need for some institutional holders to sell defaulted bonds and the emergence of vulture funds as significant investors in bonds in bankruptcy.

Panel B shows the mean number of bond transactions for each firm. Investors continue to trade prior to and around the disclosure date. During the five-week period before the disclosure date, where the plan value is set, there is a spike in the number of transactions, reaching a peak of 21. Transaction volume also increases around the filing date, reaching a weekly peak of 43.

We examine below the extent to which trading liquidity around the disclosure of the court plan facilitates the reduction of misvaluations when there is dissemination. In particular, we test whether differences in misvaluation between disseminated and non-disseminated bonds might be attributable to differences in bond liquidity, rather than to dissemination itself. We would expect that low levels of liquidity, that is stale prices, would dilute or even eliminate the impact of dissemination on misvaluations.

With respect to the literature on bond liquidity for distressed and defaulted securities, Elias (2018) examines trading in a large sample of bonds issued by firms that filed for bankruptcy between 2002 and 2012. He finds that Chapter 11 bonds are, on average, more heavily traded than other distressed bonds and are among the most heavily traded bonds in the corporate bond market.[15]

## III. An Analysis of Misvaluations

### *A. The Measurement of Misvaluations*

[15] Feldhütter et al. (2016) also provide descriptive statistics for the level of bond trading around bankruptcy filings (see also Jankowitsch, Nagler, and Subrahmanyam (2014) and Han and Wang (2014)).

We measure misvaluations using the following formula:

$$\text{Misvaluation}= \frac{|V_{court}-V_{market}|}{[(V_{court}+V_{market})/2]}$$

Here, $V_{court}$ is the value of the reorganized company's newly issued common stock in the final court plan of reorganization which we take to be the "fresh start" equity value obtained from the first post-emergence 10-K; only two firms in our sample did not adopt "fresh start" accounting, and in those cases plan values in the disclosure statement were used instead. In the majority of cases, the "fresh start" value is equal to the value of the new equity in the court plan.[16] There are two important exceptions. First, if the company made a rights issue and the proceeds of this issue were included in the "fresh start" equity value, the value of the rights offering (and any warrants) were subtracted from the "fresh start" value before calculation of a misvaluation. Second, in a few cases, changes in asset values occur between the plan confirmation date and the effective date, and in that event, the "fresh start" value reported in the 10-K is a revised and updated version of the court plan value. In that case, our misvaluation is based on the updated value and not the original court value. We adopt this rule because we do not wish misvaluations to capture changes in the intrinsic value of the assets between the date when the final plan of reorganization is announced and the date on which the firm emerges from bankruptcy as opposed to valuation errors in the court plan.[17]

$V_{market}$ is our proxy for the intrinsic, or fundamental, value of the newly issued common stocks. It equals the average split- and issuance-adjusted market value of the stocks three months after the first

[16] We have data on final court values for 75 cases. In 55.4% of those cases, court value and fresh start value are within 1% of each other. In 68.9% of the cases, they are within 5%, and in 79.7% of the cases they are within 10% of each other.

[17] For example, while the total equity value of American Banknote Corporation was estimated to be approximately $85 million when the court plan of reorganization was confirmed on August 22, 2002, on the effective day, the company assumed a "fresh start" equity value of $20.9 million. The adjustment was made due to several specific business-related events that impacted the valuation of the company, as discussed in the firm's post-emergence 10-K report. We took the "fresh start" equity value of $20.9 as being the value in the court plan of reorganization.

trading date subsequent to emergence, discounted back to the confirmation date of the final court plan of reorganization. In calculating excess returns, we use the daily CRSP equal-weighted industry return over the same time horizon.

When calculating misvaluations, we do not rely on the first available market price since practitioners suggest that stock prices may be temporarily depressed after emergence due to selling pressures (Gilson, Hotchkiss, and Ruback (2000)). We normalize the absolute difference between $V_{court}$ and $V_{market}$ by the average of the two values so as to (i) bound our measure of misvaluation between zero and two, thus reducing the potential effect of outliers on our results; and (ii) give equal treatment to overvaluations and undervaluations.[18]

### *B. Univariate Effect of Dissemination on Misvaluation*

Table II presents summary statistics on misvaluations for different partitions of the sample of 130 Chapter 11 reorganizations. As reported, the average misvaluation is 51.8% in the overall sample, 65.5% in the pre-TRACE sample, and 39.8% in the post-TRACE sample.[19] In comparison, Butler (2003) finds an average misvaluation of 54.7% in a sample of 71 Chapter 11 reorganizations during

[18] The second point is best illustrated with an example. Suppose Firm A has a court value of $40 million and market value of $60 million, and Firm B has a court value of $60 million and market value of $40 million. Misvaluation, based on our measure, is 40% in both cases. Using instead the plan value in the denominator would lead to misvaluations of 50% and 33% for Firm A and Firm B, respectively.

[19] Our reported misvaluation is based upon the difference between the court value and the market value of newly issued equity. Since newly issued equity is only 45% of the firm's capital structure, the misvaluation based on the enterprise value is 20.4% (=45.3% x 45%).

1990 to 1997.[20] In contrast to our sample, which only includes firms with publicly traded bonds, his sample includes some firms without publicly traded bonds.[21]

As shown in the last column of Table II, in about one-third of reorganizations in the full sample and in more than one-half of those in the pre-TRACE period the misvaluation exceeds 50%. Such large valuation errors raise significant concerns about the distributional efficiency of the Chapter 11 process (see Baird and Bernstein (2006) and Bebchuk (1988, 2002)).

The focus in this paper is on whether the dissemination of bond prices during the Chapter 11 process reduces misvaluations and consequent inter-claimant wealth transfers. As shown in the top panel of Table II, the average misvaluation of the 54 disseminated firms in our broad sample is substantially lower than that of the 76 non-disseminated firms (38.2% versus 61.5%). The difference between the two groups is 23.3% and is statistically significant at the 1% level. We see a similar pattern using medians, suggesting that the mean difference is not driven by outliers.

In the bottom panel, we report misvaluations for the pre-TRACE sample, where all firms are non-disseminated, and the post-TRACE sample, where all firms are disseminated. In this analysis, we exclude firms that emerged from bankruptcy during the TRACE implementation period. As shown, we find that post-TRACE firms have 25.7% (30.6%) lower average (median) misvaluations than pre-TRACE firms; the difference is statistically significant at the 5% level.

To summarize, the univariate evidence in Table II is consistent with the hypothesis that dissemination of bond prices reduces misvaluations.

### *C. Comparison of Firm and Bankruptcy Characteristics*

[20] Lehavy (2002) estimates misvaluations of 11.5%, where the denominator of his misvaluation measure is the enterprise value. Transforming the denominator into an equity value increases the misvaluation to around 46%, which compares with around 52% in our sample.

[21] We find that the mean difference between court value and post-emergence market value scaled by the average of the two values, that is, directional misvaluation, is not significantly different from zero.

In Table III, we provide bond, firm, and bankruptcy characteristics for firms in both the dissemination and the non-dissemination subsamples. The table presents mean differences in the characteristics between the two samples and their statistical significance. Our goal is to investigate the extent to which those differences might explain the pattern of misvaluations reported in Table II. Appendix A provides the definitions of the variables used in the table.

In Panel A, we compare the two samples based on characteristics that TRACE used in selecting bonds in various dissemination phases. Those characteristics include whether the firm's outstanding bonds were included in the High Yield 50 list by FINRA during 1996 to 2002,[22] whether the firm was rated investment grade in the three years before Chapter 11 filing (whether it was a fallen angel), whether the firm has an outstanding bond with an original issue size exceeding one billion dollars, and whether the bond's liquidity exceeded the liquidity threshold used to separate Phase 3A versus 3B bonds. We find that disseminated bonds are more likely to be fallen angels, have a higher original issue size, be more liquid, and are more likely to be in the High Yield 50.

In Panel B, we report bankruptcy characteristics which include variables that proxy for the complexity of bargaining. Gilson, Hotchkiss, and Ruback (2000) argue that the size of valuation errors in Chapter 11 is "… systematically related to proxies for the competing financial interests and relative bargaining strengths of the participants." These competing interests suggest that the senior creditors have incentives to undervalue the enterprise and thereby gain a larger proportion of the post-emergence equity laid out in the court plan, whereas the junior creditors have an incentive to overvalue the enterprise so that value is left over for them in the court plan. Like Gilson et al. (2000), we measure the complexity of the bargaining process between senior and junior claimants using the following indicator variables: an equity or creditors committee is formed, percentage hedge fund ownership in the court plan, institutional ownership concentration, the presence of a third-party equity investment in the firm or a rights offering, the incidence of DIP financing, secured debt to total debt, and the presence of

[22] FINRA provided us 14 different lists of High Yield 50 firms covering this period. We set the High Yield 50 indicator equal to one if the issuing firm appears in any one of those lists, and zero otherwise.

multiple plans. The more complex the bargaining process the less transparent the valuation to the court and the greater is the potential for misvaluation.

One variable, "third-party equity and rights issues" deserves some clarification. Rights offerings allow debtors to offer their claimholders the right to purchase equity in the post-emergence company. They usually involve a solicitation of the eligible claimholders in connection with the plan of reorganization. If the claimholders are offered equity distributions in the court plan and they believe that the offer price is below the true value of the shares, they have a strong incentive to participate in the offering to avoid dilution. Rights offerings can serve as a mechanism to resolve valuation disputes; specifically, by investing in a rights offering, a group of claimholders can demonstrate to the bankruptcy judge their belief in a particular valuation by "putting their money where their mouth is" (in the spirit of Bebchuk (1988, 2002), Roe (1983)), thereby increasing the accuracy of court valuations.

To summarize, in five of the eight variables proxying for complexity, the difference in means between the two subsamples suggests that they are more prevalent and statistically significant for firms with disseminated bonds than for those without; and in three cases they are similar. For example, the prevalence of capital injections through rights offerings or by third-party investors is greater in the dissemination sample (33% vs 20%), and likewise in hedge fund ownership (16.8% vs 6.1%). Also, there is a likelihood of more DIP financing in firms with disseminated bonds. Under the null hypothesis that dissemination has no effect on misvaluations, we would expect larger misvaluations in the dissemination sample, which is contrary to the univariate results reported earlier.

In Panel C, we measure valuation uncertainty using three variables: firm size, the presence of sell-side stock analysts that cover the firm, and market volatility measured by the VIX at Chapter 11 filing. Greater uncertainty in the disseminated sample would suggest higher misvaluation. The dissemination subsample includes firms with on average larger assets (7.9 vs 6.4), virtually identical analyst coverage, and a higher VIX index (26% vs 22%) compared with the non-dissemination subsample. Unlike complexity, the results for valuation uncertainty are mixed: larger size suggests less uncertainty and a higher VIX suggests greater uncertainty. Thus, there is no firm prediction for uncertainty characteristics and the direction of misvaluation between our two sub-samples.

In the next subsection, we address concerns about differences in characteristics more formally, by providing a regression analysis where we control for these characteristics so as to identify their incremental effect on misvaluation differences between the two subsamples.

### *D. Regression Results*

Table IV presents our misvaluation regressions. We cluster regression standard errors at the 3-digit SIC Code level throughout the paper since misvaluations may be correlated within an industry.[23] In column (1), we estimate a univariate impact of dissemination of -23.3%. Since disseminated bonds are in general larger, more liquid, and more highly rated (pre-bankruptcy) than non-disseminated bonds (see Table III), misvaluation differences between the disseminated and non-disseminated firms might reflect differences in their bond characteristics. We address this selection concern in two ways.

First, we partition the dissemination dummy in column (1) with dummy variables that indicate the phase in which the firm's bonds were publicly disseminated for the first time. If the selection criteria used at the different phase introductions are correlated with the difficulty (or complexity) of valuing the firm, dissemination could simply serve as a proxy for those criteria instead of having a causal impact on misvaluations. If that is indeed the case, we would expect firms with disseminated bonds in earlier phases to have lower misvaluations than firms disseminated in later phases.

As shown in column (2), we find that firms disseminated in the first two phases ($N$=22) and firms disseminated in the final phase ($N$=32) have 25.9% and 21.5% lower misvaluations, respectively, than non-disseminated firms (both statistically significant). The difference between the phase dummies of 4.4%, is economically small and statistically insignificant. This suggests that the effect of dissemination does not vary with TRACE bond selection criteria at different phase introduction dates.

Second, in column (3) we directly control for the four selection criteria used by NASD at various phase introductions. None of the coefficients on the selection criteria is statistically significant. Also, the coefficient on dissemination barely changes with these controls. These two sets of results

[23] There are 70 different unique clusters in our sample; the average cluster size is 1.9.

suggest that selection criteria cannot explain much of the effect of dissemination reported in column (1).

In column (4), we present a specification with firm and bankruptcy characteristics as well as industry (1-digit SIC Code) fixed effects. We find that the dissemination coefficient is -24.8%, similar to the univariate estimate, and significant at the 1% level. In column (5), we combine the controls in columns (3) and (4), and find that the dissemination coefficient is -22.5%, which is significant at the 1% level. In column (6), we present a specification where we include the subset of control variables in column (5) that are significant at the 10% level to mitigate concerns about overfitting. The coefficient on dissemination is barely changed and remains significant at the 1% level.

In summary, the coefficient on dissemination is remarkably stable across the different specifications; the range is about 21% to 25%. We conclude that differences in bond, firm or bankruptcy characteristics do not appear to drive differences in misvaluation between disseminated and non-disseminated firms.[24]

[24] We conduct a battery of empirical tests to check the robustness of these findings and report them in the internet appendix that accompanies the paper. First, in Table IAIII, we find that the effect of dissemination remains large and statistically significant when we measure market values based on stock prices 1-month or 6-months after emergence (instead of 3-months) discounted to the emergence date using industry-adjusted returns. The disadvantage of using the stock price 1-month after emergence is that it might be temporarily depressed due to selling pressures (Gilson et al. (2000)). The disadvantage of using prices 6-months after emergence is that there is a greater likelihood that the market prices will include information that was not available at the time of the court valuation. Second, in Table IAIV, we split our full sample into two based on median post-emergence stock liquidity and find that dissemination has a significant effect on misvaluations in both subsamples. Third, as shown in Table IAV, we find that the effect of dissemination on misvaluation remains significant using robust standard errors that are not clustered. Fourth, as shown in Table IAVI, when we control for the length of the bankruptcy process or the time gap between emergence and first post-emergence trade, the effect of dissemination barely changes. Finally, we implement a propensity score matching methodology to focus only on those disseminated firms that are in the same covariate space as non-disseminated firms. We find that the effect of dissemination (in absolute value)

In Table V, we provide a series of time-series tests to address concerns that judicial learning or confounding events can explain our findings. In the first two columns, we estimate misvaluation regressions using the sample of firms that emerged from Chapter 11 between July 1, 2002 and December 31, 2007, which we refer to as the TRACE sample. The advantage of this sample is that it focuses on a relatively short time window and therefore is unaffected by the impact of potential time-series changes on the efficiency of court valuations or potential confounding effects of the 2005 Bankruptcy Reform Act and the global financial crisis. Column (1) does not include any controls, whereas column (2) includes the same set of control variables in column (5) of Table IV. As shown, we find that dissemination reduces misvaluations by between 30% to 34%, which is about 10% larger than the estimates for the full sample.

In column (3), we present a specification with both filing and emergence year fixed effects based on the full sample. The idea is to isolate unobserved time effects. We are able to estimate this model because there are years in our sample in which disseminated and non-disseminated firms coexist. However, since the latter sample is small (9 companies) the results are suggestive and show that the effect of dissemination remains economically large and statistically significant at the 1% level.

In columns (4) and (5), we find that the effect of dissemination is virtually unchanged when we include binary controls for firms affected by the financial crisis (which applies to firms that emerged between 2007Q3 and 2010Q1) and the 2005 Bankruptcy Reform Act (which applies to cases filed after October 17, 2005).

In column (6), we present a regression that includes a linear time trend based on the emergence year. We find that the coefficient on the trend variable is positive but statistically insignificant, which is inconsistent with judicial learning. Also, once we control for the time trend, the coefficient on dissemination becomes larger (increases to almost 40% in absolute value) and its standard error smaller.

Finally, in column (7), we estimate the effect of dissemination using only the pre-TRACE and post-TRACE samples; that is, we drop the TRACE sample from the estimation. The focus here is on a

increases from 20.7% in the unmatched sample to 35.5% in the matched sample and it remains statistically significant, as shown in Table IAVII.

subsample where dissemination was not assigned based on bond characteristics and therefore selection problems are not present. As shown, we find that dissemination is associated with a 45% reduction in misvaluations (significant at the 5% level) in this subsample.

To summarize, we find no evidence in Tables IV and V that selection, judicial learning, or confounding events are driving our results.[25]

### *E. Placebo Test*

To further address the concern that the relationship between dissemination and misvaluation is driven by selection or it is spurious, we simulate placebo TRACE rollouts for our sample of non-disseminated firms. If the differences in misvaluation between the disseminated and non-disseminated firms are driven by differences in their bond characteristics (due to FINRA's selection criteria at different phases), we would expect to find a significant negative relationship between dissemination and misvaluations in the placebo samples.

To maximize the number of treated firms within a simulated sample, and therefore increase both the power of the tests, and the number of distinct simulations, we make the following two choices in implementing our placebo tests. First, we consider a firm to be placebo disseminated if it meets one or more of the selection criteria used by TRACE over a simulation year. Second, we do not constrain the simulation years to the order of the actual TRACE rollout.

In our placebo tests, firms are assigned to Phase 1 dissemination if they satisfy both Phase 1 bond rating and size criteria, or if their bonds were part of the High Yield 50 program during calendar years 1996, 1998, 1999, and 2000. Similarly, firms are assigned to Phase 2 dissemination if they include a bond that is rated A or higher during 1995 to 2001. We assign a firm Phase 3A dissemination if it has

[25] The average directional misvaluation (which some refer to as bias), which is the difference between the court value and the market value scaled by the average of the two values, is -10.9%. Since the dispersion in directional misvaluation is very wide, the mean is statistically indistinguishable from zero. The relationship between dissemination and directional misvaluation is negative but is statistically insignificant. The effect of dissemination on misvaluations remains unchanged when we control for directional misvaluation.

an outstanding bond that traded at least once a day in 2002 or 2003. Out of the 56 possible combinations (= 4 x 7 x 2) of our simulated TRACE rollouts, 39 yield distinct portfolios of disseminated and non-disseminated bonds. On average, each simulation has 17 disseminated firms out of the possible 76 firms.

Figure 3 presents our results. For each of the 39 placebo samples, we estimate a separate OLS regression where we regress misvaluation on dissemination. Each black dot in the figure indicates the estimated effect of dissemination on misvaluation for one of the 39 simulated samples. The shaded region shows the 95% confidence intervals around each coefficient estimate using robust standard errors clustered at the 3-digit SIC Code level. The average coefficient on dissemination is +1.4, suggesting that "fake" disseminated firms on average have a 1.4% *higher* misvaluation than non-disseminated firms. Of the 39 placebo tests, 17 (22) yield a negative (positive) coefficient. None of the coefficients are statistically significant at the 5% level and only one is negative and significant at the 10% level, which would be expected with random variation in these coefficients.

While not shown, we repeat the placebo analysis in a multivariate setting using the control variables in Table IV, column (6). Here, we find an average placebo effect of dissemination of +1.9% and again, none of the 39 dissemination coefficients are significant at the 5% level (available on request).

To summarize, the placebo analysis indicates that differences in misvaluations between placebo disseminated and non-disseminated firms are on average around zero, and therefore the large misvaluation differences between disseminated and non-disseminated firms in our actual sample cannot be attributed to differences in their characteristics.

### *F. Bond Price Informativeness*

Our final test to rule out selection is cross-sectional, comparing misvaluations of different groups of disseminated firms. We hypothesize that if dissemination is an important informational channel for reducing misvaluations, it can only function effectively if the bonds are sufficiently traded, that is, the prices are not stale, around the confirmation of the court plan and the bondholders receive a significant fraction of post-emergence equity, that is, the bond's value is sensitive to the size and allocation of the pie.

To test this hypothesis, we create a binary informativeness measure that equals one if the firm has a bond that trades on at least 5 separate days during the 60 trading days prior to the confirmation of the final court plan, and it is part of a claim class that receives at least half of the emerging firm's newly issued common stocks. Our estimation sample is restricted to 96 firms that appear in TRACE, as TRACE daily transactions records are required to calculate informativeness.

Table VI presents our results. All the regressions in the table include a dissemination dummy, an informativeness dummy, and the interaction between the two variables. In column (1), we include no additional controls. In column (2), we saturate our model with our full set of firm and bankruptcy controls as well as industry fixed effects. In column (3), we report a model that is similar to the one in column (2) but includes a more restricted list of firm and bankruptcy controls (as in column (5) of Table IV). Finally, in column (4), we include interactions between dissemination and the control variables in column (3). This specification addresses concerns that forcing the coefficients on the control variables to be equal for the dissemination and non-dissemination group may have the unintended consequence of making the interaction term to be spuriously significant.[26]

Overall, we find that the coefficients on dissemination and informativeness on their own are never significant. This suggests that more liquid fulcrum bonds in the absence of dissemination have no noticeable impact on misvaluations. Without sufficient trading dissemination also has no noticeable effect on misvaluations. Only when we combine more liquid fulcrum bonds with dissemination do we find a large and statistically significant reduction in misvaluations.[27]

## IV. Inter-claimant Wealth Transfers

[26] These results are robust to using a continuous measure of informativeness which is based on the percentage of days traded before the confirmation of the final court plan (see Table IA.VIII).

[27] In Table IAIX in the Internet Appendix, we find evidence that dissemination is associated with large reductions in mean and median misvaluations in many different subsamples of the data constructed using firm or bankruptcy characteristics.

An important issue is whether misvaluations lead to significant wealth transfers between different claimants. There is a large literature on wealth transfers between equityholders and different creditor classes, although it is focused on the extent to which court plans in Chapter 11 deviate from the absolute priority of contractual debt and equity claims. These deviations from strict absolute priority have been widely documented in the literature and on average amount to 7.6% of the reorganized firm's enterprise value, although during the first half of the 2000s they have declined to less than 2% of the firm's value (see Bharath, Panchapagesan, and Werner (2014).[28]

In this section, we provide evidence that misvaluations in court plans lead to substantially larger unintended wealth transfers between claimants and therefore merit study in their own right. Moreover, we show that dissemination sharply reduces unintended wealth transfers.

### *A. The Measurement of Unintended Inter-Claimant Wealth Transfers*

To examine whether misvaluations lead to unintended wealth transfers between different claimholders, we first collect information on the size (referred to as the "allowed amount" in court documents) of each claim class as well as court-determined values of cash, notes, and equity securities distributed to these classes in the final plan of reorganization. We find two circumstances in our sample where the calculation of wealth transfers is complicated by the difficulty in deviations raises important issues of establishing the priority of claims.

First, the usual partitioning of the pre-bankruptcy claims into bank debt, senior debt, junior debt, and equity does not always suffice, because sometimes unsecured debt is partitioned in the court plan into senior unsecured, unsecured, and junior unsecured classes; the same happens with subordinated debt where one class may be designated senior while another is designated, junior. In the court plan of reorganization, consideration is often given to both classes, even when the more senior

[28] For a subsample of 66 firms that emerge from Chapter 11 between July 2002 and December 2007, we measure intended deviations from absolute priority that are relatively small, averaging 3.7%; the differences between the dissemination and the non-dissemination subsamples are not economically large or statistically significant.

class is not fully satisfied. The question arises as to whether the failure to satisfy the senior class of the same security should be regarded as an intended deviation from absolute priority or as an appropriate allocation of the bankrupt assets reflecting the claimholders' contractual rights. Our measures of unintended absolute priority deviations reflect the latter assumption, that is, the allocation is assumed to reflect the contractual rights of the claimant; as a result, they provide a lower bound for the frequency and size of deviations. We find five cases where this issue is of significance.[29]

A second issue concerns the case where the market value of the collateral for a particular class of creditors is below the face value of the claim. In that case, the creditor's claim will only be partially satisfied by the collateral, and the remainder of the claim will be regarded by the court as unsecured and pooled with claims of other unsecured creditors. In this event, a reported recovery rate of less than 100% of the face value of the claim accompanied by non-zero recovery rates for all pooled unsecured claims does not necessarily represent a violation of absolute priority. We find five cases where this issue is of significance.[30]

The previous literature does not provide a standard way to deal with these issues. It may be that some papers have ignored subtle variations in seniority within a given class and classified them as an intended deviation from strict absolute priority where within a given class the more senior security is

[29] For example, in American Banknote Corporation's final court plan of reorganization in 2002, both *senior subordinated* claimholders with allowed claims of $106.2 million and convertible *subordinated* noteholders with allowed claims of $3.7 million received newly issued common stocks of the reorganized company. Court-determined recovery rates were 72.0% and 43.2%, respectively. We do not consider distributions to the subordinated class before the senior subordinated class is fully satisfied as a violation of the absolute priority rule.

[30] For example, in Keystone Consolidated Industries, Inc.'s 2005 Chapter 11 reorganization, the DIP lender also held an unsecured prepetition claim. Its claims were aggregated into a single class with a face value of $20.2 million. This creditor was given common stock by the court and had a court-determined recovery rate of 54%. General unsecured creditors with $43.7 million in allowed claims also received common stock distributions and had a court-determined recovery rate of 46.9%. We do not consider distributions to the general unsecured creditors before the DIP lender is fully satisfied as a violation of the absolute priority rule.

given less than 100% recovery while the more junior security also receives some recovery. In this case, we would not necessarily regard such distributions as constituting a deviation from absolute priority.

An unintended absolute priority deviation occurs when a court undervaluation (overvaluation) of the newly issued common stocks results in wealth transfers from junior to senior (or senior to junior) claimants. For example, consider a hypothetical Chapter 11 reorganization where both senior creditors and junior creditors each have allowed claims of $100. Consider, for simplicity, that the bankruptcy court only distributes newly issued common stocks to claimants (no cash, notes, or warrants are distributed). Suppose also that the court values the stocks at $125, and distributes 80% of the stocks to senior creditors, resulting in a 100% recovery rate for senior creditors. The remaining 20% of the stocks, after senior creditors are fully paid off, are distributed to junior claimants, consistent with the strict absolute priority rule. Suppose, however, that market participants value the stocks at $80 upon emergence from Chapter 11, indicating that the court significantly overvalued the company. Based on market values, senior creditors recover 64%, and junior creditors recover 16% of their allowed claims. Since junior claimants received payments before senior claimants are fully satisfied, there is an unintended violation of absolute priority. The size of the valuation error in this example is $45 (or 43.9% based on our misvaluation measure), and the size of wealth transfer from senior creditors to junior creditors due to misvaluation is $16. In our empirical analysis, we scale the dollar amount of the wealth transfer (in absolute value) by the average of the court and post-emergence market value of newly issued common equity. Therefore, the size of unintended inter-claimant wealth transfer in the example is 15.6%.[31]

[31] Inter-claimant wealth transfers may also arise from court undervaluation of the newly issued stocks. For example, in the hypothetical reorganization above, suppose the court values the new shares at $80, distributes all the new shares to senior creditors following the strict absolute priority rule, but upon emergence from bankruptcy market participants value the shares at $125. This would result in a $25 wealth transfer from junior creditors to senior creditors based on market values (an unintended inter-claimant wealth transfer of 24.4% based on our measure), since this is the amount that the junior creditors would have received if the court had had perfect foresight.

Our guiding principle in estimating wealth transfers is to determine what the Chapter 11 process would have distributed to creditors had participants known the "true" valuation when deciding on the plan.[32] When calculating the size of unintended inter-claimant wealth transfers, we assume that no claimant's recovery can exceed 100% of his allowed claim. We also assume the value of cash and notes does not change from the court plan to emergence and focus only on the distributional effects of common stock misvaluations.

### *B. The Effect of Dissemination on Unintended Inter-Claimant Wealth Transfers*

In Panel A of Table VII, we show that the probability of an unintended wealth transfer is substantially lower in the dissemination subsample, at 33% compared with 66% in the non-dissemination subsample. We also report the size of unintended wealth transfers as a proportion of the average of the court and the post-emergence market value of the newly issued equity. The average size of (unconditional) unintended wealth transfers is 8.24%. If we confine the sample to cases where there are unintended wealth transfers, the average size of the wealth transfers rises to 15.76%. The size of those unintended (unconditional) wealth transfers is far lower at 2.55% in the dissemination subsample compared with 12.28% in the non-dissemination subsample. These differences are economically large. Overall, the evidence suggests that dissemination reduces in half the frequency of unintended wealth transfers between different claim classes, while lack of dissemination causes frequent and economically large wealth transfers that are about four times the size of intended wealth transfers in the court plans.

Univariate differences in the frequency and the average size of inter-claimant wealth transfers between the dissemination and non-dissemination groups may arise from differences in firm and bankruptcy characteristics. To address this issue, we estimate the incremental effect of dissemination

[32] Large misvaluations do not necessarily lead to wealth transfers. For example, in the case of Joy Global, the unsecured holders received a court recovery of 53% based on the court agreed value. Although, the stock price was 86% higher than the court value, leading to an ultimate recovery rate of 99%, there was no wealth transfer. This shows that where recovery rates for a fulcrum class are sufficiently low in the court plan there may be a sufficiently large buffer before a misvaluation produces a wealth transfer.

on unintended wealth transfers using multivariate regressions. Since the dependent variable is left-censored, that is, wealth transfers equal zero for approximately half of our sample, the OLS coefficients are inconsistent; thus, we estimate Tobit models instead of OLS.

Panel B of Table VII presents the results. The first six regression specifications in the table are identical to those used in Table IV where we examine the effect of dissemination on misvaluation; the remaining two regressions are based on the TRACE sample and serve as robustness checks. The evidence suggests that, holding all the other variables in the model constant, dissemination reduces the predicted inter-claimant wealth transfer by between 19% and 24% (between 25% and 30% in the TRACE sample). The high level of stability of the coefficient estimate on dissemination in different specifications mitigates concerns about selection bias.

Overall, the results in Table VII are consistent with dissemination substantially reducing inter-claimant wealth transfers arising from misvaluations.

### *C. Which Classes of Creditors Gain and Lose?*

One question arising from these wealth transfers is, who are the gainers and losers among equityholders and the different creditor classes? This is an important question in the pricing of the different debt and equity claims.

Table VIII provides information about the direction and magnitude of the 70 wealth transfers involving 68 unique companies in our sample. It should be apparent that wealth transfers may benefit a class of claimholders, for example, secured creditors, in some bankruptcies while resulting in losses in others.

In Table VIII the gainers are described in the rows and the losers in the columns. The size of the transfers between different classes of claimants are reported in both dollar terms and as percentages of the total post-emergence market value of equity (in brackets) of those cases. In aggregate, gains to all claimholders total $6.2 billion, corresponding to 15.9% of the total post-petition equity value of the 68 firms in the wealth transfer sample.

Wealth transfers are a zero-sum game. For example the table shows that secured creditors gained in total $1.027 billion in six cases. Those gains came from unsecured ($280 million) and

subordinated ($747 million) creditors. Offsetting this gain, they lost $472 million, mostly to unsecured creditors. Netting off the losses from the gains gives a net gain of $555 million; this corresponds to 6.8% of the post-emergence equity of those cases where secured creditors were involved in a wealth transfer (including both gainers and losers).

The largest beneficiaries from wealth transfers are the subordinated claimholders. Their net gains add up to $1.2 billion, roughly 8.5% of the total market value of post-emergence equity. The largest losers are prepetition equityholders, losing in 21 cases and gaining only in 13 cases. The net losses of prepetition equityholders add up to $1.4 billion, or 11.1% of the total market value of post-emergence equity.

Even when pre-petition equity receives some (equity) consideration, their median share of the post-emergence equity is only 3%.[33] The literature documents a decline in the influence of pre-petition equity. In the 1980s, equityholders gained from violations of absolute priority in around three-quarters of Chapter 11 reorganizations, whereas by the later period of 1991 to 2005 the proportion had dropped to only 22% (see Bharath et al., 2014). There is also a similar decline in the magnitude of violations in favor of pre-petition equity.

Misvaluations are not included in the conventional, that is, the intended APR metric. In contrast, as shown in Table VIII, the unintended wealth transfers arising from misvaluations are far more significant (the frequency is 52% and the conditional average size is 15.8%). This empirical observation should be priced into risky debt.

Ayotte and Morrison (2009) find 'evidence of frequent creditor conflict'…and 'that creditor conflict has an important effect on bankruptcy outcomes' (page 514). They conclude that whereas in the 1980s the conflict was between creditors and equityholders, the conflict post-2000 is between senior and junior lenders. The considerable differences in the gainers and losers provide evidence of the significance of the inter-creditor conflict.

[33] In 30% of cases, the prepetition equity receives some consideration: 19% receive some equity (6% with warrants) and 11% receive warrants only.

## V. Dissemination and Reliance on Bond Prices in Court Valuations

In this section, we investigate the channel through which dissemination affects court valuations. Dissemination could improve the aggregation of information and therefore the informational efficiency of bond prices. If that is correct, where there is dissemination, we would expect bond prices to be better predictors of the recovery rates incorporated in the final plan of reorganization. As a consequence, we would expect bond prices to impound any new information on recovery rates in the plan of reorganization well before the announcement of the plan.

In Figure 4, we divide the time between the bankruptcy filing and the confirmation date of the final court plan of reorganization into 20 equal-sized time windows and compare the median bond price in each window with the median price right after the confirmation date of the plan. We use the subsample of firms that were in bankruptcy during the TRACE and post-TRACE periods for this analysis. We only include unsecured bonds that actively traded in at least five windows in the last half of the reorganization process. If there is no trading in a given window outside those five windows, we use the price of the most recent prior transaction. As shown, we find that at any point in time during the second half of the bankruptcy process, prices of disseminated bonds are closer to the market prices on confirmation of the final court plan of reorganization. This suggests that disseminated bond prices impound more quickly the information content in the final court plan of reorganization and that bankruptcy participants pay more attention to bond prices when they are disseminated.

We test this hypothesis more formally by estimating the relation between dissemination and absolute bond returns around the announcement and confirmation of a court plan of reorganization. With dissemination, the earlier arrival of information should mean that there will be fewer surprises and therefore lower absolute returns. We estimate regressions which take the following form:

$$\left|\frac{p_{i,t}^{after}}{p_{i,t}^{before}} - 1\right| = \alpha + \beta * Dissem_i + \eta X_{i,t} + e_{i,t} \qquad (3)$$

Here, $p_{i,t}^{before}$ ($p_{i,t}^{after}$) is the median price of bonds for firm *i* in the ten days before (after) the plan of reorganization presented at time *t*. $X$ is a matrix of firm and bankruptcy characteristics as well as industry fixed effects. The main coefficient of interest is $\beta$ which we expect to have a negative sign.

Our estimation sample consists of 222 events involving 77 unique companies. For this analysis, we drop 33 pre-TRACE firms because of missing daily bond transaction data. We drop an additional 20 companies because they have two or fewer trades during their event windows and we are unable to calculate absolute returns.

Table IX presents our results. As shown in column (1), we find a negative and significant $\beta_1$, indicating that the average absolute return around the release of a plan of reorganization is about 5.2% lower for disseminated bonds than for non-disseminated bonds (significant at the 1% level). All else equal, relative to the mean absolute return of 13.8% in the non-dissemination sample, the absolute return around the announcement of a court plan is about 38% lower for firms with disseminated bonds. The coefficient on dissemination increases (in absolute value) slightly when we control for TRACE phase selection criteria as well as firm and bankruptcy characteristics in columns (2) to (4) and is statistically significant in all but one of the specifications. Overall, the evidence is consistent with the hypothesis that dissemination is associated with fewer surprises at the announcement or confirmation of the court plan, which can be explained by both the earlier arrival of information and bankruptcy participants paying more attention to disseminated bond prices.

## VI. Conclusion

Our paper investigates whether public dissemination of defaulted bond prices help reduce misvaluations in Chapter 11 bankruptcies and the wealth transfers between different classes of creditors that may result from those misvaluations. In our analysis, we take advantage of the introduction of the TRACE dissemination program which provides a quasi-random shock to the transparency of corporate bond transactions. We find an economically large and statistically significant reduction in misvaluations for firms with disseminated bond prices. The effect of dissemination is large enough to sharply reduce inter-claimant wealth transfers and APR violations associated with valuation uncertainty. While the attitudes towards the use of market prices to determine the size of the pie and how it is allocated between the different claimants in the court plan varies considerably within the judiciary, our findings suggest that verifiable and transparent bond prices act as a valuable source of information in Chapter 11.

Our paper has important policy implications in other settings, for example, where EU bank resolution authorities use hypothetical valuations to determine haircuts for particular bonds. Our results also have some important asset pricing implications. Even if court valuations are unbiased, the reduction in valuation uncertainty due to dissemination will reduce the option value of default in bond pricing and therefore reduce the offered returns on bonds.

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## Appendix A: Variable Definitions

| Variables | Definition | Source |
|---|---|---|
| Disseminated (d) | =1 if transactions on one or more of the firm's outstanding bonds are disseminated via the TRACE system (that is, the dissemination flag in the TRACE data set is set equal to "Y" for transactions involving those bonds) between the filing date and the emergence date. | TRACE |
| *TRACE selection criteria:* | | |
| High Yield 50 firm (d) | =1 if the firm was included in the NASD's High Yield 50 lists between 1995 and 2004 (we were unable to obtain the list for the year 2006 from FINRA). | FINRA |
| Fallen angel (d) | =1 if the firm was rated investment grade (rated BBB- or higher) by S&P in the three years prior to filing for Chapter 11 bankruptcy. | FISD |
| >$1bn original issue size (d) | =1 if the firm had a bond with $1 billion face value or higher at any time in the three years prior to filing for Chapter 11 bankruptcy. | FISD |
| Liquidity > Phase 3A threshold (d) | =1 if the firm has any bonds that meet the Phase 3A liquidity threshold, that is, the security trades an average of one or more times per day. | TRACE |
| *Firm characteristics:* | | |
| LN(Assets ($mm)) | Natural logarithm of total assets ("fresh start" value). | Post-emergence 10-K |
| Leverage | Total debt / Total assets ( "fresh start" value). | Post-emergence 10-K |
| Number of analysts | The number of sell-side equity analysts that covered the firm in the year before the Chapter 11 filing. | IBES |
| Analyst coverage (d) | =1 if the firm has sell-side equity analyst coverage in the year before the Chapter 11 filing. | IBES |
| Penny stock | =1 if the court plan indicates a share price of less than $2. | Compustat |
| Bond liquidity | Percent of trading days where the firm has at least one transaction during the one year window before bankruptcy filing excluding the 30 calendar days before filing. | TRACE, NAICS for measurement period pre-TRACE |
| VIX at filing | The level of the VIX index at Chapter 11 filing | Yahoo Finance |
| % hedge fund ownership, emergence | Percent of post-emergence shares owned by hedge funds | Thomson 13f, Distressed-Debt-Investing.com |
| Inst. ownership HHI, emergence | Herfindahl index of post-emergence common stock ownership among 13f filers. | Thomson 13f |
| Informativness (d) | =1 if the firm has a fulcrum security (for example, a bond from pari passu classes that receives the majority of post-emergence equity) that trades at least five days during the 60 calendar days prior to the confirmation date. | FISD, TRACE, PACER |
| *Bankruptcy characteristics:* | | |
| Court: DE or NY SD (d) | =1 if the bankruptcy court is Delaware or New York Southern District. | Lopucki |
| Prepackaged (d) | =1 if the final court plan of reorganization was prepackaged or prenegotiated. | Lopucki |
| Equityholders' committee (d) | =1 if equityholders formed a formal committee during Chapter 11. | Lopucki |
| Creditors' committee (d) | =1 if creditors formed a formal committee during Chapter 11. | Lopucki |
| DIP loan (d) | =1 if the debtor obtained DIP financing. | Lopucki, Dealscan, Capital IQ |
| Multiple plans (d) | =1 if the original plan is amended or an alternative plan is submitted to the bankruptcy court. | PACER |

## Appendix B: Alternative Explanations of Misvaluations

We consider whether potential bias in court valuations and the speed at which bias is eliminated from post-emergence market prices can explain differences in misvaluations and inter-claimant wealth transfers between the disseminated and non-disseminated firms. We also consider the extent to which control premiums in bond prices and fire sale discounts reduce the informativeness of market prices and thereby influence the difference in misvaluations between the disseminated and non-disseminated firms.

### Bias

There may be bias in court valuations, because different creditor groups are able to persuade the court to place an excessively large, or small, valuation on the enterprise. If the bias is large and it does not unravel post-emergence, we might measure misvaluation and wealth transfers with significant error.

However, there are three reasons why we believe bias cannot explain the very large misvaluation and wealth transfer differences between the disseminated and non-disseminated firms in our sample. First, the median size of the bias in court valuations, as estimated by LeHavy (2002), is relatively small at 1.4% of enterprise value, or approximately 7% of post-emergence equity, compared with the median reported reduction in misvaluations of 23.9% due to dissemination (see Table II). Second, LeHavy (1999) finds that market participants see through and adjust for the bias. Third, if dissemination increases the transparency of values to the court, then the bias is likely to be smaller (not larger) with dissemination than without dissemination.

### Control premiums

Traded bonds in Chapter 11 may carry a control premium, in particular around the voting of the court plan. Feldhütter, Hotchkiss, and Karakas (2016) estimate control premiums on bonds around control events using credit default swaps. The control premium is greatest for bonds that are pivotal to changes in control (fulcrum securities). Their control premium averages 6.3% for firms leading up to default and Chapter 11 bankruptcy. These control premiums seem to be concentrated in fulcrum bonds which are pivotal in control contests.

The control premiums around the court plan are unknown since Feldhütter et al., do not measure the control premium around the court valuation date, because the CDSs are not traded subsequent to bankruptcy filing.

We acknowledge that the presence of a control premium, which is difficult to measure, may reduce the informativeness of market prices for the court process. Given that the control premium is temporary, straddling the control event, that is, in our case after the court plan is published, the question arises, as to the extent to which it affects our measured misvaluation and, in particular the difference in misvaluations between disseminated and non-disseminated firms. We consider three possibilities: (i) if bond prices of fulcrum securities are not used by the court, then there is no effect on misvaluations; (ii) if bond prices are used by the court and the court adjusts for (that is, undoes) the control premium in determining valuations then again there is no effect on misvaluation; and, (iii) if the court does not adjust for the control premium and includes this in its valuation of the size of the pie, then it *will* overvalue the company and increase the misvaluation as a result of the dissemination of bond prices.

Scenario (iii) has 2 main predictions: First, dissemination should be associated with higher court values relative to market values, all else equal. However, in unreported results, we find that court values are *lower* (not higher) relative to market values where there is dissemination (but it is not statistically significant). Second, if we believed valuations to be noisy but unbiased prior to the introduction of TRACE, then the additional reliance on bond prices that includes a control premium during the reorganization process should actually *increase* misvaluations. This increase should be larger when the firm has liquid fulcrum bonds. The evidence in Table VI is not consistent with this prediction. We find the largest reduction in misvaluations occurs when disseminated bonds are in the fulcrum category.

Another influence that may be at play is, if senior claimants are able to push for lower valuations and thereby affect a downward bias in court valuations. Adjusting that valuation using bond prices that may include a control premium could undo that bias. Ultimately, dissemination is resulting in lower misvaluations by increasing the information available during reorganization, but the method is through counteracting a potential bias. Given the lack of evidence on the association of dissemination with bias in our sample, we do not believe this channel is the driving force in our results, but it may be a contributing factor.

**Fire Sales**

If there are fire sale discounts in bond prices, an implication is that traded prices might be less useful for the court in valuing the enterprise. In this event we might expect that dissemination would have little impact on reducing misvaluations.

There is evidence of fire sales in bonds. For example, Ellul et al. (2011) investigate fire sales in corporate bonds induced by regulatory constraints on insurance companies that are required to sell bonds which are downgraded below investment grade. They find a 6-7% fire sale discount, although the effect is temporary. In our case, the selling pressure is likely to be concentrated at a time when the company's bonds are downgraded below investment grade, or when they are downgraded to default, not around the confirmation of the final court plan, that is on average 13 months after entry into Chapter 11.

The predictions regarding the effects of fire sales should be similar to the predictions regarding the effects of control premiums. The main difference is that, if the court uses market prices without adjusting for fire sale discounts, it is likely to undervalue the firm. Recall that with the control premium, the prediction is that the court will overvalue the firm. In unreported results, we find no relationship between dissemination and court undervaluation, suggesting that fire sale discounts are not driving our results.

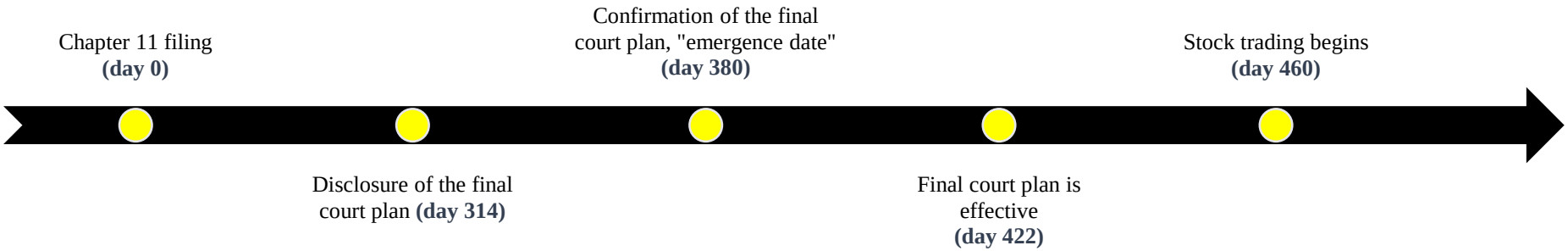
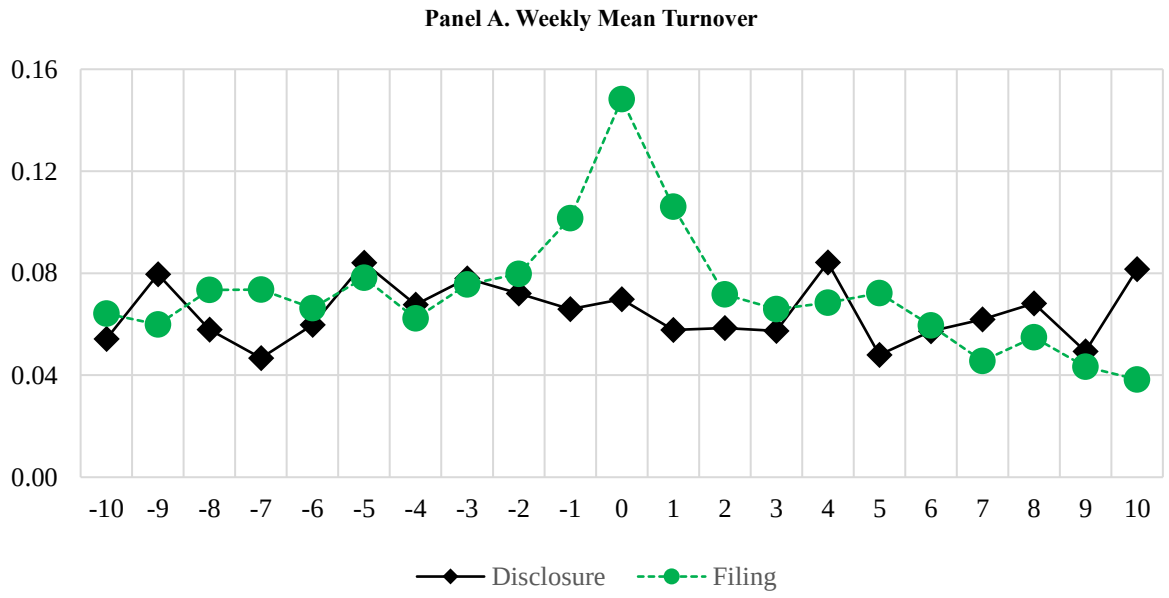



**Figure 1. Chapter 11 timeline.** This figure presents the key events during Chapter 11 reorganizations as well as the average time interval between each event and the filing date.



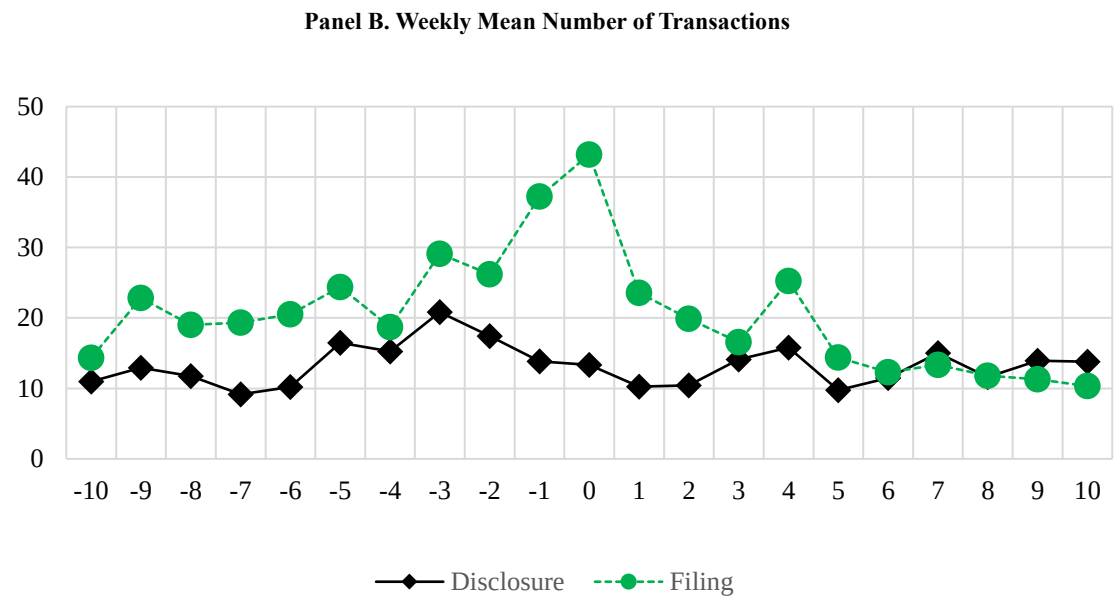




**Figure 2. Bond trading activity during Chapter 11.** This figure shows bond trading activity during the (-10, 10) calendar weeks centered on two key events in Chapter 11 reorganizations: filing and disclosure of the final court plan. Panel A shows mean weekly turnover, expressed as a fraction of the principal amount. Panel B shows the weekly mean number of transactions. The analysis is based on the subsample of 96 bankruptcies where we have TRACE transaction data. We calculate turnover at the firm level as the total weekly dollar volume of trades in an issuer's outstanding bonds, expressed as a proportion of the total face value of those bonds; we average turnover across firms. We calculate number of trades by simply counting the weekly number of trades in the issuer's outstanding bonds.

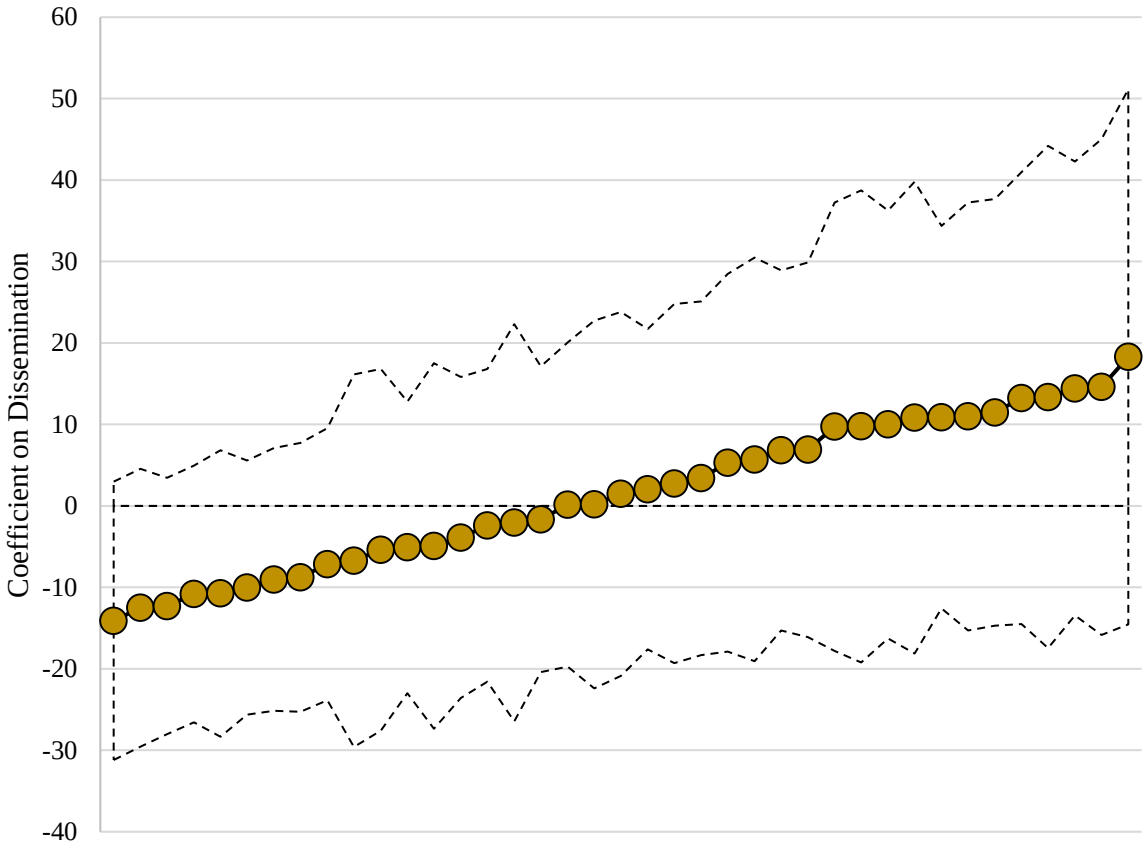



**Figure 3. Placebo Test Results.** By creating "fake" phase introduction dates that precede the actual TRACE phase introduction dates, we simulate 39 placebo samples where some of the non-disseminated firms in our actual sample received a placebo dissemination treatment. For each of these placebo samples, we regress misvaluation on a placebo dissemination indicator. We restrict the estimation sample to non-disseminated firms in our actual sample. Each dot in the figure represents the estimated coefficient on dissemination in one of the 39 placebo samples. The figure also provides the 95% confidence intervals around the estimated coefficients using dashed lines.

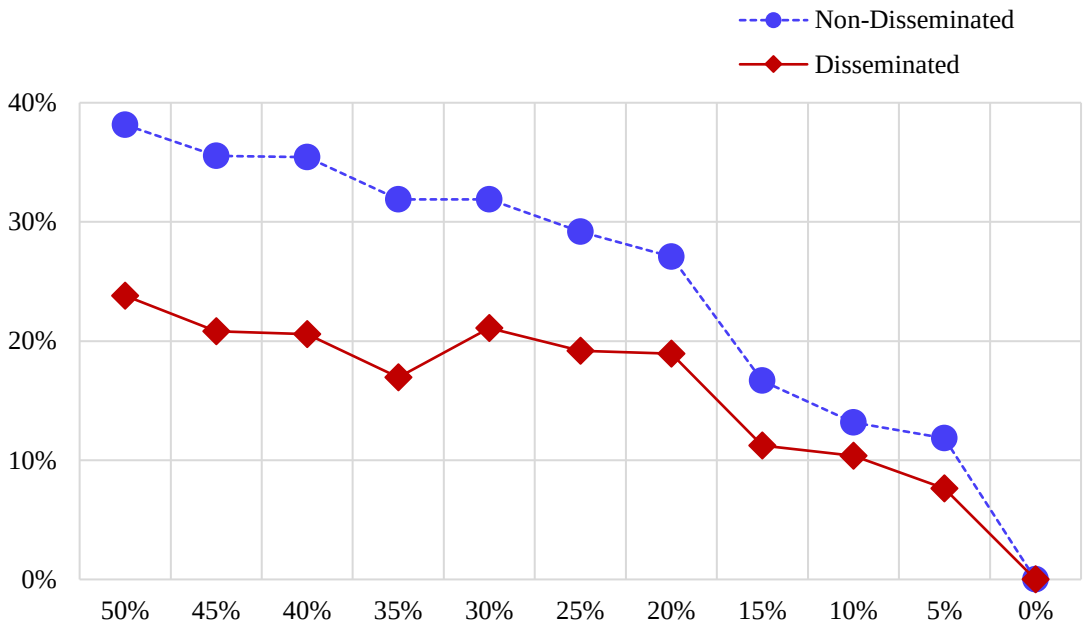



**Figure 4. Convergence of bond prices to the price on the confirmation date of the final court plan of reorganization**. This figure displays, for disseminated and non-disseminated unsecured bonds, the median difference between the trading price at any point during reorganization ($p_{i,t}$) relative to the trading price immediately after the confirmation date of the final court plan of reorganization ($p_{i,e}$). The horizontal axis is divided into 5% increments (time windows) representing the time left until the confirmation date, and the vertical axis is calculated as $|\frac{p_{i,t}}{p_{i,e}} - 1|$. To be included in the sample, a bond must trade at least once in five or more of the time windows in the second half of the reorganization process. If the price is missing in a particular time window due to the absence of trading activity, it is backfilled with using price of the most recent trade.

**Table I. Distribution of Sample by Emergence Year and Dissemination Phase**

This table shows the distribution of the 130 firms in our sample by the timing of emergence from Chapter 11 bankruptcy and the timing of TRACE transaction dissemination on firms' outstanding bonds. Pre-TRACE period is between January 1, 1995 and June 30, 2002. TRACE implementation period is between July 1, 2002 and February 6, 2005. Post-TRACE period is the period after February 6, 2005. TRACE was implemented in multiple phases including Phase 1 that was initiated on July 1, 2002; Phase 2 that was initiated on March 3, 2003; Phase 3A that was initiated on October 1, 2004; and finally, Phase 3B that was initiated on February 7, 2005.

| | Disseminated | | | | | Non- | |
|---|---|---|---|---|---|---|---|
| Timing of emergence | Phase 1 | Phase 2 | Phase 3A | Phase 3B | All | Disseminated | Total |
| Pre-TRACE period | 0 | 0 | 0 | 0 | 0 | 33 | 33 |
| TRACE implementation period | 3 | 1 | 5 | 0 | 9 | 41 | 49 |
| Post-TRACE period | 7 | 11 | 12 | 15 | 45 | 2 | 48 |
| Total | 10 | 12 | 17 | 15 | 54 | 76 | 130 |

**Table II**

**The Effect of Dissemination on Misvaluations in Chapter 11 Reorganization**

Our sample consists of 130 Chapter 11 bankruptcy reorganizations where the debtor (i) has publicly traded bonds, (ii) filed for bankruptcy between 1995 and 2010, (iii) successfully emerged from Chapter 11 as a stand-alone company between 1995 and 2013, and (iv) publicly listed its newly issued common shares during the year after emergence. We define misvaluation as $\frac{|V_{court}-V_{market}|}{[(V_{court}+V_{market})/2]}$. $V_{court}$ is the court value of the reorganized company's newly issued common stocks, which we take to be the "fresh start" equity value obtained from the first post-emergence 10-K. $V_{market}$ is the average split- and issuance-adjusted market value of the stocks three calendar months after the first trading date subsequent to emergence (according Bloomberg and Compustat Monthly Securities Files), discounted back to the confirmation date of the court plan of reorganization using the daily CRSP equal-weighted industry return over the same time horizon. We classify a firm as disseminated if transactions in the firm's outstanding bonds were publicly disseminated during the Chapter 11 process via the Trade Reporting and Compliance Engine (TRACE). We test whether the difference in average misvaluations (or the difference in the proportion of firms with above 50% misvaluation) of dissemination and non-dissemination groups is significantly different from zero using the *t*-test (assuming unequal variances). We also use the non-parametric Wilcoxon rank sum test to examine whether the misvaluations of the two samples are drawn from identical distributions. The numbers in parentheses report *t*- or *z*-statistics from these tests. In the bottom panel, we exclude 2 non-disseminated firms from the post-TRACE sample.

| | Misvaluation (%) | | | | |
|---|---|---|---|---|---|
| | N | Average | S.D. | Median | >%50 |
| *Full sample* | | | | | |
| All | 130 | 51.8 | 46.3 | 38.5 | 36.9 |
| Disseminated | 54 | 38.2 | 39.5 | 23.0 | 24.1 |
| Non-disseminated | 76 | 61.5 | 48.6 | 46.9 | 46.1 |
| Disseminated *minus* Non-disseminated | | -23.3 | | -23.9 | -22.0 |
| *t*- or *z*-statistic (absolute values) | | (3.01) | | (3.30) | (2.67) |
| | | | | | |
| *Post-TRACE sample* (disseminated) | 46 | 39.8 | 42.1 | 22.5 | 26.1 |
| *Pre-TRACE sample (*non-disseminated) | 33 | 65.5 | 51.9 | 53.1 | 51.5 |
| Post-TRACE *minus* Pre-TRACE | | -25.7 | | -30.6 | -25.4 |
| *t*- or *z*-statistic (absolute values) | | (2.34) | | (2.63) | (2.31) |

**Table III**
**Comparison of Firms in Dissemination and Non-Dissemination Subsamples**

This table provides a comparison of the characteristics of bankruptcies in the dissemination and the non-dissemination subsamples. We explain the construction of our sample in Section II and provide variable definitions in Appendix A. We compare differences in mean characteristics using the two-sided t-test (assuming unequal variances).

| | Disseminated | | | Non-disseminated | | | Difference | |
|---|---|---|---|---|---|---|---|---|
| | N | Mean | S.D. | N | Mean | S.D. | Mean | *p*-value |
| *Panel A: TRACE selection criteria:* | | | | | | | | |
| High Yield 50 firm (d) | 54 | 0.30 | — | 76 | 0.18 | — | 0.11 | 0.15 |
| Fallen angel (d) | 54 | 0.35 | — | 76 | 0.09 | — | 0.26 | 0.00 |
| >$1bn original issue size (d) | 54 | 0.15 | — | 76 | 0.05 | — | 0.10 | 0.09 |
| Liquidity > Phase 3A threshold (d) | 54 | 0.81 | — | 76 | 0.28 | — | 0.54 | 0.00 |
| *Panel B: Bargaining complexity measures:* | | | | | | | | |
| Equityholders' committee (d) | 54 | 0.24 | — | 76 | 0.09 | — | 0.15 | 0.03 |
| Creditors' committee (d) | 54 | 0.87 | — | 76 | 0.68 | — | 0.19 | 0.01 |
| DIP loan (d) | 54 | 0.93 | — | 76 | 0.67 | — | 0.25 | 0.00 |
| Secured debt to total debt | 54 | 0.27 | 0.28 | 76 | 0.26 | 0.29 | 0.01 | 0.85 |
| Multiple plans (d) | 54 | 0.72 | — | 76 | 0.67 | — | 0.05 | 0.53 |
| Capital injection (d) | 54 | 0.33 | — | 76 | 0.20 | — | 0.14 | 0.09 |
| % hedge fund ownership | 54 | 16.76 | 22.73 | 76 | 6.11 | 12.66 | 10.65 | 0.00 |
| Inst. ownership HHI | 54 | 3.71 | 7.9 | 76 | 2.54 | 5.91 | 1.18 | 0.36 |
| *Panel C: Uncertainty measures:* | | | | | | | | |
| LN(Assets) | 54 | 7.86 | 1.67 | 76 | 6.43 | 1.02 | 1.43 | 0.00 |
| Analyst coverage (d) | 54 | 0.76 | — | 76 | 0.75 | — | 0.01 | 0.90 |
| VIX at filing | 54 | 26.29 | 10.94 | 76 | 22.49 | 5.65 | 3.80 | 0.02 |
| *Panel D: Other variables:* | | | | | | | | |
| Prepackaged (d) | 54 | 0.46 | — | 76 | 0.50 | — | -0.04 | 0.68 |
| 10K or 10Q filed during Ch 11 (d) | 54 | 0.72 | — | 76 | 0.50 | — | 0.22 | 0.01 |
| Old equity traded in Ch 11 (d) | 54 | 0.78 | — | 76 | 0.71 | — | 0.07 | 0.39 |
| Plan price < $2 (d) | 54 | 0.00 | — | 76 | 0.08 | — | -0.08 | 0.01 |
| Book leverage | 54 | 0.31 | 0.23 | 76 | 0.42 | 0.24 | -0.11 | 0.01 |
| Bond liquidity | 54 | 0.56 | 0.45 | 76 | 0.25 | 0.35 | 0.31 | 0.00 |

**Table IV**
**The Effect of Dissemination on Misvaluations: Multivariate Analysis**

We estimate ordinary least squares (OLS) regressions to examine the effect of dissemination on misvaluations. We explain the construction of our sample in Section II and provide variable definitions in Appendix A. We cluster heteroscedasticity-consistent standard errors at the industry (3-digit SIC Code) level and report the absolute values of *t*-statistics in parentheses beneath the coefficient estimates. ***, **, and * indicate that the coefficient estimate is significantly different from zero at the 1%, 5%, and 10% level, respectively. At the bottom of column (2), the *p*-value indicates whether the coefficients on Phase 1 or 2 versus Phase 3A or 3B dummies are significantly different.

| | Misvaluation (%) | | | | | |
|---|---|---|---|---|---|---|
| Explanatory variables | (1) | (2) | (3) | (4) | (5) | (6) |
| Disseminated (d) | -23.28*** | | -20.43*** | -24.79*** | -22.54*** | -23.01*** |
| | (3.43) | | (2.72) | (4.13) | (3.24) | (3.87) |
| Phase 1 or 2 (d) | | -25.85*** | | | | |
| | | (3.04) | | | | |
| Phase 3A or 3B (d) | | -21.51** | | | | |
| | | (2.56) | | | | |
| *TRACE selection criteria:* | | | | | | |
| High Yield 50 firm (d) | | | -5.76 | | -5.15 | |
| | | | (0.84) | | (0.53) | |
| Fallen angel (d) | | | -10.60 | | -0.93 | |
| | | | (1.37) | | (0.10) | |
| >$1bn original issue size (d) | | | -1.05 | | -16.69 | |
| | | | (0.09) | | (1.01) | |
| Liquidity > Phase 3A threshold (d) | | | 1.20 | | -8.59 | |
| | | | (0.13) | | (0.93) | |
| *Bankruptcy characteristics:* | | | | | | |
| Prepackaged (d) | | | | 13.98* | 15.93** | 15.70** |
| | | | | (1.90) | (2.15) | (2.52) |
| Equityholders' committee (d) | | | | 0.33 | -0.27 | |
| | | | | (0.04) | (0.03) | |
| Creditors' committee (d) | | | | -31.37*** | -30.51*** | -24.51** |
| | | | | (2.98) | (2.82) | (2.42) |
| DIP loan (d) | | | | 17.99* | 14.64 | |
| | | | | (1.92) | (1.37) | |
| VIX at filing | | | | 1.51*** | 1.66*** | 1.20** |
| | | | | (2.69) | (3.02) | (2.36) |
| 10K or 10Q filed during Ch 11 (d) | | | | 6.32 | 5.03 | |
| | | | | (0.77) | (0.57) | |
| Old equity traded in Ch 11 (d) | | | | -19.67 | -21.27 | |
| | | | | (1.57) | (1.45) | |
| Multiple plans (d) | | | | 11.05 | 9.59 | |
| | | | | (1.52) | (1.30) | |
| Capital injection (d) | | | | 8.24 | 7.14 | |
| | | | | (1.18) | (0.93) | |
| % hedge fund ownership | | | | 0.31 | 0.34 | |
| | | | | (1.23) | (1.38) | |
| Inst. ownership HHI | | | | -0.85 | -0.95 | |
| | | | | (1.25) | (1.60) | |
| Plan price < $2 (d) | | | | 60.87*** | 59.45*** | 54.12*** |
| | | | | (3.13) | (3.11) | (2.86) |
| *Firm characteristics:* | | | | | | |
| LN(Assets) | | | | -3.79 | -1.39 | |

| | | | | | | |
|---|---|---|---|---|---|---|
| | | | | (1.15) | (0.29) | |
| Book leverage | | | | 2.30 | 3.20 | |
| | | | | (0.14) | (0.21) | |
| Secured debt to total debt | | | | 8.22 | 7.84 | |
| | | | | (0.56) | (0.47) | |
| Bond liquidity | | | | 7.78 | 12.53* | 6.08 |
| | | | | (1.38) | (1.93) | (1.25) |
| Analyst coverage (d) | | | | 12.83 | 13.58 | |
| | | | | (1.19) | (1.16) | |
| Constant | 61.49*** | 61.49*** | 63.18*** | | | |
| | (10.95) | (10.90) | (9.43) | | | |
| Industry FEs | No | No | No | Yes | Yes | Yes |
| $R^2$ | 0.062 | 0.063 | 0.074 | 0.357 | 0.365 | 0.291 |
| N | 130 | 130 | 130 | 130 | 130 | 130 |
| *p*-diff Coef. 2 versus 3 | | 0.669 | | | | |

**Table V**
**Time-Series Tests**

We estimate ordinary least squares (OLS) regressions to examine whether judicial learning or confounding events can explain the effect of dissemination on misvaluations. The TRACE sample includes firms that were in Chapter 11 during the TRACE implementation period. Pre-TRACE and post-TRACE samples include firms that emerge from Chapter 11 before and after the TRACE implementation period, respectively. We cluster heteroscedasticity-consistent standard errors at the industry (3-digit SIC Code) level and report the absolute values of t-statistics in parentheses beneath the coefficient estimates. ***, **, and * indicate that the coefficient estimate is significantly different from zero at the 1%, 5%, and 10% level, respectively.

| | Misvaluation (%) | | | | | | |
|---|---|---|---|---|---|---|---|
| | (1) | (2) | (3) | (4) | (5) | (6) | (7) |
| Disseminated (d) | -33.55*** | -29.61** | -26.48*** | -22.69*** | -25.34** | -39.09*** | -45.01** |
| | (4.36) | (2.22) | (3.99) | (2.74) | (2.48) | (2.87) | (2.22) |
| Emerged during crisis (2007Q3-2010Q1) | | | | 0.52 | | | |
| | | | | (0.04) | | | |
| Filed post-Bankruptcy Reform (d) | | | | | 5.32 | | |
| | | | | | (0.35) | | |
| Linear time trend (emergence year) | | | | | | 3.51 | |
| | | | | | | (1.40) | |
| TRACE selection criteria | No | Yes | No | Yes | Yes | Yes | Yes |
| Firm and bankruptcy characteristics | No | Yes | No | Yes | Yes | Yes | Yes |
| Petition year FEs | No | No | Yes | No | No | No | No |
| Emergence year FEs | No | No | Yes | No | No | No | No |
| Industry FEs | No | Yes | No | Yes | Yes | Yes | Yes |
| Sample | TRACE | TRACE | Full | Full | Full | Full | Pre or Post TRACE |
| $R^2$ | 0.153 | 0.661 | 0.289 | 0.365 | 0.366 | 0.383 | 0.510 |
| N | 68 | 68 | 119 | 130 | 130 | 130 | 79 |

**Table VI**

**Does the Effect of Dissemination Vary with the Informativeness of Bond Prices?**

We estimate ordinary least squares (OLS) regressions to examine whether the effect of dissemination on misvaluations varies with the informativeness of the disseminated bonds. Because we need daily bond trading data for this analysis, we restrict the estimation sample to 96 TRACE and post-TRACE firms. We create a binary informativeness measure that is equal to one if the fulcrum bonds (for example, bonds from pari passu classes that receive the majority of post-emergence equity) trade for at least five days during the 60 calendar days before the confirmation of the final court plan. If the firm has no fulcrum bonds trading prior to confirmation, informativeness equals zero. We explain the construction of our sample in Section II and provide variable definitions in Appendix A. Selected controls are those included in column (6) of Table IV. We cluster heteroscedasticity-consistent standard errors at the industry (3-digit SIC Code) level and report the absolute values of *t*-statistics in parentheses beneath the coefficient estimates. ***, **, and * indicate that the coefficient estimate is significantly different from zero at the 1%, 5%, and 10% level, respectively.

| | Misvaluation (%) | | | |
|---|---|---|---|---|
| | (1) | (2) | (3) | (4) |
| Disseminated (d) | 5.27 | 14.39 | 10.77 | |
| | (0.32) | (0.83) | (0.82) | |
| Informative bond prices (d) | -14.57 | 9.45 | 2.22 | 6.37 |
| | (1.24) | (0.60) | (0.23) | (0.54) |
| Disseminated x Informative bond prices (d) | -29.41* | -50.84** | -37.21** | -39.86** |
| | (1.70) | (2.33) | (2.30) | (2.22) |
| TRACE selection criteria | No | Yes | No | No |
| Firm and bankruptcy characteristics | No | Yes | No | No |
| Industry FEs | No | Yes | Yes | No |
| Selected controls | No | No | Yes | Yes |
| Selected controls x Disseminated (d) | No | No | No | Yes |
| Industry FEs x Disseminated (d) | No | No | No | Yes |
| $R^2$ | 0.179 | 0.494 | 0.414 | 0.465 |
| N | 96 | 96 | 96 | 93 |

**Table VII**
**Unintended Wealth Transfers**

This table shows the frequency as well as the size of inter-claimant wealth transfers in our sample. When calculating the size of wealth transfers, we scale the dollar transfer between claimants by the average of the plan and market value of newly issued common stocks. We explain the construction of our sample in Section II and the estimation of wealth transfers in Section IV. In Panel A, we compare mean differences between the dissemination and the non-dissemination subsamples using the *t*-test. In Panel B, we present wealth transfer regressions. We estimate the regressions via Tobit because the dependent variable is left truncated at zero. Selected controls are those included in column (6) of Table IV. We cluster heteroscedasticity-consistent regression standard errors at the industry (3-digit SIC Code) level and report the absolute values *t*-statistics in parentheses beneath the coefficient estimates. ***, **, or * indicates that the coefficient estimate is significantly different from zero at the 1%, 5%, or 10% level, respectively.

**Panel A. Univariate Results**

| | All | | | Disseminated | | | Non-Disseminated | | | Difference | |
|---|---|---|---|---|---|---|---|---|---|---|---|
| Variables | N | Mean | S.D | N | Mean | S.D. | N | Mean | S.D. | Diff | *t*-stat |
| Frequency | 130 | 0.52 | 0.50 | 54 | 0.33 | 0.48 | 76 | 0.66 | 0.48 | -0.32 | -3.83 |
| Size (% of emergence equity value) | 130 | 8.24 | 20.41 | 54 | 2.55 | 5.63 | 76 | 12.28 | 25.58 | -9.73 | -3.21 |
| Conditional size (%) | 68 | 15.76 | 26.11 | 18 | 7.66 | 7.57 | 50 | 18.67 | 29.66 | -11.01 | -2.42 |

**Panel B. Tobit Regression Results**

| | Percent wealth transfer (unconditional) | | | | | | | |
|---|---|---|---|---|---|---|---|---|
| | (1) | (2) | (3) | (4) | (5) | (6) | (7) | (8) |
| Disseminated (d) | -23.56*** | | -19.29*** | -22.58*** | -21.29*** | -22.67*** | -24.61* | -29.64*** |
| | (2.85) | | (2.62) | (3.23) | (3.01) | (3.66) | (1.70) | (3.02) |
| Phase 1 or 2 (d) | | -24.67** | | | | | | |
| | | (2.50) | | | | | | |
| Phase 3A or 3B (d) | | -22.82*** | | | | | | |
| | | (2.67) | | | | | | |
| TRACE selection criteria | No | No | Yes | No | Yes | No | No | Yes |
| Firm and bankruptcy characteristics | No | No | No | Yes | Yes | No | No | Yes |
| Selected controls | No | No | No | No | No | Yes | No | No |
| Industry FEs | No | No | No | Yes | Yes | Yes | No | Yes |
| Sample | Full | Full | Full | Full | Full | Full | TRACE | TRACE |
| $R^2$ | 0.019 | 0.020 | 0.021 | 0.063 | 0.071 | 0.045 | 0.012 | 0.190 |
| N | 130 | 130 | 130 | 130 | 130 | 130 | 68 | 68 |
| *p*-diff Coef. 2 versus 3 | | 0.812 | | | | | | |

**Table VIII**
**The Direction of Unintended Interclaimant Wealth Transfers**

This table summarizes the size of unintended wealth transfers, which arise from misvaluations of newly issued stocks in the court plan of reorganization, between different pairs of claim classes. The sample consists of 70 different transfers involving 68 unique Chapter 11 reorganizations. We describe the calculations of the wealth transfers in Section IV. Claim classes that benefit from wealth transfers are in rows and those that lose are in columns. In each cell, the first number shows the total dollar value of the particular type of wealth transfer (in millions), the second number (in brackets) shows the total size of those transfers divided by the total market values of the newly issued stocks, and the third number (in italics) shows the frequency of cases with such transfers. The last column shows the net gain or loss for each claim class, both in dollar terms and as a fraction of the post-emergence market value.

| | Class that loses | | | | | |
|---|---|---|---|---|---|---|
| Class that gains | Secured | Unsecured | Subordinated | Equity | Total gain | Net gain/loss |
| Secured | | $280<br>[11.3%]<br>*4* | $747<br>[52.2%]<br>*2* | | $1,027<br>[25.0%]<br>*6* | $555<br>[6.8%] |
| Unsecured | $422<br>[13.1%]<br>*10* | | $462<br>[22.3%]<br>*8* | $1,442<br>[14.4%]<br>*7* | $2,326<br>[16.4%]<br>*25* | -$454<br>[-1.0%] |
| Subordinated | $11<br>[7.1%]<br>*1* | $2,251<br>[13.7%]<br>*11* | | $174<br>[19.8%]<br>*4* | $2,436<br>[14.8%]<br>*16* | $1,212<br>[8.5%] |
| Equity | $39<br>[2.0%]<br>*1* | $249<br>[4.4%]<br>*15* | $15<br>[4.1%]<br>*5* | | $303<br>[4.2%]<br>*21* | -$1,400<br>[-11.1%] |
| Third party | | | | $87<br>[113.3%]<br>*2* | $87<br>[113.3%]<br>*2* | $87<br>[113.3%] |
| Total loss | $472<br>[11.6%]<br>*12* | $2,780<br>[8.7%]<br>*30* | $1,224<br>[20.2%]<br>*15* | $1,703<br>[31.3%]<br>*13* | $6,178<br>[15.9%]<br>*70* | |

**Table IX**

**Does Bond Market Reaction to the Announcement of Reorganization Plans Vary with Dissemination?**

We estimate OLS regressions to analyze whether bond market reaction to the announcement of a court plan of reorganization or the confirmation of the final court plan varies with dissemination. The estimation sample consists of 222 announcements involving 77 unique companies. The dependent variable equals the median bond price during the 10 calendar days before an event divided by the median price in the 10 calendar days following the event. An announcement is included in the estimation sample if the firm has at least two bond trades both before and after the event. We exclude announcements before July 1, 2002, because of missing TRACE data. We add fixed effects for the plan number in column (3). Plan number refers to the sequence of reorganization plans filed with the bankruptcy court, where there are multiple plans. Selected controls are those included in column (6) of Table IV. Appendix A provides variable definitions and data sources. We cluster heteroscedasticity-consistent standard errors at the industry (3-digit SIC Code) level and report the absolute values of *t*-statistics in parentheses beneath the coefficient estimates. ***, **, and * indicate that the coefficient estimate is significantly different from zero at the 1%, 5%, and 10% level, respectively.

| | Absolute abnormal bond return | | | |
|---|---|---|---|---|
| | (1) | (2) | (3) | (4) |
| Disseminated (d) | -0.052* | -0.061** | -0.059 | -0.062** |
| | (-1.93) | (-2.44) | (-1.67) | (-2.08) |
| Constant | 0.138*** | 0.105*** | | |
| | (6.06) | (3.49) | | |
| TRACE selection criteria | No | Yes | Yes | No |
| Firm and bankruptcy characteristics | No | No | Yes | No |
| Selected controls | No | No | No | Yes |
| Industry FEs | No | No | Yes | Yes |
| Plan number FEs | No | No | Yes | No |
| N | 222 | 222 | 222 | 222 |
| $R^2$ | 0.026 | 0.062 | 0.279 | 0.099 |

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