“Bankruptcy codes, bargaining and the valuation of distressed securities”

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SECTION 1. Macroeconomic processes and regional economies management

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Bankruptcy codes, bargaining and the valuation of distressed securities

Abstract

Do differences in creditor rights across countries affect creditors' recovery rates in distressed exchanges? Theories of strategic debt service imply opposing effects, with borrowers in creditor friendly jurisdictions restructuring at lower firm values but with lower deviations from the absolute priority rule.

Using a comprehensive sample of publicly listed companies from the United States (a relatively equity friendly jurisdiction) and the United Kingdom (a relatively creditor friendly jurisdiction) that have defaulted and restructured their debt between 1998 and 2007, the authors find a significant influence of creditor rights on both the timing of financial restructuring and deviations from absolute priority. Surprisingly, the effect of a delayed restructuring is more important than the reduction in deviations from absolute priority rule, resulting in overall lower creditor recovery rates for distressed exchanges in the United Kingdom compared to the United States.

Keywords: reorganization, bankruptcy code, bargaining power, recovery rate.
JEL Classification: G12, G32, G33.

Introduction

The financial crisis that started in 2007 has led to a sharp increase in corporate defaults worldwide, reaching record highs in 2009 in the United States and Western Europe. At the same time, many firms, particularly among those that underwent a leveraged buyout in previous years, are still overleveraged and may have to undergo financial reorganization or risk insolvency as debt issues mature in the next 3-5 years[1]. This wave of corporate defaults and looming recapitalization-needs heightens the general interest in how best to resolve these firms' financial troubles, and whether financial reorganizations are better undertaken in formal insolvency proceedings or out-of-court in voluntary reorganizations. For example, Altman and Karlin (2009) discuss the re-emergence of out-of-court distressed exchanges in 2008 and 2009 as an important tool to restructure overindebted corporations. The recent credit crisis has also reignited discussion about the efficiency of different bankruptcy regimes around the world in facilitating reorganizations and pursuing policy goals including maximizing debt holder recoveries, speed of resolution and promoting the continuation of viable firms[2].

This paper analyzes the effect of differences in creditor rights across countries on debt and equity recovery rates. In a study of distressed exchanges in the United States and the United Kingdom, we find a significant influence of creditor rights on both the timing of financial restructuring and the distribution of firm value to debt and equity holders in deviation of absolute priority.

As a firm approaches default, the values of its debt instruments become increasingly dependent upon their expected recovery rates. In a generalized framework, the recovery rate of a debt instrument in bankruptcy depends upon the value of the firm and how this firm value is distributed among the different claimant classes, including debt and equity holders, in the plan of reorganization or liquidation. Both the value of the firm and the distribution among claimant classes partially depend on the relative bargaining power of debt and equity holders.

In the United States and most European countries the bankruptcy code contains an absolute priority rule, stating that claims need to be fully satisfied in order of seniority before more junior claims (including equity) can receive any recovery. However, deviations from absolute priority are frequent and well documented in the United States[3]. A reorganization plan filed in Chapter 11 may divert from absolute priority if all claimant classes agree to it[4]. Senior claimants frequently agree to smaller deviations from absolute priority benefiting junior lenders and equity holders, in order to avoid lengthy bankruptcy

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[1] See Credit Suisse (2010, p. 23).

[2] See Azar (2008a, pp. 382-388) for a comprehensive discussion on the goals and means of bankruptcy law.

[3] See for example Franks and Torous (1989) Eberhart, Moore and Roenfeldt (1990), LoPucki and Whitford (1990), Weiss (1990), Betker (1995) and Capkun and Weiss (2008).

[4] Each impaired creditor class must agree to plan by a majority in numbers and two-thirds in claim amount. Unimpaired classes are deemed to agree to the plan automatically and do not vote.

proceedings and litigation. Equity holders have bargaining power in the bankruptcy process mainly due to their ability to protract the bankruptcy proceedings, possibly blocking a reorganization altogether and forcing the bankrupt firm into liquidation[1]. Both delay and liquidation are costly to the firm, as bankruptcy costs increase greatly with the time between bankruptcy filing and emergence, and a liquidation could incur additional liquidation costs[2]. At the same time, equity holders also have a clear incentive to delay reorganization, as delay increases the value of their option-like equity claim on the firm – with more time, the value of the firm may rise again above the face value of debt. It is thus in the creditors' interest to pay-off junior claimants with part of the cost savings in order to expedite their agreement to the plan of reorganization[3]. Similarly, it may be in the interest of all parties to avoid a costly bankruptcy altogether by reorganizing privately out-of-court as described for example by Jensen (1989) and Wruck (1990).

Concerning the value of the firm at default, structural credit pricing models building on the classical Merton (1974) usually assume that default is triggered when the asset value of the firm reaches a certain default boundary level. Several papers that follow Black and Cox (1976) and Leland (1994) model this default boundary endogenously as a strategic default decision of the equity holders. Equity holders decide when it is optimal for them not to service debt anymore, dependent on the value of their equity upside and expected recovery – if any – in case of default.

Several authors have proposed credit pricing models that incorporate a bargaining game between equity and debt holders[4]. Fan and Sundaresan (2000) formulate a structural model that extends the model of Leland (1994) and Anderson and Sundaresan (1996) with strategic renegotiation and variable bargaining power of equity holders. Equity holders bargain with debt holders over the terms of a debt-for-equity swap. The bargaining power of equity holders vs. debt holders determines the optimal reorganization time (value of the firm at default) and the sharing rule between equity holders and debt holders (deviation from absolute priority). One insight of their model is that higher bargaining power of equity holders and higher bankruptcy costs provide an incentive for firms to reorganize early and with higher deviations from absolute priority.

Our paper tests the dynamics described by Fan and Sundaresan (2000) using different proxies for equity holders' bargaining power, including the influence of a countries bankruptcy code. This approach is similar to Davydenko and Strebulaev (2007) who have tested the influence of different bargaining power proxies on bond credit spreads. However, whereas they study credit spreads of non-defaulted U.S. corporate bonds, our study focuses on actual recovery rates in distressed exchanges and the influence of variations in creditor rights across countries.

A number of studies have analyzed firm and instrument specific determinants of recovery rates in distressed exchanges or bankruptcies. However, these have been nearly exclusively focused on firms in the United States[5]. Internationally, La Porta, Lopez-de-Silanes, Shleifer and Vishny (1998) in their seminal paper describe how shareholder and creditor rights differ among jurisdictions and the impact on financial development. We would also expect recovery rates to vary significantly by jurisdiction. Weiss (1990) and later Capkun and Weiss (2008) study deviations from absolute priority in US bankruptcies and find significant differences even within the US, with Delaware and the Southern District of New York exhibiting significantly higher deviations than other US states. Franks, Nyborg and Torous (1996) compare the bankruptcy codes of the US, the UK and Germany and secondary evidence on recovery rates in these countries. Davydenko and Franks (2008) study recovery rates of bank loans to small and medium sized enterprises in Germany, France and the UK and find significant differences related to creditor rights of each country. Thorburn (2000) provides evidence on debt recovery rates in Sweden[6].

[1] See for example Betker (1995, p.165). Equity holders in the United States exercise bargaining power as a junior claimant organized in the equity committee, and via their control of the firm's management. The management has the exclusive right to propose plans of reorganizations in the first 120 days after filing, which can be extended. The equity committee can further delay creditor plans by contesting, by proposing own plans of reorganization or by litigation. The main item of disagreement besides plan distribution is often the valuation of the firm, that determines how much would formally be available for distribution to junior claimants. There is however significant leeway in valuation of distressed firms (see Gilson, Hotchkiss and Ruback, 2000).

[2] See Bris, Welch and Ning (2006) for a detailed discussion of bankruptcy and liquidation costs.

[3] Eberhart and Senbet (1993) also demonstrate that deviations from absolute priority can be in the debt holders' interest in order to reduce incentives for risk-shifting of distressed firms.

[4] To name just a few: Anderson and Sundaresan (1996), Mella-Barral and Perraudin (1997), Mella-Barral (1999), Fan and Sundaresan (2000), Francois and Morellec (2004), Hege and Mella-Barral (2005) and Hackbarth, Hennessy and Leland (2007).

[5] Studies of recovery rates in distressed exchanges in the US include for example Asquith, Gertner and Scharfstein (1994), Franks and Torous (1994), James (1996) and Gilson (1997).

[6] There have also been a number of studies on the effect of creditor rights across countries on loan market development and lending terms including Djankov, McLiesh and Shleifer (2007), Qian and Strahan (2007), Bae and Goyal (2009) and Cao, Cumming, Qian and Wang (2010).

Our study focuses on the United States and the United Kingdom, two jurisdictions with similar cultures, legal systems and highly developed financial markets but distinctly different bankruptcy codes[1]. The United States has a very debtor friendly regime that gives significant power over the firm and reorganization plan to management and equity holders during the bankruptcy procedure. The United Kingdom on the other hand traditionally has a very creditor friendly regime, and in particular grant significant rights to secured creditors to enforce their collateral and take control of the firm. Differences in the two countries' creditor rights have been studied for example by Acharya, Sundaram and John (2010), who demonstrate the effect on financial leverage of issuers, and by Acharya, Amihud and Litov (2010) who study the influence on risk taking in acquisitions. We discuss differences in the two countries' bankruptcy codes in more detail in section 1.

Our paper studies how the difference in creditor rights of both countries is reflected in the bargaining outcomes of a sample of distressed exchanges, in particular the debt and equity recovery rates, the firm's overall recovery rate, and deviation from absolute priority. We control for firm specific measures of credit risk (asset volatility, cost of debt, risk-free interest rate) and other factors influencing potential bankruptcy costs (firm size, industry type, market default rates) or equity holders' bargaining power (complexity of debt structure, debt maturity profile).

Consistent with our hypotheses and theories of strategic default, we find that firms in the United Kingdom reorganize later (at a significantly lower firm value) but with much lower deviations from absolute priority than firms in the United States. Surprisingly, creditor recovery rates are also lower in the United Kingdom, as the impact of the late reorganization overweighs the reduction in deviation from absolute priority. These findings add to the debate about the effect of strategic renegotiation, creditor rights and the optimal design of bankruptcy rules. Apparently, very creditor-friendly regimes provide little incentives for firms to reorganize, potentially prolonging financial difficulties.

To our knowledge, this is the first cross-country study documenting strategic bargaining and deviations from absolute priority in an international context. The results highlight the interest for further analysis of country-specific dynamics of distress resolution.

The remainder of the paper is structured as follows. Section 1 provides a brief comparison of the bankruptcy codes in the US and the UK. Section 2 discusses our hypotheses. Section 3 describes our data set and descriptive statistics for the variables used. Section 4 presents regression results concerning cross-country comparison of recovery rates. The final section concludes the paper.

1. Bankruptcy codes in the US and the UK

Even though the legal systems of the US and the UK have the same legal tradition and common law, they differ substantially among others in the rights accorded to creditors, and more specifically the provisions of the bankruptcy code. While the US code is relatively debtor-friendly and designed to promote consensual reorganization of the firm, the UK code is focused on protecting the rights of creditors, particularly secured creditors. To capture differences across countries, La Porta, Lopez-de-Silanes, Shleifer and Vishny (1998) construct a creditor rights index (referred to hereforth as "LSSV") consisting of four measures related to creditors rights in either liquidation or reorganization of the firm, scoring the United States as "1" and the United Kingdom as "4". Table 1 shows how the US and the UK differ in these measures, as well as additional characteristics of both countries bankruptcy codes[2].

Table 1. Bankruptcy codes in the US and the UK

The table lists the main procedures and characteristics of the bankruptcy code in the US and the UK LSSV is the creditor rights score reported by La Porta, Lopez-de-Silanes, Shleifer and Vishny (1998).

	US	UK
Principal procedure	Chapter 11 (Reorganization) Chapter 7 (Liquidation)	Administration (Reorganization) Administrative receivership (Liquidation)
Main legislation	A) Bankruptcy Reform Act 1978 B) BAPCPA 2005	A) Insolvency act 1986 B) Enterprise act 2002
LLSV creditors' rights score	1	4

[1] A detailed discussion of legal and institutional differences can be found in Azar (2008a).

[2] Azar (2008b) constructs a more detailed pro-creditor index composed of seven sub-indices (some of which composed of several other indicators). The difference between the jurisdictions is less pronounced, with the UK scored 74 and the US scored 60. The US fares relatively better than in the LSSV score, as the interests of unsecured creditors are considered in addition to the interest of secured creditors.

Table 1 (cont.). Bankruptcy codes in the US and the UK

	US	UK
1. Automatic stay on assets	Yes	A) No B) Yes
2. Secured creditors paid first	Yes (but after administrative and certain other claims)	Yes
3. Bankruptcy trigger / restrictions for filing	Voluntary filing by management. Involuntary filing only in case of insolvency	Payment or technical default. No voluntary filing
4. Management stays	Yes	No
Additional characteristics		
Control rights	Management (debtor-in-possession)	Secured creditors or court-appointed administrator
Focus of procedure	Maintain firm as going concern. Restructure balance sheet and preserve value for both debt and equity	A) Focus on protecting secured creditors B) Focus on protecting all creditors and preserving the firm as a going concern
Reorganization plan	120 day exclusivity period for debtor, extendable	Receiver/Administrator
Required voting majority	2/3 in amount and 50% in number of claims for each class	50% in amount of claims (75% for voluntary arrangement)
Supra-priority financing available	Yes	No
Reject contracts	Yes	Limited (onerous contracts)
Control rights	Management (debtor-in-possession)	Secured creditors or court-appointed administrator

Interestingly, both countries' codes have changed during our observation period of 1998 to 2007[1]. However, while the changes have somewhat aligned both codes on a number of measures, the basic differences remain large. Djankov, McLiesh and Shleifer (2007) update the LSSV index for 129 countries, leaving the score for the United States and the United Kingdom unchanged at 4 and 1, respectively.

1.1. United States. The federal bankruptcy code in the US is largely defined by the Bankruptcy Reform Act of 1978, which was updated by the Bankruptcy Reform of 1994 and the Bankruptcy Abuse Prevention and Consumer Protection Act (BAPCPA) of 2005. Under US federal law, either the debtor or creditors can file for bankruptcy, but it is usually the debtor who files voluntarily under bankruptcy code (BRC) 301, which he can do without specific requirements or conditions precedent[2]. In either case, the petition can be for proceedings under Chapter 11 of the Bankruptcy Code that allows for a reorganization of the firm in bankruptcy, or Chapter 7 that foresees appointment of a trustee to liquidate the firm's assets.

On filing, an automatic stay on assets prohibits creditors from taking action against the debtor or seizing collateral. Management generally stays in place to manage the firm as debtor-in-possession, and has an exclusivity period of 120 days (extendible) to propose a plan of reorganization. All claimant classes have to agree on a plan of reorganization, and a court "cramdown" on dissenting creditors is rarely used. Consequently, Chapter 11 proceedings can take several years to resolve.

The US Bankruptcy Abuse Prevention and Consumer Protection Act of 2005 did introduce more rights to creditors (e.g., limiting the plan exclusivity period to 300 days and providing information rights to small creditors) and provides for a greater role of turnaround managers[3]. Still, equity holders' position remains substantially stronger than in most other countries.

1.2. United Kingdom. The UK bankruptcy regime has evolved with the primary aim of protecting secured creditors' rights. There are strict rules for when management can and has to file for bankruptcy in case of payment default. Secured creditors' interests are protected with no automatic stay on assets and with a limitation on new senior financing during bankruptcy. Prior to the Enterprise Act of 2002 (effective on September 15, 2003), the principal procedure under the Insolvency Act of 1986 was Administrative Receivership. When a company defaults, creditors secured with a floating charge[4] can appoint a Receiver with wide powers to manage the firm and liquidate assets in the best interests of the secured creditors.

The Insolvency Act of 1986 had already introduced the Administration scheme, under which a court-

[1] See Mallon (2008) for a detailed explanation of both countries current and former bankruptcy regimes.

[2] Formally, management can file if it foresees a "likelihood" of insolvency. The bankruptcy judge can reject the filing if he deems it unnecessary. Creditors can also file for involuntary bankruptcy under BRC 303 if the debtor is in legal default.

[3] See for example Bharath, Panchapegesan and Werner (2010).

[4] In the UK there are two types of collateral charges. A fixed charge is given over a specific asset, a floating charge is given over all of a company's assets except those already encumbered by a fixed charge. In practice, a fixed charge is often supplemented with a floating charge.

appointed Administrator takes control of the company to draw up a plan of reorganization in the interest of all creditors. The Administrator must, within 8-10 weeks of his appointment, put the reorganization plan for a vote to the creditors committee of unsecured creditors, who have to accept it with a simple majority[1]. However, prior to the Enterprise Act of 2002, his appointment could be blocked by floating charge holders who could appoint a Receiver instead, making the procedure ineffective and little used.

In response, the Enterprise Act of 2002 introduced a number of changes to enhance the effectiveness of the Administration procedure and reduce the number of liquidations. Use of Administrative Receivership is much restricted (mainly to legacy floating charges), and Administration introduced as the main procedure. While the Administrator can still be chosen and appointed by the floating charge holders, his fiduciary duty is further extended seeking to (a) rescue the company as a going concern; (b) secure the best result for all creditors and only lastly (c) liquidate assets to pay out secured creditors. The Act also introduced a limited stay on assets.

A distressed exchange can be conducted in the UK via a Company Voluntary Arrangement (CVA), a semi-formal procedure introduced by the Insolvency Act of 1986 and supplemented in the Enterprise Act of 2002[2]. Interestingly, a CVA can be used both within Administration and out-of-court to agree on claim amounts, distribution and company restructuring between the claimants. One of the main advantageous of the CVA procedure is that it allows to make agreements binding on all creditors (including dissenters) even outside bankruptcy, with a 75% majority vote by creditors amount[3].

2. Hypothesis development

In this section, we introduce testable hypotheses. The principal question we wish to address is how differences in creditor rights across countries affect timing and bargaining in distressed exchanges, and the distribution of firm value between creditors and equity holders.

Since we lack a model that explicitly details different restructuring paths across countries, we here simply consider for our purpose a country's bankruptcy code as one factor influencing bargaining power of equity and debt holders in a distressed restructuring.

The credit risk literature generally differentiates between exogenous default (i.e., when the asset value of the firm or other state variable reaches an exogenously given barrier value) and endogenous or strategic default (where the barrier value is derived by the firm's stakeholders). We focus our study on out-of-court distressed exchanges rather than formal bankruptcies in order to highlight the strategic nature of the bargaining game underlying the decision to restructure. In a distressed exchange, debt holders exchange their claims against a combination of equity, cash or new debt in order to deliver the firm and avoid a costly bankruptcy. Often, they will accept a write-off and deviations from absolute priority to gain the consent of junior claimants such as equity holders. The distressed exchange may or may not have been preceded by a default, but will always contain a bargaining element among claimant classes, as all classes need to agree to the exchange (and out-of-court there is generally no possibility of a cramdown).

In the following, we review the strategic reorganization model of Fan and Sundaresan (2000) to better understand the influence of equity holders' bargaining power in a stylized setting and derive relevant hypotheses.

In the presence of bankruptcy costs, a distressed exchange is always preferable to bankruptcy or liquidation. Creditors and equity holders bargain over the allocation of the cost savings from avoiding bankruptcy. For a firm with a single perpetual debt instrument and no renegotiation costs, Fan and Sundaresanderive an optimal sharing rule that allocates the savings to equity holders in proportion to their bargaining power η. The equity value E_B of the firm at the reorganization triggering asset value V_B can then be written as

$$E_B = \eta(\alpha V_B + K), \quad (1)$$

where α and K denote proportional (of firm value) and fixed bankruptcy costs[4].

[1] In cases where unsecured creditors are expected to have no recovery, only the secured creditors vote as residual claimants.

[2] A detailed description of the current mechanics of Company Voluntary Arrangements can be found in Tribe (2009).

[3] The ability to bind dissenting creditors is an important reason for the popularity of the UK CVA procedure to conduct distressed exchanges. For example, Schefenacker cited this as a major reason for the transformation and migration of the parent company to the UK from Germany prior to effecting a distressed exchange.

[4] Proportional bankruptcy costs can be interpreted as indirect costs that include for example loss of market share, brand value and employees as well as higher financing costs. Fixed bankruptcy costs can be interpreted as direct costs, such as court costs, and, to a degree, legal and advisory fees. A detailed discussion of the composition of bankruptcy costs can be found in Bris, Welch and Ning (2006).

Fan and Sundaresan endogenously determine the reorganization boundary V_B that maximizes equity holders' wealth:

$$V_B = \left[\frac{(1-\tau)c}{r+\frac{\sigma^2}{2}} + \frac{\eta K}{1+\frac{\sigma^2}{2r}} \right] \frac{1}{1-\eta\alpha}, \quad (2)$$

where τ is the tax rate, c is the coupon, r is the risk-free interest rate and σ is the asset volatility of the firm.

Knowing that $V = E + D$ we can solve equation (1) for the equity value E_B and debt value D_B at the optimal reorganization point:

$$E_B = \eta(\alpha V_B + K) = \left[\frac{(1-\tau)c}{r+\frac{\sigma^2}{2}} + \frac{\eta K}{1+\frac{\sigma^2}{2r}} \right] \frac{\eta\alpha}{1-\eta\alpha} + \eta K \quad (3)$$

and

$$D_B = V_B - E_B = \left[\frac{(1-\tau)c}{r+\frac{\sigma^2}{2}} + \frac{\eta K}{1+\frac{\sigma^2}{2r}} \right] - \eta K = \frac{(1-\tau)c - 2\sigma^2\eta K}{r+\frac{\sigma^2}{2}}. \quad (4)$$

We define deviations from the absolute priority rule (*DAPR*) as the value accorded to equity holders in reorganization in excess to what they would receive under the absolute priority rule:

$$DAPR_B = E_B - \max(V_B - F, 0) \quad (5)$$

Given these relationships from Fan and Sundaresan (2000) and knowing that η is dependent on the creditor rights in a country, we can formulate three hypotheses with regard to the influence of creditor rights on recovery rates.

H1: Firms in creditor friendly jurisdictions reorganize late (low V_B).

With high bargaining power, equity holders can expect larger benefits from reorganization and therefore have an incentive to reorganize the firm early, rather than holding out in the hope of the firm's fortunes turning around[1]. *Differentiating V_B with respect to bargaining power η shows a positive sign:*

$$\frac{\partial V_B}{\partial \eta} = \frac{\alpha \frac{(1-\tau)c}{r+\frac{\sigma^2}{2}} + \frac{K}{1+\frac{\sigma^2}{2r}}}{(1-\eta\alpha)^2} > 0. \quad (6)$$

H2: Creditor friendly jurisdictions have lower recovery rates for equity and lower deviations from absolute priority.

Equity holders recover less as they reorganize later and extract less value from creditors. *Differentiating E_B with respect to bargaining power η shows a positive sign:*

$$\frac{\partial E_B}{\partial \eta} = \alpha \frac{\frac{(1-\tau)c}{r+\frac{\sigma^2}{2}} + \frac{K\eta(2-\alpha\eta)}{1+\frac{\sigma^2}{2r}}}{(1-\eta\alpha)^2} + K > 0. \quad (7)$$

H3: Creditor friendly jurisdictions have higher recovery rates for debt.

H1 and H2 highlight opposing effects for debt recovery rates in the model. On the one hand, one expects the reorganization boundary to be lower in creditor friendly jurisdictions. On the other hand, debt holders need to share less of the reorganization benefits with equity holders (lower *DAPR*). Differentiating D_B with respect to bargaining power η shows the second effect to be stronger. Debt holders appropriate part of the saved fixed bankruptcy costs that they do not need to pay away to equity holders. Interestingly, they are not affected by the proportional bankruptcy costs that are appropriated entirely by equity holders. *Differentiating E_B with respect to bargaining power η shows a negative sign:*

$$\frac{\partial D_B}{\partial \eta} = -\frac{2\sigma^2 K}{r+\frac{\sigma^2}{2}} < 0. \quad (8)$$

3. Data

3.1. Data sources and sample selection. For our study of distressed exchanges, we chose an observation period from January 1, 1998 to December 31, 2007. We did not consider previous periods given a low number of defaults and little debt market data availability in the UK before this time, and overall low number of defaults[2].

[1] This so far untested intuition is in line with the arguments made by White (1996) and Adler, Capkun and Weiss (2007).

[2] The UK high-yield market only started developing mid-1997. See de Bondt and Marqués (2004) for a review of the UK and European high-yield market development.

For the US dataset, we used Moody's Ultimate Recovery Database (URD) to obtain a list of all issuers that executed distressed exchanges and those issuers' outstanding debt instruments at the time. Moody's URD includes all defaulted US corporate issuers with debt in excess of $50,000,000 at the time of default. It includes distressed exchanges as a default event when impairing debt holders or having the apparent purpose of avoiding default.

The database gives detailed information for each defaulted debt instrument, derived from SEC and bankruptcy filings and news reports. Issuer specific information includes the name, country and industry as well as Bloomberg and CUSIP identifiers. Event specific information includes the exchange date and usually a short description of the exchange mechanism and possible default. Instrument specific information includes the instrument type, face amount, maturity, coupon, the percent of the issuer's debt subordinated to it and Moody's seniority ranking. The instrument's debt recovery (as a % of face value) is derived either from the settlement value of exchanged securities or the trading price on the exchange date, with preference given to the latter method, and excludes any recovery portion attributable to unpaid coupons.

As Moody's URD only contains data for US issuers, we used Moody's Default Risk Services Database (DRSD) to obtain a list of distressed exchanges in the UK. The DRSD lists defaulted rated debt securities of corporate issuers worldwide going back to 1970. We complemented this list by running a separate search on Datastream and on Factiva, adding four issuers[1], and excluding two[2]. The DRSD contains issuer specific information (name, country, industry and a third party identifier such as CUSIP or SEDOL), event specific information (exchange date and sometimes a short description of the exchange) and instrument specific information (instrument type, face amount, maturity and coupon). We complemented the data obtained from the DRSD with data obtained from Datastream, the applicable exchange filings[3] and Factiva news clippings, adding in particular the debt recovery rate and seniority ranking, applying the same criteria as used by Moody's URD in order to ensure comparability.

For both samples, we excluded issuers without available equity pricing data at the time of default, which we obtained from Datastream by cross-matching with the URD dataset using the CUSIP code as identifier.

Our final dataset in the observation period contains 29 issuers with 174 corresponding debt instruments in the US, and 17 issuers with 55 debt instruments in the UK[4].

For each issuer, we calculated the debt recovery rate (denoted as R_D, $-weighted average across all the issuer's debt instruments as a % of the face value of debt), equity recovery rate (denoted as R_E, also as a % of the face value of debt), firm recovery rate (R_V, firm value divided by face value of debt) and *DAPR* (equity value accorded in excess of the value under the absolute priority rule, divided by the face value of debt).

We obtained the firm asset volatility σ from Moody's KMV Creditedge database[5]. As the risk-free interest rate r we used the 3-month Libor rate (US or UK as applicable) at the exchange date as reported on Datastream. Finally, to account for the state of the overall distressed market we used yearly US bond default rates as reported by Altman, Karlin and Kay (2008).

3.2. Choice of independent variables. In equations (2) to (4) used in the formulation of our three hypotheses, we can see that the four recovery rate variables are a function of the independent variables r, σ, t, c, η, α and K. As the equity holders' bargaining power η and the bankruptcy costs (α and K) are not directly observable, we choose several empirical proxies for them based on existing empirical studies. To proxy for bargaining power, we use the country dummy *UK*, the number of seniority ranks and a dummy for issuers with any debt maturing in less than 12 months. We use firm size, the *Energy & Utility* industry dummy and the *default rate* to proxy for bankruptcy costs. Table 2 describes all the variables used in our analysis and discussed in the following in more detail.

[1] Clubhaus, Jarvis, Mytravel and Schefenacker.
[2] Ermis and Pegasus, which are not domiciled in the UK.
[3] Company Voluntary Arrangement or Scheme of Arrangement as submitted to the UK Listing Authority.

[4] Our sample is similar in size to those used in other studies of distressed exchanges, for example Franks and Torous (1994), James (1996) and Gilson (1997).
[5] KMV calculates equity price implied asset volatility using the Vasicek-Kealhofer model and own adjustments based on historic data. Details of the estimation methodology can be found in Crosbie and Bohn (2003, pp.16-17). Where the asset volatility at the exchange date was not available for the individual issuers in Creditedge, we used either the last available asset volatility for the issuer or the industry average at the exchange date.

Table 2. Description of dependent and independent variables

The table describes the variables used in the analysis of recovery rates. URD is the Ultimate Recovery Database provided by Moody's corporation. The URD contains data on US issuers only. DRSD is the Default Risk Services Database by Moody's, providing data for rated issuers worldwide.

	Description	Source
Panel A: Dependent variables (recovery rates)		
Debt recovery rate (R_D)	Market value of debt divided by face value of debt	US: Moody's URD UK: Datastream, company filings
Equity recovery rate (R_E)	Market value of equity divided by face value of debt	Datastream, company filings
Firm recovery rate (R_V)	Market value of firm (debt plus equity) divided by face value of debt	Constructed from equity and debt recoveries
DAPR	Market value of equity divided by firm value	Constructed from equity and debt recoveries
Panel B: Independent variables (firm and instrument characteristics)		
UK	Dummy variable, 1 if issuer is based in the UK	US: Moody's URD & DRSD
Asset volatility (σ)	Asset volatility of firm value	KMV
Firm size (V_B)	Market value of firm (debt plus equity) *in $m*	Constructed from equity and debt recoveries
Coupon (c_{avg})	$-weighted average coupon rate of all debt instruments of issuer	Moody's URD & DRSD
Risk-free rate (r)	3-month Libor rate	Datastream
Classes	Number of debt seniority classes	Moody's URD & DRSD, company filings
Energy & utility	Dummy variable, 1 if issuer is energy or utility firm	Moody's URD & DRSD
Short maturity	Dummy variable, 1 if any debt instrument maturing in < 1 year	Moody's URD & DRSD
Default rate	% of outstanding bonds defaulted in calendar yearin the US market	Altman, Karlin and Kay (2008)
Percent below	% of issuers debt subordinated to the instrument	Moody's URD, company filings

Complex debt structures make it more difficult for debt holders to coordinate, weakening their bargaining position vs. equity holders. To measure the complexity of the debt structure, we follow Betker (1995) and count the number of different seniority classes of debt in an issuer's debt structure (hereafter denoted as *classes*). Moody's URD ranks the debt instruments (such as senior secured, senior unsecured, subordinated, junior subordinated) of an issuer into different seniority classes. Debt seniority can arise from legal subordination (as specified in the debt documentation or inter-creditor agreements), differences in collateral (secured or not) or structural subordination (being located in different legal entities of the issuers group). A number of other studies have used the number of debt instruments instead of classes to account for complexity[1]. However, we believe that *classes* is a better measure of differing interests between creditors, whereas the number of instruments is often more a reflection of firm size[2].

In addition to increasing creditors'coordination costs, the presence of junior debt holders can also increase equity holders' bargaining position vs. senior debt holders, for junior debt holders' interests may be more aligned with equity holders, as described by Weiss (1990). For example, junior debt holders may prefer riskier investments by the firm and may also argue for a higher firm valuation in order to increase the value of their claims. However, higher coordination costs and diverse creditor interests may also increase renegotiation frictions and make an out-of-court restructuring less likely. While renegotiation costs are not modelled in the Fan and Sundaresan model, we could most easily interpret them as a reduction in the benefits of avoiding bankruptcy (complex restructurings may be easier and more cost efficient to conduct in court in Chapter 11 or Administration)[3].

The dummy *short maturity* equals one if any debt instruments mature in the next twelve months. Gertner and Scharfstein (1991) and Berglöf and von Thadden (1994) show that upcoming refinancing needs reduce the bargaining power of equity holders in out-of-court restructurings as they have little time to find new financing sources, and short maturity creditors may prefer to hold out and be paid in full ahead of other creditors.

We use the logarithm of firm value to control for the influence of firm size[1]. With larger firm size the

[1] For example Franks and Torous (1994) and Gilson (1997). Davydenko and Strebulaev (2007) instead use the number of instruments divided by assets of the firm.

[2] For example, in our sample Qwest Communications, a relatively straightforward debt exchange, had 30 individual debt issues, but only two distinct classes: secured bank loans and senior unsecured bonds. Lexington Precision Corp., on the other hand, was a small but complex restructuring involving only 4 debt issues, secured bank loans, senior unsecured bonds, senior subordinated bonds and junior subordinated bonds each ranking separately and being offered different exchange terms including cash, new bonds and equity warrants.

[3] Francois and Morellec (2004) model this effect as a time-dependent bargaining cost. Alternatively, Davydenko and Strebulaev (2007) in their extension of the Fan and Sundaresan (2000) model and Eraslan (2008) in his 3-party bargaining model interpret renegotiation frictions as the *probability* that renegotiations fail, leading to costly liquidation of the firm.

impact of the fixed bankruptcy costs *K* in the structural model gets smaller – a large firm can more easily afford court and advisor fees, and is therefore expected to recover more in a bankruptcy[2].

To control for industry effects, we include an industry dummy *Energy & Utility* that equals one for firms active in the utility or energy industry (using Moody's specific industry codes), as previous studies have shown those industries to exhibit particularly high recovery rates[3].

To account for market disruptions and the economic cycle, we include the *default rate* of US bonds as reported by Altman, Karlin and Kay (2008) in the year of the issuer's reorganization[4].

Finally, for the analysis of instrument level recovery rates we also include a proxy for instrument seniority. *Percent below* indicates the percentage of an issuer's debt subordinated to the instrument, acting as a buffer in case of bankruptcy.

In line with most other recovery rate studies and in order to reduce complexity, we do not control for changes in tax rate across countries or time.

3.3. Descriptive statistics. Table 3 presents firm recovery rates stratified by industry group (panel A) and default year (panel B). Noteworthy are the energy & utility and the telecommunications industries, with the largest number of distressed exchanges (8 each). Interestingly, they also exhibit the highest recovery rates, above 90%. The number of distressed exchanges picks up in 2001 (six) with the bust of the dot-com/telecom bubble and peaks in 2002 (eleven) and 2003 (ten), with average *firm recovery rate* taking a dive in 2001 (45.31%).

Table 3. Sample description and firm recovery rates

This table documents firm recovery rates and number of firms for the sample of distressed exchanges in the US and the UK from January 1, 1998 to December 31, 2007, stratified by industry and by event year.

Panel A: Recovery rates by industry			
Industry	Firm recovery rate (mean)	Number and names of defaulted firms	
Automotive	58.09%	1	Schefenacker
Construction	71.54%	3	Foster Wheeler, Luxfer, Fortress
Consumer products	83.40%	4	Hartmarx, Salton, Scovill Fasteners, Texon Int.
Distribution	70.00%	1	Foxus DIY
Energy & utility	95.26%	8	Abraxas Petroleum (2x), AES Drax, British Energy, Danka Business Systems, Grant Geophysical, Kelley Oil & Gas
Leisure & entertainment	71.60%	4	Clubhaus (2x), Mytravel, Silverleaf Resorts
Manufacturing	67.28%	3	Hybridon, Lexington Precision, Trikon Technologies
Media	86.24%	5	Central European Media, Charter Com; Sirius Satellite Radio, Telewest Com; XM Satellite
Metals & mining	49.32%	2	Coeur d'Alene Mines, Weirton Steel
Natural products	83.99%	1	Gaylord Container
Packaging	65.60%	1	IFCO Systems
Services	27.41%	2	Envirosource, Timco Aviation Services
Technology	42.60%	8	Alamosa, Esprit Tel., FiberNet Tel., Jazztel, Level 3 Com., Qwest Com., Suncom Wireless, Talk America
Telecommunications	92.63%	8	Alamosa, Esprit Tel., FiberNet Tel., Jazztel, Level 3 Com., Qwest Com., Suncom Wireless, Talk America
All	76.73%	46	
Panel B: Recovery rates by year			
Year	Firm recovery rate (mean)	Number and names of defaulted firms	
1998	52.62%	2	Hybridon, Trikon
1999	95.71%	2	Abraxas Petroleum, Kelley Oil & Gas
2000	80.47%	3	Aviva Petroleum, Central European Media, Grant Geophysical
2001	45.31%	6	Coeur d'Alene Mines, Danka Businesses Services, Envirosource, Esprit Tel., Scovill Fasteners, Fortress

[1] Transformation to normality as the firm value measured in absolute terms is not normally distributed.
[2] This is corroborated in empirical studies for example by Betker (1995), Bris, Welch and Ning (2006) and Baird, Bris and Zhu (2007).
[3] For example, Acharya, Bharath and Srinivasan (2007) find the Utility & energy sectors to have the two highest recovery rates in their sample (though only Utility significantly so). They hypothesize this to have regulatory reasons. Another reason could be that both industries exhibit particularly high tangible assets, which can be sold in case of bankruptcy.
[4] Both Altman, Brady, Resti and Sironi (2005) and Bruche and González-Aguado (2010) report a significant influence of default rates on recovery rates.

Table 3 (cont.). Sample description and firm recovery rates

Year	Firm recovery rate (mean)	Number and names of defaulted firms	
2002	78.56%	11	Acterna, Clubhaus, FiberNet Tel., Gaylord Container, Hartmarx, Qwest Com., Silverleaf Resorts, Talk America, Texon Int., Timco Aviation, Weirton
2003	89.56%	10	Abraxas Petroleum, AES Drax, Alamosa, British Energy, IFCO Systems, Jazztel, Lexington Precision, Marconi, Sirius Satellite, XM Satellite
2004	88.13%	5	Clubhaus, Foster Wheeler, Level 3 Com., Telewest Com.
2005	73.31%	3	Charter Com., Jarvis, Salton
2007	74.84%	4	Focus DIY, Luxfer, Schefenacker, Suncom Wireless
All	76.73%	46	

Panel A of Table 4 summarizes the dependent variables (recovery rates), separately for the US and the UK sample. The average firm recovery rate is markedly higher at 87.29% in the US compared to only 58.71% in the UK. As expected, companies in creditor-friendly UK apparently reorganize at a much lower firm value. With average DAPR of 7.94% in the US against 2.27% in the UK, equity holders recover much more in the US (17.25%) than the UK (2.99%), as do creditors (70.04% versus 56.17%). While the figures for the US are broadly in line with previous studies[1], the latter result is surprising, as we expected higher recovery rates in the creditor friendly jurisdiction of the UK, both intuitively and from the model relationships described in section 1. However, the difference in firm recovery rate is larger in absolute terms than the difference in *equity recovery rates*, still leaving a higher recovery value for debt holders. In section 4, we will analyze these results further and see whether the relationships hold after controlling for the independent variables in a regression analysis.

In Panel B we present summary statistics for the independent variables. The average asset volatility is slightly higher in the US with 30.03% versus 24,01% in the UK[2]. Average firm size is more than twice as large in the US than the UK ($1.963m and $911m), however the median firm size is similar, as the US sample is skewed by some very large telecommunications firms (Charter Communications, Level 3 and Qwest).

Table 4. Summary statistics of dependent and independent variables

This table reports summary statistics for dependent and independent variables for the sample of distressed exchanges in the US and the UK from January 1, 1998 to December 31, 2007. The dependent variable *firm recovery rate* equals the market value of debt plus equity, divided by the face value of debt. DAPR is the deviation from absolute priority, calculated as market value of equity divided by market value of the firm. Debt recovery rate is the market value of debt divided by face value of debt. *Equity recovery rate* is the market value of equity divided by face value of debt. The independent variable *asset volatility* is the KMV asset volatility. *Firm value* is the market value of the firm (debtplus equity). c_{avg} is the average coupon of the firm's debt instruments. *r* is the applicable 3-month Libor rate. *Classes* is the number of creditor classes of the issuer with different seniority ranks. All firm variables are calculated by finding the mean value of each variable per firm and then averaging across firms. *Percent below* is an instrument level variable that expresses the percentage of the issuers debt that is subordinated to the individual debt instrument.

Panel A: Dependent variables (recovery rates)								
	US				UK			
	Mean	Median	St. dev.	*N*	Mean	Median	St. dev.	*N*
Firm recovery rate	87.29%	83.99%	36.28%	29	58.71%	63.78%	27.49%	17
Debt recovery rate	70.04%	74.27%	25.26%	29	56.17%	58.53%	27.05%	17
Equity recovery rate	17.25%	7.11%	21.92%	29	2.99%	2.57%	2.61%	17
DAPR	7.94%	5.28%	8.90%	29	2.27%	2.19%	3.71%	17
Panel B: Independent variables (firm and instrument)								
	US				UK			
	Mean	Median	St. dev.	*N*	Mean	Median	St. dev.	*N*
Asset volatility	30.03%	29.66%	12.19%	29	24.01%	22.28%	9.33%	17
Firm value ($m)	1,963	258	5.572	29	911	282	1.593	17
c_{avg}	8.65%	8.32%	1.96%	29	8.39%	7.82%	2.23%	16
r	3.07%	2.20%	1.77%	29	4.76%	4.63%	0.89%	17
Classes	2.28	2.00	0.92	29	1.65	2.00	0.49	17
Percent below	32.10%	17.39	36.57%	54	17.16%	0.00	25.94%	32

The coupon c_{avg} ($-weighted average coupon of the issuers debt) is comparable in both countries, whereas the risk-free interest rate is lower in the US for most of the observation period (except a short period in 2001 and 2006). The average number of seniority *classes* in the US is 2.28, slightly higher than in the UK with 1.65. Whereas several US firms in our sample have up to 4

seniority ranks, none have more than 2 in the UK sample. This may be due to a general reluctance by UK issuers and investors to use complex debt structures, or the later development of the UK high-yield debt market[3].

4. Regression results

Our primary tests relate recovery rates (R_V, R_D, R_E, *DAPR*) in distressed exchanges to independent variables related to country, credit risk, bargaining power and bankruptcy costs as described in the previous sections.

As each issuer is represented with multiple (correlated) debt instruments in our data sample, including each instrument individually in the analysis would result in overestimation errors. To counter this effect, we aggregate and test debt recovery data on an issuer cluster level.

In a second step, we also test our assumptions on theinstrument level, taking into consideration additional instrument specific factors.

We test variants of the specification:

$$Recoveryrate_j = \beta_0 + \beta_1 UK_j + \beta_2 \sigma_j^2 + \beta_3 c_{avg,j} + \beta_4 r_j + \beta_5 ln(V_B)_j + \beta_6 Classes_j + \beta_7 Energy\&Utility_j + \\ + \beta_8 Short\ maturity_j + \beta_9 Default\ rate_j + \varepsilon_j \quad (9)$$

with variables for firm *j* as defined in Table 2.

4.1. Firm level analysis. In Table 5 we report regression results using ordinary least squares estimates. Each recovery rate (R_V, R_D, R_E, *DAPR*) is tested in a first step using only country and credit risk factors (regressions (1), (3), (5) and (7)), and in a second step adding our additional proxies for bargaining power and bankruptcy costs (regressions (2), (4), (6) and (8)).

Table 5. Determinants of company recovery rate

This table reports the results of regression analysis of corporate issuers' recovery rates for debt and equity, for the whole sample of distressed exchanges in the US and UK from January 1, 1998 to December 31, 2007. The dependent variable in regression (1) and (2) is the recovery rate of the firm (defined as market value of debt plus equity, divided by the face value of debt); in regression (3) and (4) the average recovery rate of debt holders of the firm; in regression (5) and (6) the average recovery rate of equity holders of the firm (market value of equity divided by face value of debt); and in regression (7) and (8) the deviation from the absolute priority rule (measured as market value of equity in excess of value under the absolute priority, divided by the market value of the firm). The independent variable *UK* is a country dummy. *Asset volatility*[2] is the squared KMV asset volatility. ln(*firm value*) is the logarithm of the market value of the firm (debt + equity). c_{avg} is the average cost of debt of the firm. *r* is the applicable 3-month Libor rate. *Classes* is the number of creditor classes of the issuer with different seniority ranks. *Energy&Utility* is a dummy for firms in the energy or utility sector. *Short maturity* is a dummy variable indicating if an issuer has a debt maturity in the next 12 months. *Default rate* is the default rate of US corporate bonds in the event year as reported by Altman, Karlin and Kay (2008). Values of *t*-statistics are reported in parentheses. Coefficients marked ***, **, and * are significant at the 1%, 5%, and 10% significance level, respectively.

	Firm recovery rate		*Debt recovery rate*		*Equity recovery rate*		*DAPR*	
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
UK	-0.292**	-0.243**	-0.176**	-0.105	-0.113*	-0.135**	-0.046*	-0.062**
	(-2.632)	(-2.163)	(-2.124)	(-1.321)	(-1.893)	(-2.149)	(-1.723)	(-2.232)
Asset volatility[2]	-0.315	-0.223	-0.946**	-0.899**	0.628*	0.674**	0.187	0.197
	(-0.514)	(-0.375)	(-2.069)	(-2.144)	(1.894)	(2.028)	(1.271)	(1.346)
ln(*firm value*)	0.089***	0.057*	0.058**	0.031	0.032*	0.027	0.010	0.012
	(2.827)	(1.666)	(2.472)	(1.258)	(1.844)	(1.393)	(1.280)	(1.459)
c_{avg}	1.111	-0.973	-0.983	-2.157	2.081	1.156	0.502	0.594
	(0.436)	(-0.364)	(-0.518)	(-1.142)	(1.513)	(0.772)	(0.823)	(0.902)
r	-0.688	-7.330*	-0.452	-4.246	-0.156	-3.000	-0.192	-0.134
	(-0.203)	(-1.668)	(-0.179)	(-1.368)	(-0.085)	(-1.218)	(-0.236)	(-0.124)
Classes		0.013		0.063		-0.049		-0.021
		(0.192)		(1.370)		(1.350)		(1.292)

[1] Franks and Torous (1994) report broadly similar figures for their earlier dataset with deviations from absolute priority of 9.51% (of face value of debt) and creditor recovery rates of 80.1%. Eberhart, Moore and Roenfeldt (1990) report 7.6% deviation from absolute priority for a sample of bankruptcy settlements.

[2] This is similar to the 24.49% reported in the US study of Davydenko and Strebulaev (2007) and the 23-28% for US sub-investment grade issuers reported by Schaefer and Strebulaev (2008).

[3] See also de Bondt and Marqués (2004), who describe the development of the UK high-yield market since inception in 1997, and Armour and Deakin (2001) who discuss cause and effects of the more concentrated nature of debt structures in the UK.

Table 5 (cont.). Determinants of company recovery rate

	Firm recovery rate		*Debt recovery rate*		*Equity recovery rate*		*DAPR*	
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
Energy&Utility		0.342**		0.305***		0.034		-0.059*
		(2.447)		(3.093)		(0.430)		(-1.708)
Short maturity		-0.135		-0.083		-0.053		0.026
		(-1.137)		(-0.988)		(-0.799)		(0.881)
Default rate		-0.019		-0.007		-0.011		-0.252
		(-1.415)		(-0.801)		(-1.546)		(-0.780)
Const.	-0.910	0.183	-0.237	0.402	-0.682	-0.222		-0.162
	(-1.146)	(0.198)	(-0.400)	(0.616)	(-1.589)	(-0.428)		(-0.712)
F	3.959	3.198	3.796	3.910	3.182	2.256	2.029	1.739
Adj. *R* square	0.247	0.305	0.237	0.368	0.195	0.201	0.103	0.129
N	46	46	46	46	46	46	46	46

We find a significant effect of the country dummy *UK* on all recovery rates. UK firms reorganize at a firm value about 24.3% lower than comparable US firms. This effect is large and significant even after adjusting for firm specific factors, and confirms Hypothesis 1. Firms reorganize later in a creditor friendly regime.

As already seen in the descriptive statistics in Table 4, deviations from absolute priority and *equity recoveries* are significantly lower in the UK than the US. This supports Hypothesis 2 and 4, that equity holders are less able to extract value from creditors in a creditor friendly regime. The average *equity recovery rate* is 13.5% (of face value of debt) lower in the UK, economically highly significant compared to the mean *equity recovery rate* in the US of 17.25%.

Debt recovery rate is also significantly and on average 10.5% lower in the UK than the US This result is surprising and contrary to Hypothesis 3. One would intuitively expect for a creditor friendly regime to offer higher recovery rates for debt holders. And equation (9) shows that in the Fan and Sundaresan (2000) model, creditors should always benefit from a better bargaining position. However, our data sample shows that even though deviations from absolute priority are much lower in the UK, creditors are more affected by the lower firm value in the UK.

4.2. Control variables. As control variables, we included credit risk factors (asset volatility σ, the average coupon C_{avg} and the risk free interest rate r), bargaining power proxies (*classes* and the *short maturity* dummy) and bankruptcy cost proxies (the normalized *firm size*, a dummy for the Energy&Utility industry and the US market default rate in the year of the issuers default). We find significant coefficients for *asset volatility*, *firm size* and the *Energy&Utility* dummy.

Riskier firms have significantly lower *debt recoveries* and higher *equity recoveries*, as value gets shifted from creditors to equity holders.

The *firm size* has a statistically and economically significant positive influence on the firm recovery rate, as well as debt and equity recoveries, though the effect is lessened when including the additional control variables in regressions (2), (4) and (6). Hypothesizing a link between firm size and bankruptcy costs, we would have expected this result for bankruptcy resolutions but not for our sample of out-of-court exchanges. Possible explanations for the inverted sign could be a link of firm size with the transactions costs of the reorganization (larger firms can better afford to conduct complex capital structure reorganizations), instrument liquidity and information issues (smaller firms may shun the information requirements to get debt and equity holder approvals for a reorganization).

The *Energy&Utility* dummy is highly significant with the expected sign. Firms in the Energy&Utility industry have on average more than 30% (of face value) higher debt and firm recovery rates. *Classes* does not have a statistically significant effect[1].

The average coupon, the risk free interest rate (except in regression (2)) and the *short maturity* dummy are not statistically significant. This is in line with other recovery rate studies[2] and not particularly surprising for firms near bankruptcy, given that upon filing of the bankruptcy the terms of the existing indebtedness become nearly meaningless. While credit risk models discussed in

[1]Using the number of securities as an alternative measure yields similar results.

[2] Acharya, Bharath and Srinivasan (2007) control for the bond coupon and finds no significant influence on bond recovery rates in bankruptcies. Altman, Brady, Resti and Sironi (2005) control for the risk-free rate and find no significant on default recovery rates, likewise Davydenko and Strebulaev (2007) find no significant influence on sub-investment grade credit spreads.

section 2 highlight the relationship of *c* and *r* to the reorganization boundary, in practice this influence may be less clear for firms with complex debt structures, rolling maturities and diverse lending terms[1]

Finally, we test for the US *default rate*. For our sample of distressed exchanges, we cannot confirm the link between market default rates and recovery rates found in studies of bankruptcy settlements. This may be due to the lesser credit deterioration in distressed exchanges, or that timing of the exchange is more discretionary than filing for bankruptcy, allowing the firm to choose an appropriate time with less market disruptions. Frequently used alternative measures for the economic environment such as GDP growth or changes in the MSCI World index do not prove more significant.

4.3. Instrument level analysis. As the number of debt instruments per firm varies widely in our sample, including them all in our instrument level analysis would bias the sample, overweighting large firms and overestimating goodness of fit for the common (firm specific) variables. We, therefore, choose two bonds for each issuer to construct balanced clusters, one from the most senior class and another one from the second most senior class. In case of multiple instruments in a class, we choose the one with the largest issue size, likely to be the most liquid.

In Table 6, we present result of regression analysis of *instrument recovery rates*, linking them in regression (1) to instrument seniority (*percent below*) and *debt recovery rate*, in regression (2) to *percent below* in addition to UK and credit model variables and in regression (3) to all the control variables already used in the firm level analysis.

Table 6. Determinants of instrument recovery rates

This table reports the results of regression analysis of debt instrument recovery rates for the whole sample of distressed exchanges in the US and UK from January 1, 1998 to December 31, 2007. The independent variable *percent below* is the percentage of the issuer's debt that is subordinated to this instrument. *Collateral* is a dummy variable indicating if the instrument is secured by collateral. *Debt recovery* is the average recovery rate of the issuer's debt. *Firm recovery* is the market value of all debt plus equity, divided by the face value of debt of the issuer; *UK* is a country dummy. *Asset volatility*^{2} is the squared KMV asset volatility. ln*(firm value)* is the logarithm of the market value of the firm (debt plus equity). *c* is the coupon of the instrument. *r* is the applicable 3-month Libor rate. *Classes* is the number of creditor classes of the issuer with different seniority ranks. *Energy&Utility* is a dummy for firms in the energy or utility sector. *Short maturity* is a dummy variable indicating if an issuer has a debt maturity in the next 12 months. *Default rate* is the average default rate of US corporate bonds in the event year as reported by Altman, Karlin and Kay (2008). Values of *t*-statistics are reported in parentheses. Coefficients marked ***, **, and * are significant at the 1%, 5%, and 10% significance level, respectively.

	(1)	(2)	(3)
Percent below	0.528***	0.430***	0.432***
	(9.463)	(4.103)	(3.993)
Debt recovery rate	0.759***		
	(10.712)		
UK		-0.145**	-0.113
		(-2.127)	(-1.605)
Asset volatility^2		-0.588	-0.581*
		(-1.638)	(-1.661)
ln (*firm value*)		0.031*	0.026
		(1.796)	(1.412)
c		-1.175	-1.442*
		(-1.411)	(-1.715)
r		0.388	-2.714
		(0.193)	(-1.078)
Classes			-0.012
			(-0.285)
Energy&Utility			0.236***
			(2.925)
Short maturity			-0.089
			(-1.350)
Default rate			-0.002
			(-0.249)

[1] Alternative measures for *r* (e.g., treasury rates) or the debt maturity profile (eg, shortest/average maturity, proportion of short term debt) are also not significant.

Table 6 (cont.). Determinants of instrument recovery rates

	(1)	(2)	(3)
Const.	0.058	0.155	0.391
	(1.125)	(0.399)	(0.870)
F	112.715	11.094	7.928
Adj. *R* square	0.724	0.416	0.449
N	85	85	85

As debt recovery is the average recovery rate across a firm's debt instruments, we should be able to explain the *instrument recovery rate* entirely by the debt recovery and the distribution of it among debt instruments. Indeed, we find that that the two variables together explain 72.4% in the variation of instrument recovery rates, and are both highly significant. Each explains approximately half of the variance, with standardized coefficients of 0.541 and 0.613. In regressions (2) and (3) we add the *UK* country dummy and credit risk factors and confirm a significant influence of the country factor also on the instrument level.

We also test alternative measures for instrument seniority such as the seniority class, the presence of collateral and whether the instrument is private bank or public bond debt. While all these measures are statistically significant, they do not add substantially to the explanatory value of the measure *percent below*.

4.4. Limitations and alternative explanations. Theoretically, we motivated our hypotheses on the Fan and Sundaresan (2000) model, assuming a strategic default decision of equity holders in distressed exchanges that is dependent on equity holders relative bargaining power vs. debt holders. This seems a reasonable assumption for out-of-court distressed exchanges. However, observed UK firm value recovery rates are much lower than predictable by the Fan and Sundaresan model. This can be illustrated with a simple example: Entering the mean values for our UK sample (r = 4.76%, c = = 8.39%, σ = 24.01% and τ = 0.35), into equation (1), we obtain a minimum value for the reorganization boundary V_B of 71.4% (for η = 0, the boundary is independent of bankruptcy costs and equals the solution as derived by Leland (1994)), and much higher than the observed mean UK recovery rate for distressed exchanges of 58.71%. Yet even at this lower empirical firm recovery, we can still observe deviations from absolute priority for almost all cases in our UK sample. This suggests that other explanations, in addition to differences in bargaining power, may be necessary to explain the effect of the country factor on debt recovery rates. Possible explanations could be non-strategic default or sample bias.

A main assumption of strategic default models is that equity holders need to inject new equity into the firm to cover cash-flow shortfalls and thus have an incentive to default and reorganize strategically. In practice however, equity holders may not need to inject cash into an unprofitable firm for a while if the firm has enough cash reserves. Instead, exogenous factors such as liquidity or covenant constraints rather than strategic considerations may later force the firm to restructure, at a lower boundary value. We can assume that a creditor friendly regime such as the UK has more such exogenous default events compared to the US. In fact, 10 of the 17 distressed exchanges in the UK were preceded by a payment default, indicating liquidity problems[1]. This would be consistent with the observed lower recovery rates for the firm and for debt holders. Bargaining in default to avoid formal bankruptcy still allows equity holders to obtain a small payout.

Our sample may also be biased as it does not include US firms which chose to reorganize in chapter 11 in the US but might have chosen to reorganize out-of-court had they been UK issuers. These may be firms with particularly low firm value or complex debt structures that may prefer a formal proceeding, and would exhibit lower recovery rates, or firms that benefit from advantageous tax treatment of carry-forward net operating losses or super priority financing in US bankruptcies. Our study does not capture this self-selection effect as we do not model the decision to abandon negotiations and chose bankruptcy proceedings instead.

Yet another view on the reorganization decision is the role played by management. Management usually has the initiative for formulating a distressed exchange and deciding on when to file for bankruptcy. We abstracted from potential agency conflicts between management and equity holders in financially distressed firms that could lead to different reorganization outcomes (see Eckbo and Thornburn, 2003).

[1] Some of these (for example AES Drax, Clubhaus, Avon Energy) also had extended periods of up to 12 months of negotiations with creditors until the terms of a distressed exchange could finally be agreed upon.

Similarly, we did not in any detail consider heterogeneity and differing interests between debt holder classes. In particular, it would be interesting to study the effect of complex debt structures with bargaining between senior and junior debt holders on the default decision and recovery rates.

Empirically, we find a significant effect of the country factor *UK* on recovery rates. We hypothesized such an effect to arise due to differ-rences in creditor rights in the UK and the US But the different recovery rates could also be related to differences in bankruptcy costs or other institutional differences in the two countries. Empirical evidence is sparse but suggests that bankruptcy costs are lower in the creditor friendly UK regime, given shorter restructuring time and less scope for costly bargaining and litigation[1]. Differing bankruptcy costs thus have the same sign effect as lower bargaining power of equity on recovery rates and deviations from absolute priority in the Fan and Sundaresan (2000) model.

The bankruptcy code in the UK has changed substantially with the Enterprise Act of 2002. The reform of the Administration procedure has strengthened unsecured creditor rights at the cost of secured creditors and made reorganization in court more viable. As substantial differences in creditor rights versus the US remain[2], we can confidently use the whole time period for our study. Nevertheless, it would be interesting for future studies to analyze the impact of the new rules on the outcomes of informal reorganizations and bankruptcies.

Our proxies for bargaining power and bankruptcy costs are noisy measures of the underlying variables, and their relationships to recovery rates and coefficients may be difficult to interpret. Each of independent variables could also be related to country differences themselves. Interest rates are clearly country specific. However, the correlations between the independent variables are low or insignificant enough to give statistical comfort to include them together with the country dummy.

Furthermore, the independent variables reflecting the debt structure of the issuer (the coupon, maturity and debt seniority) are potentially endogenous to bargaining between equity holders and debt holders in distress. They may reflect ex ante expectations at issuance by the issuer and investors for the resolution of financial distress. For example, riskier issuers may need to pay higher coupons or be unable to obtain long maturity debt as debt holders anticipate lower recovery rates. Similarly, the regression coefficients for the influence of the country factor on recovery rates could be influenced by the other variables if these have adapted to expectations regarding the recovery process in that country[3]. However, any adjustments in such practices would be to counter the lower recovery rates in the creditor friendly country. This might lead us to underestimate the effect of the country factor without such adjustments, but the sign and significance of our estimates would not be affected.

The debt structure may also reflect a history of financial distress of the issuer (for example high coupons, complex debt structures and short-term debt are often the result of distressed rescue financings) that may affect future reorganizations. We do not control separately for repeated defaults but rely on the variables related to debt structure itself to capture such effects adequately.

Finally, we calculate recovery rates from market equity and debt prices on the exchange date. Distressed instruments are often highly illiquid, potentially distorting trading prices. This is even more so the case in the UK, with less liquid markets fordistressed securities than the US. However, given the very large differences in recovery rates (i.e., mean firm recovery rates of 87.29% in the US vs. 58.71% in the UK), the overall economic significance of our results is unlikely to be affected.

Conclusion

Strategic default models link recovery rates to bargaining power of equity and debt holders. This paper analyzes a comprehensive sample of distressed exchanges in the United States and the United Kingdom from 1998 to 2007 to study the effect of a country's creditor rights on the timing of financial restructuring and distribution among claimant classes.

We find that distressed exchanges in the creditor friendly UK jurisdiction occur at a much lower firm value than in the US, with significantly lower recovery rates for debt holders. We also document that deviations from absolute priority are frequent for distressed exchanges even in the UK, though at a much lower level than in the US.

Our findings suggest that the design of bankruptcy codes matters to firms in their decision for when and

[1] See for example White (1996) who discusses differences in bankruptcy costs across the EU and the US Djankov, Hart, McLiesh and Shleifer (2008) estimate bankruptcy costs of 6% of assets in the UK and 7% in the US for a fictional case study.

[2] As reflected in the unchanged LSSV score reported by Djankov, McLiesh and Shleifer (2007, p. 304).

[3] See, for example, the discussion in Davydenko and Franks (2008) on how lending practices adapt to local bankruptcy codes.

whether to reorganize out-of-court, and influences the value claimants can recover in reorganization. Additional study of how firms choose between restructuring in or out-of-court could add further insights for credit pricing and add to the debate on the optimal design of bankruptcy codes.

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