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Corporate restructurings and the effect of ownership concentration on bond recovery rates

An empirical study of recovery rates in the Norwegian high yield bond market

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Abstract

This study examines the effect of ownership concentration on recovery rates for 112 defaulted high yield bonds issued by Norwegian firms. We find evidence suggesting that concentrated ownership in the hands of the firm's largest owner negatively affects bond recovery for secured bonds. The effect is insignficant for unsecured bonds. This suggests that large shareholders reduce bond recovery rates by a transfer of value in the negotiation process during financial reorganizations. Large shareholders have greater incentive to use their bargaining power in negotiations, compared to small shareholders.

Keywords: corporate restructurings, high yield bonds, recovery rates, ownership concentration

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1. Introduction

Bonds are a vital part of well-functioning capital markets, and are important for both investors and corporations alike. The seminal groundwork on pricing risky debt by Robert C. Merton (1974) introduced both probability of default and recovery rates as pricing mechanisms, highlighting the importance of default events. Past empirical research on bond recovery rates focuses on firm and bond characteristics as determinants. On the other hand, research on corporate restructurings and bankruptcy legislation points to bargaining power as a key factor affecting recovery rates.

Bankruptcy legislation affects recovery rates in two ways. In formal bankruptcies it affects recovery rates directly by determining how value from liquidated assets are distributed. It also has an essential indirect effect: if bankruptcy is the alternative to private negotiation, then out-of-court reorganization terms will reflect legal and institutional constraints of the bankruptcy process (Gilson et al., 1990). However, as bankruptcy legislation is unique to each country, research done in foreign markets may not apply elsewhere. Country specific research is therefore warranted and may contribute to uncover weaknesses in legislation that impact markets negatively.

The Norwegian high yield (HY) bond market has experienced considerable growth in the past decade. It has developed from a regional market into the third largest HY market in the world. Additionally, the recent wave of restructurings and bankruptcies among HY issuers underlines the importance of a well-functioning Norwegian bankruptcy system.

We assess the Norwegian bankruptcy legislation in chapter 2 and conclude that it provides excessive bargaining power to debtors in private reorganizations. We point to two major contributing mechanisms. First, the *insolvency requirement*[1] prohibits creditors to petition for a bankruptcy procedure until the firm is both *illiquid* and *insufficient*, leaving the fate of the firm in the hands of the shareholders. Second, *in-court debt settlements* have restrictive limitations, making them suboptimal for most reorganizations. These requirements and limitations force creditors to either accept an out-of-court reorganization plan that may deviate from *the Absolute Priority Rule* (APR), or bear the costs associated with distress and bankruptcy. The outcome of reorganizations relies on how well the negotiating parties utilize their bargaining power.

Large shareholders have greater potential upside for the time and effort invested in negotiations,

[1]Insolvency consists of two factors, illiquidity and insufficiency. Illiquidity occurs when a firm fails to meet its liabilities at maturity. Insufficiency occurs when the assets and income of a debtor are insufficient to cover accrued debt.

which creates a free-rider situation. Furthermore, ownership concentration may capture other important but unquantifiable effects, such as reputation and sense of psychological ownership. Large shareholders therefore have greater incentive to push harder in negotiations, increasing the value transfer from creditors to shareholders. This value transfer is reflected in the creditors' recovery rates. With respect to the division of value between creditors and shareholders in reorganizations, we assume throughout our thesis that management favor the interests of shareholders[2].

In this thesis, we investigate ownership concentration's effect on bond recovery rates in the Norwegian HY market. This is done by testing two hypotheses. Our first hypothesis is that an increase in ownership concentration is associated with a decrease in bond recovery rates. To test this, we use Ordinary Least Square (OLS) regressions utilizing a cross-sectional data set. Our sample contains 112 default events from 106 bonds issued by Norwegian companies defaulting between 2008 and 2017. Our measure for ownership concentration is the percentage share holding of the largest shareholder. We find a significant negative relationship in one of our models, supporting our hypothesis. The significance fades when we control for other determinants of recovery rates.

The second hypothesis investigates whether ownership concentration's effect on recovery rates is relatively higher for unsecured bonds, compared to secured bonds. We test this by adding an interaction term between our concentration variable and a dummy variable describing bond seniority. In our final model, we find that the difference in the impact of ownership concentration on recovery rates is significant. The effect of higher ownership concentration on recovery rates is negative and significant for secured bonds. However, we find it puzzling that the effect for unsecured bonds is insignificant. Nevertheless, the results still suggest that large shareholders are able to pressure secured creditors to write down their claims.

To our knowledge, there is no research regarding the intersection of negotiations, bankruptcy legislation and recovery rates in the Norwegian bond market. Our contribution is threefold. First, we have made a considerable effort to construct an exhaustive data set of the Norwegian HY bond market. The data, covering bond-, firm- and owner-specific information over a decade, is sourced from several high quality providers, both public and private. Second, we scrutinize the Norwegian bankruptcy legislation and its effect on bargaining power in reorganizations. Third, we provide an empirical analysis of the relation between ownership concentration and bond recovery rates. Our thesis therefore contributes with insight into corporate restructurings in Norway and recovery of defaulted HY bonds.

[2]See e.g. Bebchuk and Chang (1992), page 259, for arguments.

2. Background

2.1 The Norwegian high yield bond market

The Norwegian HY market is one of three well-functioning HY bond markets, along with New York and London. Figure 2.1 shows the development in high yield issue volume, measured in billion NOK, from 2000 to October 2017. The growth has been substantial, signaling the importance of the market. A factor contributing to the increasing amount of issues is the entry of foreign issuers. In 2016, companies of non-Norwegian origin constituted 54% of the volume issued. For a full decomposition in issued volume since 2000, see appendix A.3.

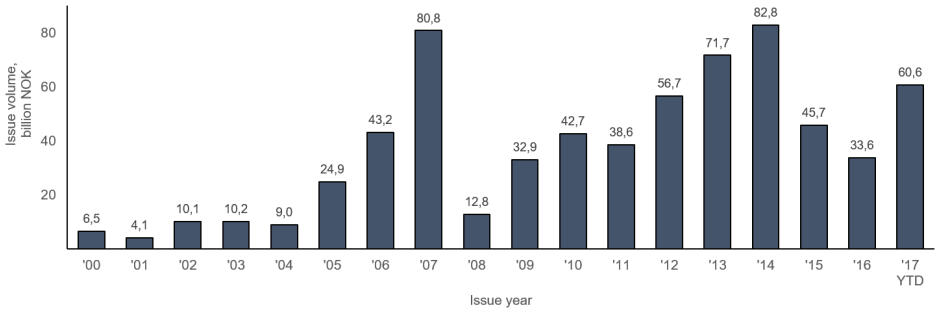

Figure 2.1 – Development in Norwegian HY issue volume. This figure shows the issued volume of HY bonds in Norway, measured in billion NOK, from 2000 to October 2017. The figure includes issues by companies of Norwegian and foreign origin. Both bonds, CDs and convertibles are included. Issue volume for 2017 is measured as YTD, i.e. as of October 2017. Data is compiled from Stamdata's Tranche database.

In terms of revenues, the Norwegian business environment is dominated by capital-intensive industries related to oil and gas and other maritime sectors. Historically, the capital needs of these firms have required them to look abroad for financing long-term projects, as traditional bank financing requirements are hard to meet. Between 2000 and today, more than 50% of all Norwegian HY issues were done by companies operating in the oil and gas industry. Shipping is also a dominant industry, representing 11% of the HY volume issued the last 17 years.

Norwegian bond issuers generally have no right to access bondholder registers. Hence, it is often impossible to map the owners of corporate bonds, and the issuing company does not know the bondholders' investment horizons nor their investment mandates. In cases where the creditors have limited long-term interest in the company, larger uncertainty results in reorganizations.

For most bond issues, a dedicated trustee is appointed. The leading supplier of trustee services in the Norwegian bond market is Nordic Trustee, representing approximately 95% of the market's issues. The main task of a trustee is to protect bondholder rights and act as a single point of contact between debtor and creditor, ensuring that the issuer complies with the debt contract.

Nordic Trustee is an independent third party that connects the anonymous bondholders to the issuing firm, and plays a key role in default cases.

2.2 In-court bankruptcy procedures in Norway

Firms experiencing severe distress can resolve their financial situation either through an in-court proceeding or a private reorganization[1]. Using options facilitated by courts, companies have three alternatives under Norwegian bankruptcy legislation: (1) bankruptcy proceeding, (2) compulsory debt settlement and (3) voluntary debt settlement.

A bankruptcy requires the firm to be insolvent. This proceeding can be filed by both debtor and creditors, and the company ceases to exist. Distribution of claims in a formal bankruptcy proceeding follow the Absolute Priority Rule, which requires senior claimants to be paid in full before more junior claimants can receive any distributions.

If the firm has value as a going concern, a debt settlement procedure may save the firm. As opposed to bankruptcies, only the debtor can petition for a debt settlement. Furthermore, a debt settlement petition requires the company to be insolvent, and the court must find it probable to achieve a successful outcome. This is true for both compulsory and voluntary debt settlements. If the company chooses a compulsory debt settlement, this requires 3/4 majority vote by all stakeholders. However, a compulsory debt settlement is limited to three available actions. These are (1) deferment of payment, (2) a reduction of debt, and (3) a liquidation of the debtor's assets with an equal reduction in the debtor's debt. On the other hand, voluntary debt settlement has no such limitations, but requires a unanimous vote from all stakeholders. This is generally difficult to achieve.

Another aspect of current legislation that may negatively affect creditors, is the lack of Debtor-in-possession financing (DIP). Under Chapter 11 in the US, firms may receive emergency financing with superpriority to cover working capital costs. Smith and Warner (1979) show that an absence of DIP provisions may reduce firm value because shareholders avoid investing in positive NPV-projects that would benefit creditors.

The restrictions, limitations and costs that accompany a debt settlement process makes it a sub-optimal choice for both debtor and creditor. As a result, the legislation is practically unused for major reorganization events. The remaining option is an out-of-court reorganization.

2.3 Out-of-court reorganizations

It is the shareholders' responsibility to propose an out-of-court reorganization plan. Since there are no formal requirements, this proposal can deviate from absolute priority, and potentially

[1]The different types of financial distress are defined according to Stamdata's default event classification, as presented in section 5.1.

transfer wealth from creditors to shareholders. However, acceptance requires 3/4 majority vote from all stakeholders. If creditors vote against the plan, shareholders have the *option to delay* until the firm is insolvent and creditors petition for a bankruptcy proceeding in-court. By then, the value of creditors' claims may have been reduced significantly, much more than the deviation from priority in the proposed private reorganization. Franks and Torous (1994) argue that deviations in absolute priority observed in private reorganizations represent creditors purchase of the option to delay. Creditors do this to avoid the costs of distress in the period of delay.

Costs of financial distress are composed by direct and indirect costs. Direct costs include expenses such as charges for legal and investment banking services. Indirect costs include all other costs related to the firm's bankruptcy or debt restructuring, such as missed investment opportunities due to management being preoccupied with the bankruptcy process. Furthermore, Meckling (1977) points to management malfeasance as a source of agency cost. An example of this is unwarranted issuance of cash dividends, but this has obvious constraints due to creditor monitoring. He also points to options that are impossible to monitor, such as abandonment of maintenance. Avoiding maintenance of assets is a virtually undetectable way to convert assets to cash.

There are other mechanisms that incentivize creditors to choose a private reorganization. Secured lenders generally want to reach a solution where they avoid converting to equity or realizing collateral. They lack operational expertise, and realizing collateral is time consuming and has other associated costs. For similar reasons, they would rather have the original shareholders keep their equity than having the unsecured lenders convert, as they also lack operational expertise.

Furthermore, a situation of informational asymmetry and insider lock-up may occur in times of distress. The board may invoke a *standstill* that freezes their obligations in order to buy time for the firm to stabilize. A standstill generally requires the board to notify the public, but they may continue the process confidentially through *postponed disclosure*[2]. Bondholders have the right to this information, but can choose to decline. In order to trade in the second-hand market, they cannot possess insider information. If they renounce the offer of inside information, a situation of asymmetric information arises. This asymmetry gives shareholders the possibility to overestimate the value of the reorganized firm. DeAngelo and DeAngelo (1990) present evidence suggesting that financially distressed firms use accounting accruals to inflate valuations and influence negotiations with creditors.

We have established that creditors have few options in situations of distress. However, if the equity value is lost, the board of directors are legally obligated to act for the benefit of the

[2] *Utsatt offentliggjøring*, cf. Vhpl §5-3.

creditors. Negligence on this matter may have criminal consequences for board members. The threat of legal action acts as a source of bargaining power for creditors. Unfortunately, this bears little weight in practise. Creditors can not take legal action if they agree to a reorganization plan. Furthermore, fiduciary negligence is hard to prove in court.

In many ways, the current Norwegian bankruptcy legislation bears stark resemblance to the US bankruptcy code before the 1978 Chapter 11 reform. Meckling (1977) quotes a testimony[3] on the power that shareholders and management had under the old code. The testimony states that creditors are in a most disadvantageous position before pointing to two reasons: (1) there cannot be an involuntary Chapter 11 case, and (2) creditors are precluded from proposing a plan under Chapter 11 (Meckling, 1977, p. 34). Both arguments apply to current legislation in Norway. Furthermore, the testimony points out that creditors' alternative is to accept an inequitable settlement proposal, or face a court-ordered bankruptcy. It also claims that debtors' bargaining position is further enhanced by their control rights, and that they can destroy or diminish firm value if creditors resist a private settlement. The testimony concludes that the legislation enables a take-it-or-leave-it attitude, and is fraught with potential abuse. One can easily make the argument that the current Norwegian bankruptcy code suffers from similar weaknesses.

In summary, the Norwegian bankruptcy legislation is harsh towards creditors. They cannot initiate a bankruptcy procedure in-court until the firm is insolvent. Creditors are therefore incentivized to settle out-of-court, despite having to accept write-downs. Secured creditors gain bargaining power from their asset claims, but unsecured creditors have little to bargain with. Shareholder's source of bargaining power is their control rights in the period leading up to an eventual bankruptcy. If creditors do not accept a reorganization proposal, shareholders have the option to delay until insolvency. Creditors are willing to accept lower recovery rates in order to avoid this delay. The potential size of this write-down is the difference between creditors claim of current firm value and their expected payoff in a bankruptcy. Shareholders use this to their advantage in negotiations to transfer wealth to themselves.

[3]The testimony is from a hearing in 1977 regarding the proposal of new bankruptcy law by the National Bankruptcy Conference. Chapter 11 has since been revised.

3. Literature review

Literature investigating the effect of shareholder characteristics on creditor wealth is twofold. First, concentrated ownership can improve the information environment and mitigate shareholder-manager conflicts by imposing monitoring of managers (Shleifer and Vishny, 1986). Second, by aligning managers with interests of the owners, a concentrated shareholder group can create shareholder-creditor conflicts as presented by Jensen and Meckling (1976). Both cases suggest that creditors consider concentration of shareholders when pricing debt contracts.

Empirical studies on distressed firms are primarily divided into two groups. First, there are papers that investigate bankruptcy codes and their effect on restructuring processes of distressed firms. Second, a vast amount of literature exists on determinants of recovery rates from a security pricing perspective. Both groups address issues that affect cost of debt.

Franks and Torous (1989) investigate the features of Chapter 11 proceedings and US firms in reorganizations. The authors find that equity deviations from absolute priority are frequently encountered. They argue that these deviations represent a purchase of shareholders' option to delay. This allows shareholders to receive residual claims in a corporate restructuring, even though creditors with senior claim have not recovered 100%. In exchange, creditors avoid a prolonged process that could cost them more than the initial APR deviation.

Franks and Torous (1994) examine debt recovery rates of 82 US firms, and more specifically how recontracting between shareholders and creditors occurs. They point to bargaining complexity, measured by firm size and creditor sophistication, as a determinant of APR deviations. This turns out to be a central element in bankruptcy literature in general, as well as in our thesis. Additionally, Franks and Torous (1994) find that recovery rates are affected by debt seniority and size of assets sales, among other things.

Given the costs of a bankruptcy procedure, firms attempt to reach an out-of-court solution. Gilson et al. (1990) provide a study on private reorganizations of defaulted US firms. They find that firms owing fewer creditors and owing more to their banks, are more likely to restructure debt privately. They also show that negotiations between companies and creditors are initiated well before a default event. Their sample indicates that negotiations outside bankruptcy on average begin 14.7 months prior to successful completion.

Thorburn (2000) investigates 263 small-firm Swedish bankruptcy auctions. Working with a bankruptcy code different from the one found in Norway and the US, she finds that the auction proceeding facilitates an efficient way to settle financial distress. This answers critics fearing that bankruptcy auctions cause fire sales of assets. Importantly, Thorburn shows that APR

deviations are often avoided under this framework. The study also provides explicit insight to debt recovery rates, presenting seniority, fraction of intangible assets and default year as determinants of the creditors' settlements.

With a sample of 696 defaulted bonds, Altman and Kishore (1996) analyze recovery rates with respect to industries and seniority. They find that industry affiliation affects recovery rates, while time of issuance and issue size has no significant effect. They also show that bond credit rating has no effect on recoveries once bond seniority is controlled for. As opposed to the studies provided by Franks and Torous and Thorburn, Altman and Kishore addresses recovery rates from a security perspective, emphasizing the importance of default severity in bond pricing.

Common for the cited studies is that they use *ultimate* recovery rates. This is the final value a claimant receives following a default. Several studies provide evidence on proxies for ultimate recovery rates. Eberhart and Sweeney (1992) show that bond prices at the time of bankruptcy declaration are unbiased proxies of ultimate recovery rates. Furthermore, in a simple model presented by Emery et al. (2007), it is shown that post-default trading prices explain a significant part of the variation in ultimate debt recovery rates, covering all types of debt.

A recent analysis of recovery rates is the 2014 paper by Jankowitsch et al. Using a sample of 1270 defaulted bonds, they document relations between recovery rates and bond characteristics, firm fundamentals and macroeconomic variables. Measures such as balance sheet ratios and bond covenants are found to have significant effects on recovery rates. Jankowitsch et al. focus their investigation solely on recovery rates measured as average bond prices following the default events.

Unfortunately, literature on Norwegian bankruptcy legislation and bond recovery rates is limited. Research only consists of a few empirical papers at graduate level. Aarvik and Nordli (2016) study determinants of market-based recovery rates in the Nordic HY bond market, while Skudal and Vartdal (2017) assess the efficiency of Norwegian restructuring alternatives. Importantly, the latter paper provides evidence suggesting that APR deviations are observed in restructurings of Norwegian HY bonds. However, Skudal and Vartdal do not analyze determinants of APR deviations or recovery rates.

Our thesis differs in several ways compared to previous assessments of Norwegian defaulted HY bonds. We provide insight to ownership concentration, its characteristics prior to default, and how it affects negotiations in corporate restructurings. We combine bond pricing and bankruptcy legislation, and analyze a comprehensive data set covering the majority of Norwegian HY issues. While the mentioned Norwegian papers only focus on defaults following the recent oil crisis, we include cases from the last decade.

4. Research questions and hypotheses

In the previous chapters we concluded that the current Norwegian bankruptcy code gives shareholders significant bargaining power in reorganizations. However, the outcome of these negotiations rely on how well the negotiating parties utilize their bargaining power. Several factors that may be critical to the outcome of reorganizations are either unsystematic or difficult to quantify directly, such as the relative bargaining abilities and personalities of the parties involved. To counter this we use ownership concentration as a proxy for shareholders propensity to bargain.

Our first hypothesis is that the presence of a large owner will lead to lower bond recovery rates. The discussion in chapter 2 indicates that Norwegian bankruptcy legislation limits the steps creditors can take to counteract a threat of delay. In line with Franks and Torous (1994), we believe creditors agree to write-down their claims in order to avoid further delay and loss of value. This write down represents a wealth transfer from bondholders to shareholders. However, someone has to spearhead the intense negotiations with the creditors. A large shareholder has more to gain from the time and effort invested in negotiations, which leads to a free-rider situation. Additionally, large shareholders may feel more pressure to achieve a positive outcome, as losing the negotiation could hurt their reputation. Furthermore, large shareholders could have a greater sense of psychological ownership, which may increase their propensity to negotiate. The first hypothesis is formalized as follows:

H1: *An increase in ownership concentration is associated with a decrease in bond recovery rates.*

The second hypothesis is that the effect ownership concentration has on recovery rates is more severe for unsecured bonds. There are three mechanisms that support this hypothesis. First, a delayed reorganization process has a negative impact on firm value. Since unsecured debt has the lowest priority, the delay erodes unsecured debt first. Second, unsecured bondholders have less bargaining power in reorganizations, relative to equity and secured. Shareholders gain bargaining power from their control rights, and secured from their claim in assets. Third, secured lenders prefer to keep industry expertise within the firm. This leads to a situation where secured bondholders want to retain management and existing shareholders, as opposed to giving equity to unsecured bondholders. This hurts unsecured bondholders' relative bargaining power. The second hypothesis is formalized as follows:

H2: *Ownership concentration's effect on recovery rates is relatively higher for unsecured bonds, compared to secured bonds.*

5. Data

5.1 Identifying default events

Default events are identified in Stamdata's Default and Recovery Database (hereby referred to as the D&R database). Stamdata is a subsidiary of Nordic Trustee, and delivers reference data for Nordic debt securities, including comprehensive information on default events (Nordic Trustee, 2017). Using an independent and recognized supplier of default event data is in line with past research, which mainly uses databases from agencies such as Moody's and Standard & Poor's (S&P).

Default events are categorized into non-payment, distressed exchange and bankruptcy (Stamdata, 2017). *Non-payment* is an event where the debtor misses or delays payment of interests and/or principal. These obligations are regulated through the credit indentures. A *distressed exchange* reshapes the debt contract in order to relieve the issuer of immediate financial pressure, and the offer can be classified as either soft or hard depending on the magnitude. *Bankruptcy* is a situation where the debtor is insolvent and faces bankruptcy proceedings through a court process, or voluntary liquidation with bondholder approval.

The D&R database covers 579 default events from 156 different firms, as observed between January 2005 and October 2017. These credit events stem from three different types of securities: straight bonds, convertibles and certificate of deposits (CDs). In order to compare the different events and avoid biased results, we choose to limit our sample to straight bonds. Pricing mechanisms and attributes of convertibles and CDs differ substantially, and could potentially make our sample heterogeneous. Furthermore, the scope of this thesis only covers Norwegian firms. By excluding non-Norwegian issuers, we reduce our straight bond sample to 297 credit events from 70 firms in the period between January 2005 and October 2017.

5.2 Recovery rates

Recovery rates of defaulted bonds stem from Stamdata's D&R database. Stamdata compiles recovery rates using three separate calculation methods (Stamdata, 2017). These are used interchangeably, and the choice of method depends on which is the most representative for the specific event. In method one, called *the trading price method*, prices of the prepetition instrument are recorded at the emergence of the credit event. The second method is *the settlement method*, measuring the earliest available trading prices of the new instrument received in exchange for the prepetition instrument. The final method is *the liquidity method*. This is the value of cash or other instruments received in the settlement from the liquidation of the issuer's

assets. Calculations of recovery rates follow the practise of major US rating agencies, such as S&P[1] and Moody's[2].

Due to the lengthiness and complexity of distressed cases, a final recovery value may not be established for some time. Several recent default events are therefore not registered with a recovery rate. We fill these gaps manually using Stamdata's *trading price method*. We obtain trading prices from Nordic Bond Pricing, an independent pricing service company. They calculate synthetic bond prices on a daily basis, and is accepted by industry professionals to provide fair estimates. Using daily synthetic prices is advantageous due to the illiquidity of the Norwegian HY market, where information may not be incorporated in the last available trading price.

5.3 Ownership data and control variables

We have gained access to weekly observations of ownership structures in listed firms through Oslo Market Solutions, a subsidiary of Oslo Børs. Ownership data for all public firms is extracted from their Arena platform. In order to include data for non-listed firms, we use public company filings from Brønnøysundregistrene. For listed firms, we use ownership data at the default event date. If the firm is privately held, we use data from the fiscal year that the default occurred.

Data on bond characteristics is obtained from Stamdata's Tranche database. This source covers attributes on bond issues, and includes both investment grade and HY bonds. Bond characteristics are measured at the time of default. In cases where the bond is issued in a foreign currency, the outstanding amount is converted to NOK with the exchange rate appearing at default event date.

Financial data is compiled by two different methods, depending on availability. We mainly use a database delivered by SNF (Center for Applied Research at NHH). The raw data originates from Brønnøysundregistrene, and is compiled and structured by SNF and Associate Professor Aksel Mjøs at NHH[3]. The data set stretches from 1992 to 2015, and includes all Norwegian firms and groups. Financial data for 2016 and 2017 is obtained by manually extracting the relevant firms' annual reports through Brønnøysundregistrene. For both P&L and balance sheet items, we extract data using financials one fiscal year prior to default. This is in line with comparable studies on recovery rates, as for example Acharya et al. (2007) and Franks and Torous (1994).

Several Norwegian firms report their financials in a foreign currency. We use exchange rates delivered by Norges Bank to convert relevant items to NOK. We use the exchange rate observed at the time when the financial statements were submitted.

[1] See Acharya et al. (2007), page 794 to 795, for recovery rate compilation in S&P's Credit Pro database.
[2] See Moody's Investor Services (2008) for procedures followed by Moody's when compiling recovery rates.
[3] For quality assurance on the SNF database, see Berner et al. (2016).

Macroeconomic data is obtained from Bloomberg. Observations of macro measures are matched with the different default events based on the default event date. A graphical presentation of the macroeconomic variables is attached in appendix A.4.

5.4 Describing the final sample

Table 5.1 and figure 5.1 present our final sample (hereby referred to as the HY sample), consisting of 112 unique observations from 106 bonds and 51 firms. 88 observations are classified as distressed exchanges, while 24 are bankruptcy observations. A majority of the events occur in the aftermath of the Financial Crisis (2009-2010) and the recent oil crisis (2015-2016). Panel B in table 5.1 classifies our default events according to seniority, and we observe 61 secured and 51 unsecured bonds. The Norwegian financial market is dominated by offshore and maritime sectors, and this presence is also reflected in our sample. Based on both number of defaults and defaulted volume, the majority of firms are oil, gas or shipping related.

Our sample is attractive for several reasons. First, it covers the majority of corporate restructurings that have occurred among Norwegian HY issuers the last decade. Second, it includes Norwegian-only firms, both public (ASA) and private (AS) ones, which enables us to look at the Norwegian legal system and its uniqueness. Third, the transparency of the Norwegian Shareholder Register allows us to consistently gather data on shareholders. Lastly, given that our observations range from 2008 to October 2017, we are able to capture different points in business cycles and thus control for time effects.

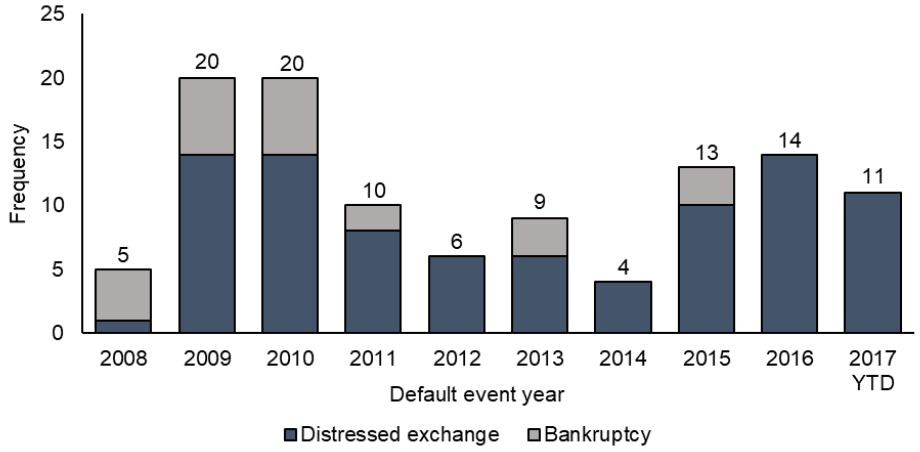

Figure 5.1 – Distribution of default events in HY sample. This figure shows the yearly distribution of recovery rates in our HY sample. The figure includes Norwegian-only bond defaults from 2008 to October 2017. Only bankruptcy proceedings and distressed exchanges are included. The recovery rates are calculated according to Stamdata's methodology for recovery rates. All data is obtained from Stamdata's D&R database.

Table 5.1 – Overview over final sample. This table reports the composition of our HY sample. Number of events represents the number of default events included in our HY sample. Outstanding amount is measured in billion NOK. Default events are compiled for the period 2008 to October 2017, and includes Norwegian-only bond issuers. Default events and their characteristics are identified through Stamdata's D&R database.

	Number of events	**Outstanding amount**
Panel A: Accumulated recovery rates		
Total	112	49.319
Panel B: Recovery rate by seniority		
Secured	61	31.676
Unsecured	51	17.643
Panel C: Recovery rate by default event category		
Bankruptcy	24	9.524
Bankruptcy proceedings	16	4.624
Voluntary liquidation	8	4.900
Distressed exchange	88	39.795
Hard exchange offer	71	32.544
Soft exchange offer	17	7.251
Panel D: Recovery rate by industry and segment		
Industry	3	1.128
Oil & gas E&P	18	7.181
Oil & gas services	71	36.732
Drilling	17	12.442
Floatels	1	0.518
FPSO	7	4.604
Service & supply vessels	31	13.044
Subsea	6	4.017
Surveying	9	2.107
Shipping	9	2.581
Chemicals	7	1.891
Gas	2	0.690
Pharma	1	0.017
Real estate	3	0.537
Seafood	5	0.750
Telecom & IT	2	0.393

6. Methodology

6.1 Recovery rates

Our dependent variable is a recovery rate, measuring the portion of a bond's face value that is repaid to the bondholder following a default. We use recovery rates as a measure for the outcome of corporate restructurings in distressed firms. The observations should reflect the amount repaid to the creditors in a distressed exchange or a bankruptcy. We therefore exclude default events classified as non-payments in the D&R database. We do this for several reasons. First, if the non-payment is reversed at a later point, and a distressed exchange or bankruptcy is avoided, the non-payment is transitory. Second, if the non-payment symbolizes more severe financial problems, the bond will undergo a distressed exchange or bankruptcy event at a later time; in other words experience a negotiation process. In events like these, the recovery rate will be recorded. Third, Stamdata does not record recovery rates for non-payments. Our observations thus represent restructurings processes and comprehensive negotiations around debt contracts, which is the interest of this thesis. Our methodology for recovery rate inclusion is comparable to papers as Acharya et al. (2007) and Franks and Torous (1994).

By relying on Stamdata, S&P and Moody's methodology for a recovery calculation, we assume that the price of a defaulted instrument is an unbiased estimator of that instrument's recovery rate. This is supported by the findings of Eberhart and Sweeney (1992). They find that bond prices observed at the bankruptcy event are unbiased estimates for bonds' payoff at the final settlement. We note potential weaknesses in this assumption. Eberhart and Sweeney's study is dated to 1992, an era where the microstructure of bond markets were less developed compared to today. In addition, the study is conducted on the US market, where trading volumes differs from the ones observed in the Nordics. Despite these arguments, we choose to proceed with the recovery rate variable delivered by Stamdata.

6.2 Ownership variables

We measure ownership concentration in relative terms throughout our thesis. Our main variable of interest, Top 1, is the percentage share holding of the largest owner. Large shareholders have the strongest incentive to affect the firm, and a negotiation, in a given direction. We also choose to include Top 5, measuring the sum of shares owned by the five largest shareholders to total shares. Top 5 is included for descriptive purposes. For further insight to our expectations about the effect of Top 1 on bond recovery rates, we refer to chapter 4.

6.3 Control variables

In order to evaluate the effect Top 1 has on recovery rates, we need to control for other proven determinants. First, we introduce event dummies according to observations' default event category. The dummy variables are *soft exchange offer*, *hard exchange offer*, *voluntary liquidation* and *bankruptcy proceedings*. Soft exchanges are regarded as mild restructurings, and we expect these events to recover most. At the other end, we regard bankruptcy proceedings as most severe, resulting in the lowest recovery rates. Following previous literature, we continue by categorizing additional control variables into (1) bond characteristics, (2) firm fundamentals and (3) macroeconomic variables.

A dummy variable is included to indicate whether bonds are *secured* or not. This is motivated by Franks and Torous (1994), who observe significant variation in recovery rates between creditor classes for Chapter 11 filings and distressed exchanges. They emphasize that this variation can be explained by the differences in particular creditors' bargaining power. The deviation in recovery rates between seniority is also observed by Altman and Kishore in their study from 1996. Motivated by this, we include a risk classification by measuring whether the bond is secured or unsecured. We hypothesize that secured claims experience higher recovery rates.

We also include the bond specific variables outstanding amount, coupon and time to maturity. *Outstanding amount* is measured in million NOK at the event date, and is believed to have a negative effect on recovery rates. This argument is based on the fact that serving a larger amount of debt will be harder in times of distress. The variable *coupon* is measured as percentage of notional. Jankowitsch et al. (2014) argue that issues paying a higher coupon could be more valuable under certain outcomes of default. This is also supported empirically. Hence, we expect the coupon rate to have a positive effect on the recovery rate. *Time to maturity* is the number of years left until bond maturity, measured from the default event date. We argue that the longer the time to maturity, the lower the recovery rate. This is supported by the fact that long-term bonds are often held by buy-and-hold investors (Jankowitsch et al., 2014). This investor group generally consists of institutional investors following an investment mandate that prohibits holding defaulted bonds. Hence, sell-side pressure may occur at default, consequently lowering the recovery rate.

Two additional bond specifications are included as control variables. Bond contracts can include a pledge in tangible assets. In contrast to shares and cash flows, an asset carrying a fundamental value will be more valuable for a creditor in times of distress. We therefore include the dummy *tangible pledge* and expect that bonds with a pledge in tangible assets will recover more. Claims in a bond contract can be guaranteed by a parental firm, and in times of distress, the guarantor will be responsible for servicing the claims. Hence, we choose to include a dummy called *guarantee*. We suggest that bonds with a guarantee experience higher recoveries.

Altman and Kishore (1996) find that a bond's credit rating has an insignificant effect on recovery rates once seniority is controlled for. This is disputed by Jankowitsch et al. (2014), who find the opposite. Nevertheless, few Norwegian corporate bonds are issued with an official credit rating. Shadow ratings provided by investment banks have been the industry's cheaper alternative for credit assessments. Unfortunately, these are hard to obtain and compile in a consistent way. Due to these circumstances, we are not able to analyze whether the rating prior to the default event has an effect on the recovery rate.

The profitability prior to a default signals the operational health of a firm and its ability to service contractual payments. Additionally, many bond contracts include covenants connected to the issuer's interest coverage ratio (ICR) and net debt to EBITDA. For both metrics, *EBITDA* is included. We therefore use a dummy variable indicating whether the firm reported a positive or negative EBITDA the year prior to the default, and expect negative EBITDA to negatively affect recovery rates.

Two debt metrics are included as control variables. We use a measure called *default barrier*, first introduced by Moody's in their KMV approach (Leland, 2004). Jankowitsch et al. (2014) find that default barrier has a significant effect on bond recoveries. The measure assess a firm's debt relative to its assets. It can therefore be interpreted as the distance to insolvency, and we expect an increase in the metric to lower the recovery rate. We also include *LTD issuance* as a measure for the firm's debt maturity profile. An amount of debt maturing in the short-term is believed to more likely trigger a default compared to a long-term counterpart. Due to this, we suggest that a higher share of LTD relative to total debt should increase the recovery rate.

Weiss (1990) finds that shareholders of large firms are compensated more in a restructuring compared to equity holders in small firms. On average, a larger firm will involve more stakeholders, potentially making it harder for creditors to form alliances. This can lead to weaker bargaining positions for creditors, resulting in lower bond recovery rates. We therefore use the total book value of assets as a proxy for firm *size*. We expect that firm size negatively affects recovery rates.

We also include a ratio assessing the amount of total assets which are intangible, *intangibility*. For example, Thorburn (2000) finds that recovery rates decrease as the portion of intangible assets to total assets increase. This observation can be justified as intangible assets are harder to convert to cash for creditors. We expect firms with a higher degree of intangible assets to yield lower recovery rates.

When introducing the Norwegian HY bond market in figure 5.1, we observed substantial differences in the number of defaults according to year. Hanson and Schuermann (2004) find that macroeconomic conditions have an effect on recovery rates. We therefore include year dummies in some of our specifications. Due to the relatively small number of observations in our sample,

we also include two interest rate variables as an alternative to the year dummies, thus saving degrees of freedom. These are the 3M NIBOR, proxying for the general condition in the Norwegian economy, and a slope variable measuring the difference between the 3M NIBOR and 10Y Norwegian Treasury yield, representing the optimism in the economy. Given the variation of industries in our sample, we also include industry dummies to control for variation across industry affiliation.

6.4 Regression model

We apply Ordinary Least Square (OLS) regressions in order to answer our research questions. Using cross-sectional data, we examine the relationship between the recovery rate of bond i issued by firm j and a set of independent variables. To test our first hypothesis, we define our base model according to the following equation:

$$Recovery_{ij} = \beta_0 + \beta_1 Top1 + \beta_X + \varepsilon_{ij} \tag{6.1}$$

β_1 represents our variable of interest, Top 1. By including variables as defined in X, we are able to control for effects from various proven determinants of recovery rates.

Our second research question targets the effect of Top 1 across bond seniority. To test this, we add a seniority dummy and an interaction term to equation 6.1, resulting in the following equation:

$$Recovery_{ij} = \beta_0 + \beta_1 Top1 + \beta_2 Secured + \beta_3 (Top1 * Secured) + \beta_X + \varepsilon_{ij} \tag{6.2}$$

Our sample is representative in size given the actual number of defaults observed among Norwegian HY issues. Despite this, 112 observations is a relatively low number from a statistical standpoint. This shortcoming becomes increasingly evident when introducing a high number of control variables. Consequently, one should be careful interpreting numerical effects in our regression models. Our focus will be on the sign of the coefficients, and whether variables have a significant positive or negative effect on the recovery rate. We remark that all our specifications contain White standard errors.

7. Descriptive statistics

7.1 Description of recovery rates

Figure 7.1 depicts the distribution of recovery rates in our HY sample. The average recovery amounts to 44%, with a standard deviation of 0.30. This is relatively close to the 40% average found by Altman and Kishore (1996), a value which is often applied as a rule of thumb in bond pricing. We observe a skew towards the right, i.e. the lower range recovery rates. A right skew is also found by Emery et al. (2007), suggesting that our sample is comparable with US observations of defaulted bonds.

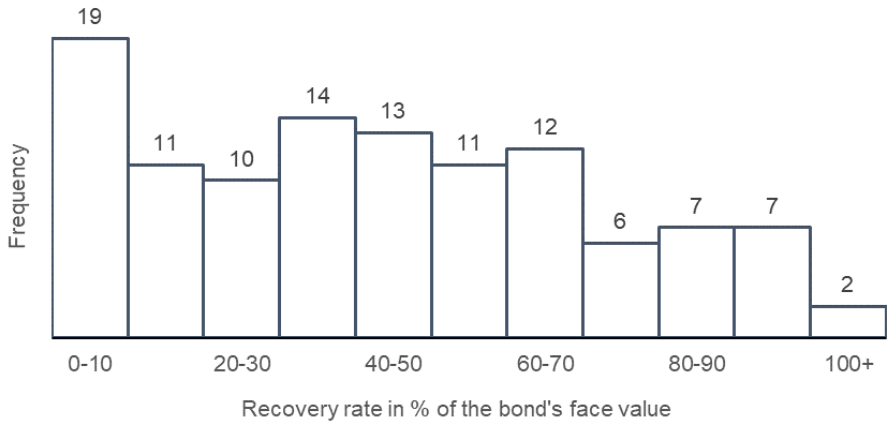

Figure 7.1 – Distribution of recovery rates on Norwegian HY bonds defaulting between 2008 and October 2017. This figure shows the distribution of recovery rates across our sample. A bond's recovery rate is defined as the amount repaid to the bondholder, measured in percentage of face value of the claim. We include Norwegian-only bond issues from 2008 to October 2017. Only bankruptcy and distressed exchange events are included. The recovery rates are calculated according to Stamdata's methodology for recovery rates. Data is compiled from Stamdata's D&R database.

Table 7.1 presents summary statistics across seniority, distress event category and industry. As seen in panel A, the largest recovery rate observed is 120%, suggesting that bondholders are compensated beyond face value. Exposure is measured at default event date, and in cases where fines and fees are added as a compensation to the bondholder, the recovery may exceed the initial exposure. Other situations where recoveries surpass 100% are cases where gains result from sale of collateral.

Panel B of table 7.1 presents recovery rates across seniority. Average recovery for secured bonds amounts to 47%, exceeding the 41% average for unsecured. Before controlling for other factors, this difference in averages supports our expectation presented in chapter 6. However, the magnitude of the difference is lower than expected. Franks and Torous (1994) and Thorburn (2000) find that unsecured debt recovers significantly less compared to secured debt. We emphasize

Table 7.1 – Recovery rates for defaulted Norwegian HY bonds, 2008 to October 2017. This table reports recovery rates for 112 bonds defaulting between 2008 and October 2017. The issuing company is of Norwegian origin in all cases. A bond's recovery rate is defined as the amount repaid to the bondholder, measured in percentage of face value of the claim. Panel A reports recovery rates for all observations. Panel B reports recovery rates across seniority levels. Panel C reports recovery rates across industry main groups and industry sub-groups for oil & gas and shipping related businesses. The default events are identified through Stamdata's D&R Database, and three methods for calculating recovery rates are utilized: the settlement method, the liquidity method and the trading price method. The methods are used interchangeably, and the one best describing the credit event is applied. All mean, median, min and max values are in percentages, while standard deviations are displayed as decimals. The mean values are not value-weighted.

	# of events	Mean	Median	Min	Max	St. dev.
Panel A: Accumulated recovery rates						
Total	112	44.35	42.29	0.00	120.00	0.30
Panel B: Recovery rate by seniority						
Secured	61	46.85	45.00	0.00	120.00	0.32
Unsecured	51	41.38	41.97	0.00	95.00	0.28
Panel C: Recovery rate by default event category						
Bankruptcy	24	31.64	10.00	0.00	120.00	0.40
Bankruptcy proceedings	16	18.67	3.38	0.00	120.00	0.33
Voluntary liquidation	8	57.57	53.60	9.00	115.00	0.43
Distressed exchange	88	47.82	46.08	0.00	100.00	0.26
Hard exchange offer	71	45.03	41.97	0.00	95.00	0.27
Soft exchange offer	17	59.51	58.00	30.00	100.00	0.18
Panel D: Recovery rate by industry and segment						
Industry	3	36.33	35.00	29.00	45.00	0.08
Oil & gas E&P	18	63.24	66.00	11.33	95.00	0.28
Oil & gas services	71	42.23	38.81	0.00	120.00	0.30
Drilling	17	40.58	17.50	0.51	120.00	0.42
Floatels	1	69.00	69.00	69.00	69.00	0.00
FPSO	7	49.24	68.00	0.65	83.00	0.34
Service & supply vessels	31	45.92	41.97	0.50	100.00	0.25
Subsea	6	43.64	46.37	25.00	62.10	0.13
Surveying	9	23.99	3.77	0.00	55.00	0.26
Shipping	9	28.06	19.00	3.84	65.00	0.23
Chemicals	7	21.13	18.58	3.84	65.00	0.21
Gas	2	52.31	52.31	52.01	52.60	0.00
Pharma	1	43.00	43.00	43.00	43.00	0.00
Real estate	3	23.69	28.07	0.00	43.00	0.22
Seafood	5	41.79	32.00	0.00	79.70	0.33
Telecom & IT	2	70.00	70.00	50.00	90.00	0.28

that this thesis only covers defaulted bonds. The majority of firms in our sample use bank debt with higher priority than secured bonds. We therefore believe that the small contrast between secured and unsecured bonds in our sample is due to the exclusion of debt classes. Nevertheless, for firms that default on both secured and unsecured bonds, we find that the recovery rate for the secured bond is significantly higher in all cases.

Panel C reports recovery rates across default event category. As expected, bonds involved in distressed exchanges on average recover more compared to those undergoing bankruptcy. The bankruptcy events comprise of 16 bankruptcy proceedings and eight voluntary liquidations, with substantial standard deviations in both categories. We therefore do not put much emphasis on these averages.

Recovery rates based on industry affiliation are reported in panel D of table 7.1. The underlying distribution is highly unbalanced, as 80% of the recorded defaults occur among oil and gas companies. We note that average recovery rates are lowest within the shipping and real estate industry. This is surprising, since assets of these firms often are tangible in nature. For shipping companies, our default observations cover a relatively long time period, thereby including different points in the business cycle. Hence, an explanation of low recoveries can be high leverage within the industry. Real estate defaults observations only comprise three observations. We therefore downplay this finding.

7.2 Ownership concentration

In order to use Top 1 as a proxy for the largest shareholder's propensity to bargain, Top 1 should not be influenced by endogenous factors prior to default. Hence, we investigate ownership structures prior to default events. Figure 7.2 and figure 7.4 indicate that Top 1 is stable in the period leading up to default. Thus, we can be more confident that ownership concentration is a true firm characteristic. A restructuring process is often initiated well before the default event occurs, as documented by Gilson et al. (1990). A stable ownership structure prior to default indicates that the parties involved in a negotiation remain throughout the process. We choose to downplay the importance of ownership structures more than one year prior to the default, since too many factors potentially influence the company within this time frame. Nevertheless, as figure 7.3 indicates, Top 1 remains unchanged one year prior to default in the majority of default cases.

For the full sample, we find that the largest shareholder on average holds 37% of the shares, and that the five largest shareholders hold 60%. This is comparable to Døskeland and Mjøs (2009), who investigated ownership concentration among Norwegian listed firms. They report that on average, the largest shareholder holds 29% and the five largest shareholders hold 55% (Døskeland and Mjøs, 2009). Our measures somewhat exceed the ones found in Døskeland and

Figure 7.2 – Plot of largest owner's share one quarter before default. Plot of the largest owner's holdings at default date against holdings one quarter prior to the default. Default events are identified in Stamdata's D&R database. Ownership data is compiled from Oslo Market Solution's Arena platform for listed companies. For non-listed companies, data stems from Brønnøysundregistrene.

Figure 7.3 – Plot of largest owner's share one year before default. Plot of the largest owner's holdings at default date against holdings one year prior to the default. Default events are identified in Stamdata's D&R database. Ownership data is compiled from Oslo Market Solution's Arena platform for listed companies. For non-listed companies, data stems from Brønnøysundregistrene.

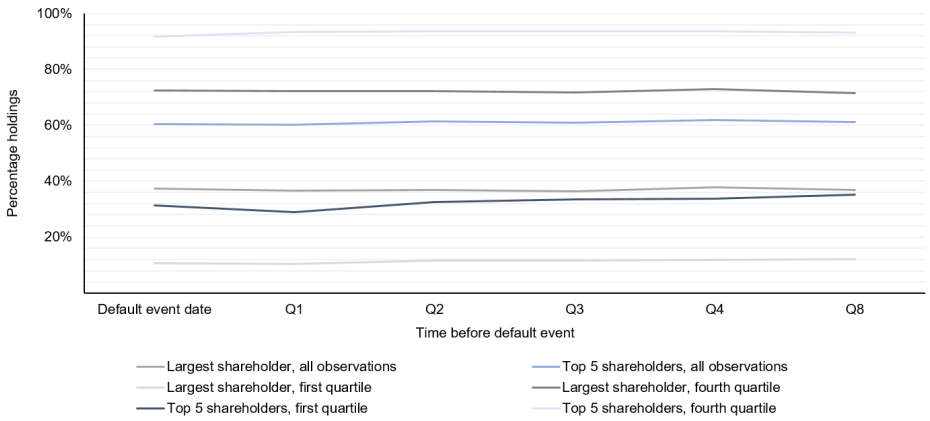

Figure 7.4 – Development in ownership shares prior to default. This figure shows the development in ownership stakes prior to default events. The observations are recorded at the default event date, four quarters back in time (Q1-Q4), together with two years prio default (Q8). The graphs represent mean values within each group. Largest shareholder is Top 1 shareholder's holdings. Top 5 equals the five largest shareholders' accumulated shares. Default events are identified in Stamdata's D&R database. Ownership data is compiled from Oslo Market Solution's Arena platform for listed companies. For non-listed companies, data stems from Brønnøysundregistrene.

Mjøs's study. We suspect this is due to our inclusion of non-listed firms. These firms have less dispersed equity holdings, and family ownership is often observed.

Table 7.2 reports quartile statistics for Top 1 and Top 5, and we divide the measures into first and fourth quartile. Panel B of table 7.2 facilitates the first comparison of recovery rates across ownership concentrations. Before controlling for other factors, we find supporting evidence for the first hypothesis presented in chapter 6. We see that the average recovery rate for bonds in the higher concentration group is smaller compared to the less concentrated counterpart. This

indication is found in both Top 1 and Top 5.

Hypothesis two addresses the difference in the impact of Top 1 on recovery rates across seniority. We observe large deviations across both seniority and concentration. For secured bonds, the average recovery rate drops significantly when moving from the first quartile to the fourth. The opposite is observed for unsecured bondholders, an observation in contrast to our initial expectation. Due to a low number of observations and large deviations within different measurement groups, we progress carefully when interpreting these averages. We find the variation in our data interesting, laying the foundation for further analysis where we control for proven bond recovery rate determinants.

Table 7.2 – Quartile statistics on ownership variables for defaulted Norwegian HY bonds. The sample period is 2008 to October 2017. The variables are Top 1 and Top 5, representing the holdings of the largest and the five largest shareholders in a company, respectively. Recovery rate is defined as the amount repaid to the bondholder, measured in percentage of face value of the claim. First quartile is defined as the 25% smallest observations in our sample, while the fourth quartile is defined as the 25% largest observations. Panel A presents statistics on ownership concentration across our sample. Panel B reports the recovery rate for the two variables across quartiles. Panel C presents recovery rates for secured and unsecured bonds according to different Top 1 holdings. Data on shareholders are gathered from Oslo Market Solution's Arena platform for listed companies. For private companies, the shareholder information is compiled from annual reports accessed through Brønnøysundregistrene. Recovery rates are based on data from Stamdata's D&R database.

	Shareholder holdings	
	First Quartile	**Fourth Quartile**
Panel A: means of different ownership shares		
Mean of Top 1 shareholder's ownership share	10.77	72.36
Mean of Top 5 shareholders' ownership share	31.29	91.76
Panel B: recovery rates for different ownernship shares		
Mean recovery rate under Top 1 shareholder	50.73	46.34
Mean recovery rate under Top 5 shareholder	49.34	45.65
Panel C: recovery rates across bond seniority and ownership shares		
Mean recovery rate for secured bonds under Top 1	59.22	46.54
Mean recovery rate for unsecured bonds under Top 1	38.38	46.18

7.3 Bond and firm characteristics prior to default

Table 7.3 presents bond characteristics recorded at the default event, and we remark several interesting findings. First, by comparing our sample with those used in US papers, we see that Norwegian HY issues are smaller in absolute terms. For example, Jankowitsch et al. (2014) report an average issue size of 400 MUSD in their sample. Second, only 66% of the secured bonds in our sample have a tangible pledge. The deviation from 100% implies that some secured bonds are issued with an intangible pledge, for example cash flows or shares. Third, the standard deviation of the time to maturity variable varies significantly between secured and unsecured bonds. By revising our HY sample in detail, we find that this is due to a perpetuity bond maturing in 80 years. We see that for both secured and unsecured, the median time to maturity amounts to 1.7 years.

Firm characteristics prior to default are reported in table 7.4. We remark a high standard deviation for default barrier. Investigating the variable, we find outliers where the equity is significantly negative, skewing the distribution towards a higher mean. Additionally, we find that the average and median value for the intangibility variable is 8% and 1%, respectively. Norwegian intangibility fractions are significantly lower compared to US observations [1]. This can be explained by the fact that a Norwegian HY sample will be dominated by asset heavy industries, as earlier presented.

Table 7.3 – Pre restructuring bond characteristics of default Norwegian HY bonds, 2008 to October 2017. This table reports characteristics of defaulted HY bonds issued by Norwegian companies. The outstanding amount is measured in MNOK. Coupon is measured in percentage of the bond's face value. Time to maturity is measured as number of years between the default event and maturity date of the bond. Guarantee is a dummy, and equals one in cases where the bond claim is guaranteed for. Tangible pledge is a dummy equaling one if the bond is secured in assets of tangible nature. Both the guarantee and tangible dummy is displayed in percentage for mean values. Standard deviations are displayed in decimals. All data reported in this table is based on raw data delivered by Stamdata through their D&R Database and Tranche Database.

	Secured bonds			Unsecured bonds			All bonds		
	Mean	Median	St.dev	Mean	Median	St. dev.	Mean	Median	St. dev.
Outstanding amount	519.3	345.0	441.9	345.9	300.0	251.8	440.4	341.6	376.3
Coupon	9.36	9.50	0.04	8.35	8.65	0.03	8.90	9.16	0.04
Time to maturity	3.23	1.65	11.20	1.71	1.71	1.26	2.54	1.71	8.31
Guarantee	47.54	0	0.50	9.80	0	0.30	30.35	0	0.46
Tangible pledge	65.57	1	0.48	0	0	-	35.71	0	0.48
Number of observations	61 events			51 events			112 events		

[1] See e.g. Acharya et al. (2007).

Table 7.4 – Pre restructuring firm characteristics observed in defaults on Norwegian HY bonds, 2008 to October 2017. This table reports firm characteristics related to defaulted HY bonds issued by Norwegian companies. All variables are measured one year prior to the default event. Positive EBITDA is a dummy indicating whether the defaulted firm had positive EBITDA the year prior to default. For mean values, this dummy is displayed in percentage. The default barrier is given relative to total assets, while the LTD issuance measure is relative to total debt. Both measures are displayed in percentage. The size proxy is based on the book value of total asset and is measured in MNOK. The intangibility ratio, displayed in percentage, is the firm's intangible assets relative to its total assets. Standard deviations are displayed in decimals. Data is compiled from SNF's accounting database for the years 2008-2015. Financial data from 2016 is extracted from annual reports ordered from Brønnøysundregistrene.

	Bankruptcy			Distressed exchange			All bonds		
	Mean	Median	St.dev	Mean	Median	St. dev.	Mean	Median	St. dev.
Positive EBITDA	20.83	0	0.41	53.41	1	0.50	46.42	0	0.50
Default barrier	130.23	69.53	2.48	88.13	62.81	1.53	97.15	62.95	1.78
LTD issuance	42.44	45.47	0.36	51.75	49.97	0.36	49.75	48.18	0.36
Size	1965	1403	1865	5017	2041	6600	4363	1885	6037
Intangibility	4.38	0.00	0.07	9.58	1.10	0.19	8.47	1.03	0.17
Number of observations	24 events			88 events			112 events		

8. Results

8.1 Ownership concentration and bond recovery rates

Tables 8.1 and 8.2 report regression results investigating the determinants of recovery rates. We begin the analysis with a basic regression specification to address our first research question. For each subsequent regression specification, we add relevant control variables and report results and implications. Table 8.2 addresses our second hypothesis by adding an interaction term to investigate the effect ownership concentration has on recovery rates across secured and unsecured bonds. Top 1 is the variable of interest for all regressions.

The first specification in table 8.1 tests the effect of the the largest shareholder's holding on recovery rates. This simple specification finds that the Top 1 coefficient is insignificant. This is not in line with our expectation that concentrated ownership in the hands of the largest shareholder negatively affects recovery rates. We find that the sign of the ownership coefficient is negative, but the estimate's confidence interval comprises both positive and negative values.

Specification two in table 8.1 controls for bond seniority and default event category. Seniority effects are captured by a dummy that takes the value 1 if the bond is secured, and 0 if it is unsecured. Recovery rates vary significantly across default event categories, as some represent more severe distress. We control for this using the dummies soft exchange offer, hard exchange offer, voluntary liquidation and bankruptcy proceedings. In this specification, Top 1 turns significant at the 5% level. The negative coefficient suggests that larger percentage holdings for the largest shareholder negatively affects the bond recovery rates. This supports our first hypothesis that large shareholders have more incentives to utilize their bargaining power in corporate restructurings to transfer value from creditors to themselves.

Surprisingly, we find that the secured dummy is insignificant in specification two of table 8.1. One explanation may be that our sample is limited to bonds. Higher prioritized debt claims, like secured bank loans, may exist in the balance sheets, affecting the resulting recovery for bondholders. Coefficients for default event dummies are not showed explicitly, but are all significant and positive. The excluded default event category is bankruptcy proceedings. As expected, bonds undergoing bankruptcy proceedings recover less on average, compared to those resolved through a voluntary liquidation or distressed exchange.

There is considerable systematic variation across time and industry[1]. Recovery rates are suppressed during economic downturns due to low asset liquidation values. Across industry, recovery rates vary due to differences in asset collateral and cash flow volatility. The third

[1]For evidences on industry-wide distress' effect on recovery rates, see for example Acharya et al. (2007).

Table 8.1 – Regression results - exploring hypothesis one. This table reports OLS specifications used to test our first hypothesis. The dependent variable is bond recovery rate, measured as the percentage of a bond's face value that is repaid to a bondholder in case of a default. The explanatory variable of interest is Top 1, measuring the percentage holdings of the largest shareholder in the relevant firm. For definition of control variables, please see appendix A.2. Soft exchange, hard exchange and voluntary liquidation are default event classifications included as event dummies, marking bankruptcy proceedings as the excluded category. Year and industry fixed effects are also included as dummies. The sample spans from 2008 to October 2017, and includes Norwegian issued HY bonds. Data on default events and bond characteristics are compiled from Stamdata's D&R database and Tranche database. Shareholder information are structured from Oslo Market Solution's Arena platform for listed companies. For private companies, shareholder information is compiled from annual reports accessed through Brønnøysundregistrene. Financial data is extracted from SNF's accounting database for the years 2008-2015, while data for 2016 is taken from annual reports ordered from Brønnøysundregistrene. Robust standard errors are given in parentheses. Significance is indicated by: * p < 0.1, ** p < 0.05, *** p < 0.01.

	Dependent variable: recovery rate						
	(1)	(2)	(3)	(4)	(5)	(6)	(7)
Top 1	-0.069	-0.176**	-0.065	-0.097	-0.040	-0.059	-0.064
	(0.089)	(0.080)	(0.101)	(0.097)	(0.110)	(0.099)	(0.097)
Secured		0.028	0.030	-0.030	0.049	-0.018	-0.055
		(0.052)	(0.054)	(0.071)	(0.052)	(0.070)	(0.075)
Outstanding amount				-0.000		-0.000	-0.000
				(0.000)		(0.000)	(0.000)
Coupon				0.010		0.013	0.015*
				(0.010)		(0.010)	(0.009)
Time to maturity				-0.004*		-0.003	-0.002
				(0.002)		(0.002)	(0.002)
Tangible pledge				0.096		0.127	0.143*
				(0.080)		(0.078)	(0.085)
Guarantee				0.029		0.012	-0.002
				(0.068)		(0.076)	(0.078)
Positive EBITDA					0.013	0.002	-0.064
					(0.081)	(0.083)	(0.074)
Default barrier					-0.024**	-0.030***	-0.036***
					(0.010)	(0.011)	(0.007)
Size					0.005	0.007**	0.004
					(0.003)	(0.003)	(0.003)
Intangibility					0.227	0.226	0.152
					(0.180)	(0.178)	(0.152)
Constant	0.470***	0.216***	-0.070	-0.197	-0.101	-0.269	0.087
	(0.049)	(0.078)	(0.224)	(0.256)	(0.269)	(0.304)	(0.147)
Observations	112	112	112	112	112	112	112
Year dummies	No	No	Yes	Yes	Yes	Yes	No
Industry dummies	No	No	Yes	Yes	Yes	Yes	Yes
Event dummies	No	Yes	Yes	Yes	Yes	Yes	Yes
R^2	0.004	0.184	0.340	0.382	0.381	0.438	0.355
Adjusted R^2	-0.005	0.145	0.221	0.229	0.236	0.266	0.239

specification in 8.1 extends our model by controlling for these effects. The coefficient of Top 1 is still negative, but is no longer significant. Specification three in table 8.1 also yields significant coefficients for our E&P and shipping dummies, suggesting that recovery rates are affected by industry fixed effects. Although not shown in table 8.1, one should be careful when interpreting these dummies given the small subsample within them. Nevertheless, we continue using these control variables when investigating Top 1.

As discussed in chapter 6, bond characteristics impact recovery rates. We therefore include them as control variables in specification four in table 8.1. Similar to our baseline specification, this regression yields an insignificant coefficient for our Top 1 variable. Of the control variables, only time to maturity is significant, at a 10% level and with a negative sign. This relationship supports our initial expectation.

We control for systematic variation across firm properties by introducing firm fundamentals under specification five in table 8.1. This does not change the effect of Top 1 on recovery rates compared to the base model. The only significant variable is default barrier, signifying a negative effect as expected. Contrary to past research, introducing firm fundamentals only marginally increases our model's explanatory power. However, in terms of both size and liquidity, the Norwegian HY market is significantly different from the US market, where the majority of research is conducted. One explanation for the absence of significant results may be the small size of our sample. Notwithstanding, our sample covers most default events that have occurred in the Norwegian market since 2008.

Specification six in table 8.1 extends the base model by including both bond characteristics and firm fundamentals. The Top 1 variable remains insignificant. Hence, we still lack evidence that supports our initial hypothesis. We remark that specification six in table 8.1 exhibits signs of multicollinearity in the year dummies[2]. To counter this, we exclude the year dummies under specification seven in table 8.1. The Top 1 variable remains insignificant.

In specification seven in table 8.1, our final model, the coefficients for the control variables coupon, tangible pledge and default barrier are all significant. The signs of the coefficients follow our expectations. We find the significance of tangible pledge especially interesting. Tangible pledge acts as an alternative proxy for the seniority among debt claims, and is therefore a variable that reflects the bondholders bargaining power. We underline that this variable is found to be sufficiently independent from the secured dummy, and does not violate any OLS assumptions.

Previous literature argues that bargaining power and ability is vital for the outcome of corporate restructurings, and in extension, recovery rates[3]. Given the legislative nature of the Norwegian

[2]Remarks on multicollinearity are presented in chapter 9.

[3]For arguments, see e.g. Franks and Torous (1994) and Gilson et al. (1990).

bankruptcy law, this should be particularly evident in Norwegian default cases. Controlling for proven determinants of bond recovery rates, table 8.1 presents insignificant results for Top 1's effect on bond recovery rates. This could mean that Top 1 serves as a weak proxy for a large shareholder's propensity to bargain at the expense of creditors. There may be several explanations for this. Although the percentage holding for the largest shareholder does capture incentives to bargain, it does not necessarily capture bargaining ability. Furthermore, Top 1 does not capture effects such as ownership type, which may also impact a shareholder's propensity to bargain.

As suggested in the introductory chapters, we believe shareholder bargaining power affects creditor classes to different degrees. This is supported by recent Norwegian HY defaults, where we register coalitions among different stakeholders[4]. We therefore continue our analysis by investigating the largest shareholder's holding and how it affects recovery rates for secured and unsecured bondholders.

8.2 Interaction effect between Top 1 and bond seniority

The first specification in table 8.2 tests whether Top 1 affects the recovery rate, and if the impact of Top 1 differs between secured and unsecured bonds. We find that none of the coefficients of interest are significant. Our interpretation of this result is that the size of the largest shareholder's ownership stake does not affect the negotiation process in terms of bondholders' recoveries. Going forward, we emphasize that the distribution of secured and unsecured bonds in our sample is 61 and 51 observations, respectively. An equal distribution covering several years and industries is adequate for further analysis.

Top 1 turned significant when we controlled for default event category, as shown in specification two table 8.1. Hence, we include event dummies in order to investigate if the effect remains when the regression specification includes an interaction term between Top 1 and bond seniority. Now, none of the coefficients of interest are significant. Controlling for industry effects does not change these results. We still observe significant industry and event dummies.

In the first section of the analysis, we concluded that year effects may influence recovery rates. We therefore continue to use year dummies, as presented in column three of table 8.2. The specification yields a negative significant coefficient for the interaction term. This result is opposite to what we expected for our second hypothesis. Furthermore, we now observe the seniority variable significant at the 5% level. The coefficient indicates that secured bonds on average recover more compared to unsecured bonds, ceteris paribus.

Given the significant interaction term in column three of table 8.2, we investigate whether the effect of Top 1 on recovery for secured bonds is significant or not. The procedure to test this

[4]E.g. the restructurings of Norske Skogindustrier ASA and Havila Shipping ASA.

Table 8.2 – **Regression results - exploring hypothesis two**. This table reports OLS specifications used to test our second hypothesis. The dependent variable is bond recovery rate, measured as the percentage of a bond's face value that is repaid to a bondholder in case of a default. The explanatory variables of interest are Top 1, measuring the percentage ownership of the largest shareholder in the relevant firm, and the interaction term between Top 1 and a dummy indicating whether the bond is secured or not. Here, secured is a dummy equaling one if the observations is a secured bond, and zero if unsecured. For definition of control variables, see appendix A.2. Soft exchange, hard exchange and voluntary liquidation are default event classifications included as event dummies, marking bankruptcy proceedings as the excluded category. Year and industry fixed effects are included as dummies. The sample spans from 2008 to October 2017, and includes Norwegian issued HY bonds. Data regarding default events and bond characteristics are compiled from Stamdata's D&R database and Tranche database. Shareholder information are structured from Oslo Market Solution's Arena platform for listed companies. For private companies, shareholder information is compiled from annual reports accessed through Brønnøysundregistrene. Financial data is extracted from SNF's accounting database for the years 2008-2015, while data for 2016 is obtained from annual reports ordered from Brønnøysundregistrene. Robust standard errors are given in parentheses. Significance is indicated by: * p < 0.1, ** p < 0.05, *** p < 0.01.

	Dependent variable: recovery rate			
	(1)	(2)	(3)	(4)
Top 1	0.075	-0.055	0.139	0.148
	(0.133)	(0.119)	(0.120)	(0.126)
Secured	0.156	0.119	0.186**	0.114
	(0.096)	(0.084)	(0.081)	(0.083)
Top 1 * Secured	-0.276	-0.246	-0.424***	-0.441***
	(0.185)	(0.159)	(0.160)	(0.144)
Outstanding amount				-0.000
				(0.000)
Coupon				0.013
				(0.009)
Time to maturity				-0.003
				(0.002)
Tangible pledge				0.168**
				(0.077)
Guarantee				0.006
				(0.074)
Positive EBITDA				-0.016
				(0.086)
Default barrier				-0.029**
				(0.012)
Size				0.005
				(0.003)
Intangibility				0.275
				(0.180)
Constant	0.384***	0.181**	-0.127	-0.332
	(0.071)	(0.081)	(0.225)	(0.301)
Observations	112	112	112	112
Year dummies	No	No	Yes	Yes
Industry dummies	No	No	Yes	Yes
Event dummies	No	Yes	Yes	Yes
R^2	0.025	0.194	0.366	0.462
Adjusted R^2	-0.002	0.148	0.243	0.289

effect is described in detail under appendix A.5. We find that the effect of Top 1 on recovery rates for secured bonds is negative and statistically significant at the 5% level. The effect only applies to secured bonds, thus partially supporting our first hypothesis.

We investigate the effect of Top 1 on recovery rates for unsecured bonds. The results are presented in appendix A.5, and we find that the effect is insignificant. This is not in line with our expectation for hypothesis two. We argue that the bankruptcy legislation in Norway results in different bargaining power between stakeholders. As unsecured bondholders have less bargaining power than shareholders and secured bondholders, we expected the effect of Top 1 on recovery rates to be of greater negative magnitude for unsecured bonds.

Specification four in table 8.2 extends the previous model by controlling for bond characteristics and firm fundamentals. We find that the interaction term remains significant and similar to the previous specification. Top 1 remains insignificant. Although not presented, we conduct a similar test to the one shown in appendix A.5. We find that the effect of Top 1 on recovery rates for secured bonds remains negative and significant at the 5% level. For unsecured bonds, this effect is insignificant.

The interaction term turns significant when we include year dummies. Since our sample consists of 112 observations, adding numerous variables could lead to overfitting issues. The reason for adding year fixed effects is to capture business cycle effects. Although not presented, we replace the year dummies with two macroeconomic variables. We include the 3M NIBOR variable, together with the slope variable measuring the difference between the 10Y Norwegian Treasury rate and the 3M NIBOR rate at the default event. Using these measures in specifications similar to the ones in table 8.2, we still observe a negative and significant interaction term. Top 1 remains insignificant. We remark that these specifications satisfy econometric conditions regarding homoscedasticity and absence of multicollinearity.

Table 8.2 presents evidence suggesting that the largest shareholder's equity position influences recovery rates for secured bonds. Norwegian bankruptcy legislation limits creditor's ability to prevent a threat of delay in negotiations. Bondholders are left in a position where they must choose between further delay and accepting the cost of financial distress, or accept a reorganization plan where their assets are written down. Large shareholders have more incentives to press their bargaining advantage in negotiations, which could lead to lower recovery rates for creditors. The significant negative effect found in this analysis supports this view, but only for secured bonds.

However, we find it surprising that Top 1's effect on bond recovery is only significant for secured bonds. Unsecured bonds have the lowest priority among the debt tranches, and their claims are the first to erode during a prolonged negotiation. Furthermore, while secured bondholders have security in tangible or intangible assets, unsecured bonds have no such guarantee.

An explanation for the unexpected results may lie in our sample, which solely consists of bond defaults. Due to data restrictions, our analysis does not include bank debt. Bank debt is an important part of a firms' debt structure, and plays a vital part in reorganization negotiations. Furthermore, as our analysis compares individual bonds, we do not capture differences in the issuing firm's debt structure. We hypothesize that a majority of firms issuing secured bonds do so only when higher priority bank debt is not available. This is due to cost of debt and banks' risk tolerance. Ownership concentration's effect on recovery rates may depend on whether there exists bank debt in the capital structure or not. This may distort our results. Nevertheless, our results suggest that a more concentrated ownership affects the negotiation process, something that should be remarkable enough.

9. Assessment of robustness

The HY sample constitutes 112 default observations. The extended regression specifications use a large number of control variables relative to the number of observations, potentially weakening the robustness of our results. However, specification three in table 8.2, with a moderate number of control variables, provides significant results.

Our assumptions allow one bond to default several times. A common feature for these cases is that there is substantial time between the defaults. An adequate gap between the default events assures that they are sufficiently independent. This procedure is followed in most studies on bond recovery rates.

Past papers have pointed at potential endogeneity issues when assessing the relation between blockholders and firm performance. This may be true for our study as well, and we approach inference of causality with caution. There may be factors influencing the size of the largest shareholder's holdings that enters the error term, potentially affecting the recovery rate. Nevertheless, the results and argumentation presented throughout the thesis provide evidence that justifies our work, and warrants further research on the topic.

In most cases, recovery rates range between zero and one. However, table 7.1 shows that several of our observations contained amounts exceeding 100%. To assess whether our initial results are robust, we apply an alternative econometric approach by using a fractional dependent variable. This binds recovery rates to an interval from 0% to 100%. The derivation of this variable is described in detail under appendix A.6. Using this variable in the specifications from table 8.2, we obtain similar results as before.

Using the variation inflation factor (VIF), we observe values exceeding five for several year dummies throughout our analysis. Although Wooldridge indicates that a cutoff value for VIF scores should not be used to conclude whether variables exhibit multicollinearity or not (Wooldridge, 2014), one would like VIF indications to be as small as possible. Multicollinearity does not affect bias of coefficients, but a presence can result in estimates being sensitive to modifications of the empirical testing strategy. Nevertheless, Wooldridge (2014) suggests that one should downplay VIFs of coefficients that are not of particular importance, a mentality that we adopt. Throughout our specifications, we find no evidence for multicollinearity among Top 1, the secured dummy, or the interaction term between the two. Additionally, we replace year dummies with macroeconomic proxies and find that our results remain unaffected. We conclude that multicollinearity does not affect our results.

10. Conclusion

The Norwegian HY bond market has become an increasingly important venue for both Norwegian and international firms and investors. Meanwhile, the recent oil crisis has resulted in corporate restructurings for many bond-financed Norwegian firms. Some of these events have sparked a debate on whether current legislation gives debtors excessive control rights in the period between first sign of distress and insolvency. The constraints in formal bankruptcy procedures incentivizes creditors to negotiate out-of-court. Shareholders have control of the firm during out-of-court reorganizations. This acts as a source of bargaining power that they can use to transfer wealth from creditors. Large shareholders have greater potential upside for the time and effort invested in negotiations. This creates an incentive to push harder in negotiations, increasing the value transfer from creditors to shareholders, thus reducing bond recovery rates.

This thesis examines a proposed proxy for debtors' propensity to negotiate: the percentage share holding of the largest owner. Concentrated ownership has been a research topic in the field of agency theory and corporate governance, but to our knowledge, our thesis is the first to investigate if large shareholders affect reorganization negotiations, and in extension, recovery rates of distressed bonds. Using cross-sectional data covering the majority of HY defaults dating from 2008 to 2017, we examine 112 defaulted bonds issued by Norwegian firms. Our sample contains comprehensive information regarding firms' ownership composition, bond characteristics and the issuing firms' financials.

Signs of distress appear well before the default event. To be more confident that ownership concentration is a true firm characteristic, we show that the largest owners' equity shares remain stable one year prior to the bond default.

Our first hypothesis is that an increase in the percentage share holding of the largest owner is associated with a decrease in bond recovery. Our initial results are weak, and we fail to reject the null hypothesis.

The second hypothesis is that ownership concentration's effect on recovery rates is relatively higher for unsecured bonds when compared to secured bonds. The intuition behind our second hypothesis is that the outcome of a reorganization depends on the negotiating parties' bargaining power. Since secured bondholders gain bargaining from their claim in assets, unsecured bondholders' claims are expected to erode first. Our results indicate that secured bondholders are negatively affected by ownership concentration, but the effect is insignificant for unsecured bondholders. These findings suggest that ownership concentration does in fact have an effect on recovery rates for secured bonds. However, while we hypothesized that the effect would impact

unsecured bonds most, we observe the opposite.

Our thesis contributes to the literature by providing an initial look at ownership measures as determinants for bond recovery. Furthermore, we add to the discussion surrounding Norwegian bankruptcy legislation and its effect on reorganizations. While we remain humble towards our results, we believe our findings warrant further research into ownership concentration's effect on recovery rates. Negotiations are a critical factor for the outcome of corporate restructurings. More research on factors that affect the negotiations process could therefore provide much needed insight to accurately predict recovery rates.

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Appendix

A.1 Abbreviations

AS - Aksjeselskap
ASA - Allmennaksjeselskap
CD - Certificate of deposit
CDS - Credit default swap
EBITDA - Earnings before interest, taxation, depreciation and amortization
FV - Face value
HY - High yield
ICR - Interest coverage ratio
LT - Long-term
LTD - Long-term debt
LTM - Last twelve months
M(currency) - the stated currency in millions
NIBOR - Norwegian Interbank Offering Rate
OTC - Over-the-counter
Vhpl - Lov om verdipapirhandel
YTD - Year-to-date

A.2 Variable definitions

Variable Label	Variable Description	Source
10Y Norwegian Treasury	Numeric value representing the 10Y Norwegian Treasury rate at the default event date. Measured in percentage.	Bloomberg
Bankruptcy	Dummy variable that takes the value of 1 if the event is categorized as a bankruptcy, and 0 otherwise	Stamdata
Coupon	Numeric value indicating the coupon of the bond. Measured in percentage (stated between 0 and 100) of the bond's face value.	Stamdata
Default barrier	Numeric value representing the issuer's debt relative to the assets. Measured the year prior to the default as [ST debt + 1/2 LT debt, divided by the total assets].	SNF database or Brønnøysundregistrene
Hard exchange offer	Dummy variable taking the value of 1 if the default event is classified as a hard offer, and 0 otherwise.	Stamdata
Guarantee	Dummy variable that takes the value of 1 if the bond has a guarantee, indicating that a guarantor is accountable for servicing the debt. 0 otherwise	Stamdata.
Intangibility	Numeric value measuring the issuer's intangible assets relative to total assets. Measured one year prior to default event.	SNF database or Brønnøysundregistrene
LT debt issues	Numeric value measuring the fraction of the issuer's total debt that is LT debt. Measured one fiscal year prior to default event.	SNF database or Brønnøysundregistrene
3M NIBOR	Numeric value representing the 3-month NIBOR at the default event date. Measured in percentage.	Bloomberg
Positive EBITDA	Dummy variable that takes the value of 1 if the firm had positive EBITDA one year prior to default, and 0 otherwise.	SNF database or Brønnøysundregistrene
Outstanding amount	Numeric value presenting the outstanding amount of a bond in million NOK. Measured at the default event date.	Stamdata
Secured	Dummy variable that takes the value of 1 if the bond is secured, and 0 if unsecured.	Stamdata
Size	Numeric value measuring the book value of total assets of the firm. Measured in billion NOK, and compiled one fiscal year prior to the default event	SNF database or Brønnøysundregistrene
Soft exchange offer	Dummy variable taking the value of 1 if the default event is classified as a soft offer, and 0 otherwise.	Stamdata
Tangible pledge	Dummy that takes the value of 1 if the bond is secured with a pledge in tangible assets, and 0 otherwise.	Stamdata
Top 1	Numeric value measuring the precentage share holding of the largest owner in the firm. Measured at default event date.	Arena Platform or Brønnøysundregistrene
Time to maturity	Numeric value presenting the time maturity for the bond issues. Measured in years.	Stamdata
Voluntary liquidation	Dummy variable taking the value of 1 if the default event is classified as a voluntary liquidation, and 0 otherwise.	Stamdata

A.3 HY issue volume from 2000 to October 2017

Table A.1 – HY issue volume in the Norwegian bond market, 2000 to October 2017. This table presents the annual Norwegian HY issue volume by issue type. Issued volume by foreign companies, as a fraction of grand total volume, is also displayed. Hence, grand total HY issue volume represents all bonds issued in the Norwegian HY bond market. All numbers are in billion NOK. Data is compiled from Stamdata's Tranche Database, and extracted as of October 2017.

	2000	**2005**	**2010**	**2011**	**2012**	**2013**	**2014**	**2015**	**2016**	**2017**
Bonds	4.420	12.493	16.577	20.670	21.710	32.176	39.262	27.357	17.104	28.920
in % of total	75%	72%	86%	97%	98%	87%	92%	89%	94%	100%
CDs	0.325	2.110	0.353	0.018	0.030	0.150	0.006	0	0	0
in % of total	6%	12%	2%	0%	0%	0%	0%	0%	0%	0%
Convertibles	1.139	2.712	2.422	0.321	0.408	4.525	3.313	3.482	1.051	0
in % of total	19%	16%	13%	2%	2%	12%	8%	11%	6%	0%
Linked notes	0	0	0	0	0	0	0	0	0	0
in % of total	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%
Warrants	0	0	0	0	0	0	0	0	0	0
in % of total	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%
Total Norwegian volume	5.884	17.316	19.352	21.310	22.149	36.851	42.582	30.840	18.156	28.921
Total foreign volume	0.660	7.547	23.368	17.321	34.538	34.830	40.203	14.867	15.483	31.722
in % of grand total	10%	30%	55%	45%	61%	49%	49%	33%	46%	52%
Grand total HY issue volume	6.544	24.863	42.720	38.632	56.687	71.682	82.785	45.707	33.639	60.643

A.4 3M NIBOR and 10Y Norwegian Treasury Rate

Figure A.1 – Development of 3M NIBOR and 10Y Norwegian Treasury rate. This figure shows the development in 3 months Norwegian Interbank Offering Rate (3M NIBOR) and the 10 year Norwegian Treasury rate (10Y Norwegian Treasury). The interest rates are measured from 3rd of January 2005 to 6th of November 2017. Data points are downloaded from Bloomberg.

A.5 Supplement to regression table 8.2

$$\begin{aligned}\text{Recovery} = \beta_0 + \beta_1 Top1 + \beta_2 Secured + \beta_3 (Top1 * Secured) \\ + \gamma_{\text{Industry dummies}} + \delta_{\text{Year dummies}} + \omega_{\text{Event dummies}} + \varepsilon\end{aligned} \tag{10.1}$$

$$\begin{aligned}\text{Recovery} = \beta_0 + \beta_1 [Top1 * (1 - Secured)] + \beta_2 Secured + \beta_3 (Top1 * Secured) \\ + \gamma_{\text{Industry dummies}} + \delta_{\text{Year dummies}} + \omega_{\text{Event dummies}} + \varepsilon\end{aligned} \tag{10.2}$$

Table A.2 – **Regression results - investigating interaction effects**. This table supplements table 8.2. The dependent variable is the recovery rate, measured as the percentage of a bond's face value that is repaid to a bondholder in case of a default. The explanatory variable of interest is Top 1, measuring the percentage ownership of the largest shareholder in the relevant firm, and the interaction term between Top 1 and a dummy indicating whether the bond is secured or not. Default event category, year and industry dummies are included. Our sample consists of default events observed between 2008 and October 2017 among HY bonds issued by Norwegian companies. Data on default events and bond characteristics are compiled from Stamdata's D&R database and Tranche database. Shareholder information are structured from Oslo Market Solution's Arena platform for listed companies. For private companies, the shareholder information is compiled from annual reports accessed through Brønnøysundregistrene. Robust standard errors are given in parentheses. We indicate significance by: * p < 0.1, ** p < 0.05, *** p < 0.01.

	Dependent variable: recovery rate	
	(1)	(2)
Top 1	0.139	
	(0.120)	
Secured	0.186**	0.186**
	(0.081)	(0.081)
Interaction term: Top 1 * Secured	-0.424***	-0.285**
	(0.160)	(0.133)
Interaction term: Top 1 * (1 - Secured)		0.139
		(0.120)
Constant	-0.127	-0.127
	(0.225)	(0.225)
Observations	112	112
Year dummies	Yes	Yes
Industry dummies	Yes	Yes
Event dummies	Yes	Yes
R^2	0.366	0.366
Adjusted R^2	0.243	0.243

The model specified in formula 10.1 is a replication of specification three of table 8.2, where we identified a highly significant interaction term, i.e. β_3. In order to find the effect of Top 1 on recovery rates for secured bonds, we need to add β_1 and β_3 from this specification. The question remaining is whether the resulting number is significantly different from zero. This is tested by running the model specified in formula 10.2, where we replace the Top 1 variable with a new interaction term. As expected, the new interaction term (β_3 in formula 10.2) has a coefficient equal to the sum of β_1 and β_3 from formula 10.1. Furthermore, we find that the coefficient is statistically significant at the 5% level.

Column two in table A.2 also presents evidence on the effect of Top 1 on recovery rates for unsecured bonds. We observe, as expected, that β_1 from formula 10.1 equals β_1 from formula 10.2. Neither of these coefficients are significant.

A.6 Transformation to a fractional response variable

A traditional solution to handle fractional dependent variables is to perform a transformation of the variable of interest, and strictly bounding it to values between zero and one. This transformation enables us to employ the variable in an OLS model, and we exploit this methodology for recovery rates. The procedure is derived using the following steps, as proposed by Papke and Wooldridge (1996):

$$\begin{aligned} Y &= \frac{e^{xb}}{1+e^{xb}} \\ (1+e^{xb})Y &= e^{xb} \\ Y + Ye^{xb} &= e^{xb} \\ ln\left(\frac{Y}{1-Y}\right) &= e^{xb}(1-Y) = xb \end{aligned} \tag{10.3}$$

In our case, Y is the recovery rate. Furthermore, b represents coefficients for a set of variables x. To employ the model, we run the newly derived dependent variable on our set of explanatory variables.