Recovery Rates in the Israeli Corporate Bond Market 2008–15*

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Abstract

This paper examines default events in Israel's corporate bond market between 2008 and 2015. Using a sample of 106 distress events, the variation in expected recovery rates is analyzed. The value of distressed firms at the time of default was found to be mostly influenced by the financial conditions of peers in the industry and in the market. In particular, low liquidity and high average leverage ratios of other market participants had a negative effect on the anticipated recovery rate. Firm-specific characteristics were found to have negligible effect on expected recovery rates. Some of the firms appear in the dataset more than once, as in many cases the process of reorganization is not ultimately successful. Recovery rates at default, as opposed to emergence, were used because of limited data for emergence. For investors who mark their investments to market, once default occurs, the price at default is indeed their recovery estimate. Recovery rates are based on market prices, an advantage of the Israeli data, where bonds are typically traded on the stock exchange. The average recovery rate for the sample is 53 percent and the median is 50 percent; average recovery and default rates are shown to compare well with the experience in other countries.

1. Introduction

The aim of this paper is to examine the Israeli corporate bond market crisis that began in 2008, and present some analysis regarding the recovery rates of defaulted securities. This study is the first, to my knowledge, to empirically

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investigate the determinants of recovery rates of publicly traded bonds in Israel and to compare the results with previous experience abroad.

The bond market in Israel experienced a significant rise in default rates starting at the end of 2008—a phenomenon that had been quite rare in the market in previous years. The bond market itself experienced unusual growth in par value traded in the preceding years, as can be seen in Figure 1. The yearly average default rate between 2008 and 2015 was 2 percent in terms of the number of public firms, and 4 percent in terms of the share of distressed debt in total corporate bond par value. For comparison, in Altman, et al. (2005), the average weighted default rate in the US between 1982 and 2001 was around 4 percent. The majority of defaulting firms were from the real estate, construction and financial sectors (mostly holding companies)—which had demonstrated a rapid accumulation of debt and the sharpest rise in leverage ratios prior to the crisis. The defaults were triggered initially by a real estate crisis in Eastern Europe. Many Israeli real estate and holding companies had real estate investments in that region. Contributing to the vulnerability of the sectors mentioned above in particular were their high ex-ante leverage ratios. Other characteristics related to corporate governance and financial conduct were shown to predict default by these firms as well (see Chen, et al., forthcoming). As the global financial crisis persisted and evolved into a real-economy crisis, an increasing number of companies became liquidity deficient, and sought to restructure their debt obligations. Only recently has the amount of new debt reaching default in Israel started to decline.

The results in this paper suggest that average recovery rates on defaulted debt in Israel during the years 2008–15 are similar to previously documented recovery rates in other markets. Peer firms' conditions in terms of liquidity and leverage were found to play the most significant role in explaining the variability between recovery rates over time.

The paper is structured as follows: Section 2 reviews relevant literature; Section 3 provides background on the Israeli bond market; Section 4 elaborates on the legal framework for debt workouts and liquidation in Israel; Section 5 describes the data; Section 6 presents the methodology, results and robustness checks; and Section 7 concludes.

2. Related literature

A firm is considered to be in distress when its liquid assets are not sufficient to meet its current financial obligations—interest or principal payments to bondholders, banks, or regular payments to suppliers or employees. When a

company fails to make a payment that is part of a hard contract[1], it is in fact in breach of that contract, which calls for court intervention. However, a firm might initiate debt reorganization when it expects future distress, or reorganization can be forced upon it by creditors if they fear for their upcoming payments and the court agrees with them.

Debt restructuring provides relief from financial distress by replacing existing debt with a new debt contract that either alters the interest or principal payments, extends the maturity, or replaces debt with equity. At the same time, the company usually undertakes asset reorganization as well, commits to a new business plan and makes an effort to raise more capital by selling assets or receiving capital injections from new investors or the shareholders.

The cost of liquidation, and hence the cost of the asset restructuring, depends on a variety of factors, such as what percentage of the assets needs to be sold and whether the assets can be sold as a going-concern package instead of a piecemeal sale of assets. Aside from the economic value of the new debt agreement or the expected value in liquidation, the renegotiation procedure itself takes away from the firm's value. The main difficulty in resolving debt reorganizations stems from the problem of asymmetric information between different stakeholders in the company - the equity holders and management, debt claimers and even the court. This problem has direct and indirect costs – the direct costs may arise from payment to experts and mediators, while indirect costs arise from the time spent in reorganization, inefficient asset sales, and opportunistic behavior by management and owners (Jensen and Meckling, 1976).

Recovery rates represent the proportion of the face value of the debt that is repaid or expected to be repaid following default. Experience in the US and elsewhere indicates that the recovery rate on a defaulted debt instruments is influenced by the value of the issuing firm and its future prospects, the seniority of the debtor and the value of the collateral, the state of the industry and of the economy, and the legal system relevant to the market and its efficiency in resolving default.

In one of the first papers on debt reorganization in the US, Franks and Torous (1994) found that for a sample of 82 firms during the period 1983–88 in the US, recovery rates at emergence from Chapter 11 reorganizations averaged 51 percent, while recovery rates at emergence in distressed exchanges (an informal out-of-court restructuring) averaged 80 percent. Bris, Welch and Zho (2006) reported average recovery rates at emergence of 69 percent for another sample of Chapter 11 bankruptcies. Acharya, et al. (2007) found average recovery rates of 42 percent at default and 51 percent at emergence (discounted for the time spent in bankruptcy)

[1] An example of a hard contract is a coupon-paying debt contract that promises periodic payments by the firm to its bondholders. In contrast, common stock and preferred stock are types of soft contracts.

for a large US sample over the period 1982–99. Thorburn (2000) examined the bankruptcy procedure in Sweden, where it is resolved through a mandatory auction. She found average recovery rates of 35 percent resulting from the cash settlement under the local system.

Recovery rates are characterized by time variation. It is a documented fact in the literature that recovery rates and default rates are inversely related, and that recovery rates are procyclical (Mora, 2015). Recent papers investigating recovery rates have focused on explaining this relationship. Altman, Brady, Resti and Sironi (2005) argue that defaulted bonds are a type of commodity, and that a market exists for their supply and demand. In their view, the demand is quite inelastic; as a result, when there is a downturn in the economy accompanied by a high default rate, defaulted debt is in excess supply, and its price falls in order to clear the market. They find evidence supporting their theory in a US sample in the years 1982–2002. A competing argument emphasizes the state of the market for real assets, rather than financial ones. Shleifer and Vishny (1992) suggested that the price received in a distressed asset sale may suffer from large discounts if the entire industry is financially distressed and industry insiders are unable to compete for the assets due to liquidity constraints (known as "fire sales"). According to this view, the potential buyers of a defaulted firm's assets are peers from the same industry, especially when the assets are highly specific. It follows that when peers are unable to buy the defaulted firm's assets due to difficulties of their own, the assets price will fall. Acharya, et al. (2007), find evidence that industry-wide distress affects recovery rates in a negative way, consistent with the rationale of asset "fire sales". Mora (2015) attempts to reconcile these two competing views (industry fundamentals vs. financial distress) suggesting that an industry which is highly dependent on the state of the real economy (business cycle) will suffer a sharper decline in recovery rates in bad times. In a later paper, Shleifer and Vishny (2011) propose the concept of "fire sales" by financial institutions; in contrast to real assets, these "fire sales" may arise when there is a sudden stop in financing. The concept of financial "fire sales" seems to resemble the supply and demand theory of Altman, et al.

The focus of this paper is to investigate the time variation property of recovery rates in Israel in the years 2008–15. The paper does not elaborate on the individual reorganization processes that took place nor on their unique characteristics.

The debt crisis in Israel involved mostly firms from the construction, finance (including holding companies) and real estate industries. These industries are characterized by low asset-specificity, since most of their assets are real estate investments and ownership of other firms rather than machinery or a specific commodity. Who are the "peers" to be considered for these types of assets, and what is the degree of information asymmetry concerning the firms' assets? Should

the recovery rates for this type of firm be affected by the conditions of other industry participants? These are several questions that bear investigation.

3. The Israeli corporate bond market

The corporate bond market in Israel is a rather recent phenomenon. Until the beginning of the millennium, the two major creditors in the country were the banks and the government. In 2003, only 7 percent of the debt of the business sector was held by local non-bank financial institutions. In comparison, in 2013 the debt held by local non-bank financial institutions constituted 29 percent of the debt of the business sector. This shift in the providers of corporate financing was a result of several changes that occurred in that period: A sharp drop in the total face value of government-issued securities due to contractionary budgetary policy in 2003–04; high growth rates of the domestic economy during 2004–08; consistent growth of assets managed by long-term savings institutions (such as pension funds) and the introduction of new regulatory rules that forced them to better diversify their portfolio; and new legislation (Bachar Committee, 2005) that required banks to separate from long-term savings of the public and sell all rights of management of these funds. As a result, the value of the corporate bond market, which was very small before 2003, grew markedly to around 25 percent of GDP in face value in 2007, the eve of the Global Financial Crisis (Figure 1). Firms receiving new access to a growing equity market offering credit at competitive prices started to accumulate debt, and their leverage ratios rose substantially (Figures 2 and 3). Whether as a result of inexperience by investors, moral hazard, strong competition, or the reliance on strong creditor rights[2], most debt contracts in Israel before 2010 were issued without any collateral or covenants.[3] In addition, issues were not distinguished by seniority, and all public debt claimers in effect had equal seniority claim on the debt.

Against this background, at the end of 2008, when liquidity shortages and downturns in economies in Europe and the US became more severe, a growing number of Israeli public firms seemed to be at high risk of default. Eventually, some of them indeed defaulted—the average yearly default rate as a share of total outstanding corporate bond liabilities (by par value) was 4 percent for the period 2008–15, peaking in 2012 at a yearly default rate of 12 percent. Considering the trends depicted in Figure 2, it was not a surprise that defaulting firms were concentrated in the real estate, finance and construction industries, the same industries that had the highest leverage ratios ex ante. A prominent group of firms

[2] Israel received a ranking of 3 out of 4 in the "Creditor Rights Index" in Djankov et al., 2007, compared to a 1 for the US.

[3] According to the final report of the "Hodak Committee " (The committee to determine parameters for consideration by institutional investors that provide credit through the purchase of non-government bonds), published in 2010.

among defaulters belonged to either of two sub-industry classifications—holding companies or construction entrepreneurship.[4] In terms of total liabilities, the share of this group in the liabilities of all defaulting companies in the sample is 79 percent, although in terms of individual firms they account for 21 percent of defaulters; some of the companies that defaulted were very large and prominent companies in the market, and a few years earlier had been considered a solid investment. It should be noted that the bond crisis was largely not accompanied by a downturn in the domestic economy.

4. The legal framework in Israel for debt reorganization[5]

For a US-based firm seeking debt reorganization, the law allows for one of two options – either an out-of-court procedure that relies on the cooperation and consent of participating debtholders, or a restructuring in court, either through Chapter 7 procedures (liquidation) or Chapter 11 (reorganization).

Israeli insolvency law is rooted in English law, though it is increasingly influenced by US bankruptcy practice. A financially distressed firm in Israel can choose between two main bankruptcy proceedings—liquidation or reorganization. Liquidation proceedings are quite specific on many of the aspects that characterize insolvency cases, namely: a stay of all outstanding proceedings against the debtor, appointment of a trustee to the debtor's property, filing of proofs of claims, avoidance of precommencement preferences, and orderly distribution of the proceeds of the debtor's property among its creditors based on the absolute priority rule. The reorganization statute is more limited in scope—it provides for a moratorium on all proceedings against the debtor or its property. Unlike in liquidation, this moratorium suspends the collection rights of all creditors, including the secured ones; and, the statute authorizes the court to convene a creditors' meeting to vote on a proposed arrangement or settlement. To approve a proposed reorganization plan the creditors must convene and vote on its terms. For this purpose, the creditors are classified into separate assemblies. Creditors sharing homogeneous interests are classified together. Within each class the proposed plan must achieve a requisite majority.

Looking at the reorganizations that took place in Israel in recent years, it appears that both the distressed firms and their bondholders preferred to avoid a formal bankruptcy procedure. Management was reluctant to commence formal reorganization proceedings in order not to lose their control over the firm - upon the

[4] Defined as sub branches 6420 and 4120 in the CBS industry classification.

[5] This section is based largely on Hahn, David, "The Financial Crisis of 2009 - Have Reorganization Proceedings in Emerging Markets Gone Bankrupt-Israel as a Case Study." U. Pa. J. Bus. L. 12 (2009): 731; a review by S&P, "Debt Recovery for Creditors and the Law of Insolvency in Israel", 2013, Ratings Direct; and "Restructuring Corporate Debt in Israel", 2013, Milken Institute, Andrey Yanai.

initiation of a formal insolvency proceeding, the courts appoint a trustee to control and manage the debtor's property and business affairs. In a liquidation case, the appointment is explicitly provided by the statute. In reorganization, while not mandated by the legislature, the courts have nonetheless implemented the practice of appointing a trustee. So the task of filing for a formal procedure was left to the creditors. However, as noted earlier, most bond contracts at the time did not specify covenants or contractual clauses that would support the legal ability of the bondholders to declare a default by the firm, as long as the issuing firm has not yet fallen behind on payment.

Official reorganization proceedings may nonetheless be used by the parties, in a prepackaged format, upon reaching a consensual path. In order to simplify the confirmation of the negotiated solution and making it binding on all dissenting creditors, the parties may seek court approval.

Section 18 of the Companies Law, which was added in July 2012, requires the appointment of an expert to review the terms and conditions of settlement proposals, particularly those relating to publicly held debt. In addition, the amended Companies Law requires that any settlement or arrangement be approved not only by the court, but also by a simple majority of the bondholders by represented value of each class (in contrast to the prior 75 percent requirement). Yet the law is unclear about many aspects of reorganization—how do the debtholders decide on their representation; timetables for the agreement; restrictions on the actions of the firm while the process is ongoing, and so on.

5. Data

The list of defaulted public firms was collected manually at the Research Department of the Bank of Israel, following public statements released by the companies. The follow-up on defaulting firms began at 2008 and is ongoing, though this paper is limited to reorganizations that began up to the end of 2015. The dataset includes identification of the defaulting company, the date that the company became distressed, a short explanation for why this company was determined as being in distress[6], and the date that the firm either emerged from reorganization with a reorganization scheme approved by the court, or was diverted to a process of liquidation following the decision of the court. The sample of defaulted firms was cross-referenced with extensive firm-specific and industry-specific information: DWH data set that contains daily quotes from Tel Aviv Stock Exchange (henceforth, TASE) of all traded securities at the TASE, including equities, bonds (most bonds are traded

[6] The date that represents the entrance of the company into a reorganization procedure was selected as the earliest among (1) a delay in the payment of interest; (2) a petition by the company to issue a stay of proceedings; or (3) an announcement by the company that it wishes to negotiate with bondholders on debt reorganization or that such a negotiation has begun.

on the stock exchange in Israel), commercial paper and convertible bonds. The quotes include trading prices, trading volumes and catalog information. Debt obligations were valued ad hoc, since most Israeli corporate bonds are CPI-indexed while a minority is either exchange rate-indexed or is unindexed. The market information was then supplemented by quarterly and yearly reports published by the companies.

According to the data set, during the years 2008–15, there were 146 events of public firms becoming distressed. Some of the firms appear in the dataset twice or even three times–118 firms are unique, 25 of them (22 percent) became distressed for a second time and 3 firms for a third time. After cross reference with other data sources (some of the companies experienced a suspension of trade[7] around the time of default) we are left with 106 distress events.

Recovery rates were calculated as the market price of the debt divided by the amount due to be paid (par). The recovery rates were sampled close to the event of default—I used the average price over a period of a month, from a month and a half before default to half a month before default; recovery rates at default, as opposed to emergence, were used because the record at the end of the reorganizations is not as reliable, and includes a much smaller number of firms, not all of them still trading at the market. Although recovery rates at emergence are a more obvious subject of interest, I rely on the assumption that the price at default is an unbiased estimate of the recovery at emergence (as was demonstrated by Eberhart and Sweeney, 1992, and by Acharya et al. 2007). For investors who mark their investments to market or sell once default occurs, the price at default is indeed their recovery estimate. Sampling recovery rates at default rather than at emergence is not unusual, and was used by Altman et al. (2005). For robustness checks, recovery rates were evaluated at two additional time intervals relative to distress – (1) as the average recovery symmetrically sampled around the time of the distress event; and (2) an average recovery sampled one month after formal distress. The recovery rate was calculated separately for each bond issue of a distressed firm, and then a single recovery rate was assigned to each distressed firm equal to the weighted average of recovery rates of all bond issues.

[7]According to the TASE's website, suspension can occur due to the following reasons:

1. Lack of clarity in a matter relating to the company or its controlling shareholders, or its security, which might affect the price of the security.
2. The appointment of a liquidator, provisional liquidator, receiver or provisional receiver for the company or most of its assets (in respect of a limited partnership - if a receiver is appointed for the partnership's assets or a decision is made to dissolve it).
3. Non-publication of financial statements.
4. The share price is NIS 0.01 (1 agora) for 15 trading days in the last 30 calendar days (the check takes place at the end of each trading day).
5. The call for immediate payment of a series of bonds.

Figure 4 depicts the behavior over time of median recovery rates and default frequency in the sample. Default frequency spiked first in 2009 and then again in 2011. Recovery rates seem to have a weak negative correlation with default frequency, as was documented in other papers (see, for instance, Mora 2015). On average, the recovery rates in Israel (the sample mean is 53 percent and the median is 50 percent) seem to compare well with those in the US (41 percent in market prices for Chapter 11 reorganizations according to Franks and Torous 1994; 51 percent in Acharya, et al. 2007), and are higher than in Sweden (35 percent in Thurnborn 2000) where an auction procedure is used to resolve default. Figure 5 displays the overall distribution of recoveries. The distribution is slightly skewed to the left, although not as much as in Mora (2015), for example.

Table 1 presents default and recovery statistics by industry. The industry classification follows from the Central Bureau of Statistics Standard Industrial Classification from 2011. The largest number of distressed firms were from the construction, real estate, and financial sectors, as discussed earlier. The default rate for these sectors is especially high relative to the size of each sector, as can be seen by comparing columns 1 and 2 in Table 1.

6. Empirical Analysis

6.1. Variables and methodology

Accounting based information was acquired from public quarterly statements, dating no longer than one year before default and no less than a quarter prior to default, to account for the delay in the release of quarterly statements. Cross section regressions were run on recoveries; in all of the regressions, each company and each distress event appear as a single observation. I avoid presenting regressions for separate bond issues of the firms as no effect was found for individual issues other than the aggregate effect for all the issues of the company taken as a weighted average. Another reason for avoiding running separate regressions for instruments is the little information they carry—as mentioned earlier, public bond issues in Israel before 2010 were not distinguished by seniority, and most debt contracts to the public were issued without any collateral or covenants. In 2010, the Hodak Committee addressed these issues and recommended limiting the ability of institutional investors to purchase newly issued bonds without covenants or collateral, but these restrictions came into effect later on and are mostly irrelevant to the bond issues that became distressed at the time of the sample.

The set of explanatory variables used can be divided into three categories; the first set of explanatory variables describes the firm's characteristics, assets and debt structure. The variables are listed below, as well as their description and

calculation, and their expected effect on recovery rates which is indicated by either (+), (–), or (?) sign.

log (assets) (?)	The natural logarithm of total balance.
log (face value) (?)	The natural logarithm of the summarized par value for all traded bond issues outstanding at the time of default. The use of total assets and total face value (in natural logarithm) is meant to test for a size effect in reorganizations, due to fixed costs, for example, or complexity of debt restructuring.
Profit margin (+)	(EBIT + Depreciation)[8] / sales. Taken one year before default.
Tangibility (+)	Non-current assets to total assets ratio. This is an estimate of the company's value in liquidation, because it sums up the value of its physical assets.
Leverage (?)	Long term liabilities to total assets. The effect of leverage is difficult to anticipate – high leverage may be more difficult to resolve; however, it could also attest to a liquidity shortage faced by the company rather than economic difficulties.
Issues (-)	The number of bond issues that were traded on TASE at the time of default. The number of issues should be correlated with the complexity of the negotiation for reorganization and thus should negatively affect recovery value .
Duration (?)	Weighted average duration for all the traded issues. The effect of duration on recovery is not straightforward and should depend on the expectations of the market about the future prospects of the company, the industry and the economy in general.

The next set of explanatory variables follows from Acharya, et al. (2007), extending their investigation into the effect of financial constraints faced by peers in the industry on recoveries. The defaulted firm is excluded from calculation of industry variables. The prominent result in the paper by Acharya, et al., was that "fire sale" of assets is important in explaining time variation of recovery rates—they find that creditors recover less if the industry is in distress and non-defaulted firms in the industry are in hardship, especially if the industry is characterized by large possessions of specific assets. Their analysis is based on the idea (introduced originally by Shleifer and Vishny 1992) that the ability of "specialists" from the industry to make best use of the defaulting company's specific assets , rather than appreciating the assets in "dislocated" prices by non-specialists, affects recovery

[8] Firms in Israel seldom report EBITDA directly. That is why I use EBIT (Earnings Before Interest and Taxes)+Depreciation.

rates. The major methodological challenge they face is determining convincingly that recovery prices are low because industry insiders are liquidity constrained and unable to pay their full valuation, rather than because of low industry demand.

Median industry return (+) The median stock return for the industry of the defaulting firm in the year of default. Should move together with recovery as it proxies for the overall state of the industry.

Distress (-) Measures the distress of the industry as a whole. It is equal to one if the median stock return for the industry of the defaulting firm in the year of default is less than or equal to 40 percent (roughly 10th lowest percentile). In addition, measures of financial constraints—illiquidity and leverage—are employed for firms in the industry to proxy for poor conditions. Should negatively affect recovery if adverse circumstances in the industry have a further negative effect. Acharya, et al. (2007), find that the negative effect of distress on recoveries overshadows the (insignificant – in their paper) effect of industry return; they interpret this result as supporting the existence of a real asset "fire sales" effect.

Median industry leverage (-) Median long-term debt to total assets of all the firms in the industry of the defaulted firm. Should have a negative effect on recoveries from the financial point of view since it attests to poor ability of industry participants to bid for the defaulting company.

Median industry cash (?) Median ratio of cash and cash equivalents to assets in the industry. The effect is not straightforward—it could be negative if firms hoard cash as a precaution (Holmstrom and Tirole, 1998), or positive, if firms are better situated financially and have larger internal reserves to make investments and bid for defaulted peers.

Asset specificity (-) Median ratio of constant assets as a percentage of total assets. Should negatively affect recoveries according to the "fire sales" of real assets theory.

Median industry Q (+) Median of the ratio of the market value of the firm (estimated as market value of equity+ book value of minority interest) to the book value of the firm (estimated as book value of total assets), of all the firms in the industry of the defaulted firm. Should proxy for the growth prospects of assets and should positively affect recovery.

The third and final set of variables used tests for a macroeconomic effect on recovery rates. When a firm encounters a liquidity shortage and does not possess specific assets, the potential buyers from the industry do not necessarily have an advantage over other potential bidders outside of the industry in their ability to better employ the assets of the defaulter. In this case, the approaches of Altman, et al. (2004) and Shleifer and Vishny (1992, 2011) converge—the inelastic demand for defaulted bonds according to Altman, et al., or the insufficient liquidity and decline in collateral value according to Shleifer and Vishny cause recovery rates to be depressed when there is a downturn in the economy.

GDP (+) Quarterly GDP growth, seasonally-adjusted in constant-prices

TA100 return (+) Average quarterly return of the 100 largest companies in Israel's equity market. GDP and TA100 return represent the state of the market/economy and the economic value of assets and should move with recovery rates.

Low rated bond issues (+) Quarterly cumulative amount of par value issued with low rating.

Defaulted amount (-) Cumulative par value of public debt that entered default in the past four quarters (resembles the BDA explanatory variable in Altman, et al. 2005). Low rated bond issues and defaulted amount are considered to represent the demand and supply of defaulted bonds theory advocated in Altman, et al. (2005). If this theory is correct, low rated issues which proxy for market demand/capacity for risky bonds should move with recoveries, while a higher supply of defaulted bonds should lower their price (recovery).

Median market leverage (-) Median long-term debt to total assets of all public firms. Median market leverage should have a negative effect on recoveries since it attests to poor ability of industry participants to bid for the defaulting company.

Median market cash (+) Median ratio of cash and cash equivalents to assets in the market. Should have a positive effect on recoveries since it attests to good ability of industry participants to bid for the defaulting company.

In the Israeli case, most firms defaulting between 2008 and 2015 did not have considerable amounts of specific assets due to the nature of their business and industry affiliation. Indeed, the asset specificity variables did not come out as significant in my regressions. Considering the characteristics of the defaulting companies—high leverage, short term debt duration, heavily invested in real estate and/or structured as holding companies—these firms seem to be situated somewhere between real firms and financial institutions. Their operation is not

characterized by high asset specificity, and they are extremely vulnerable to a cessation of funding.

6.2. Results

This subsection presents and discusses the extent to which firm, industry and market characteristics explain the variation in recovery rates of Israeli corporate debt obligations between 2008 and 2015.

I avoid presenting the regressions where only the first set of independent variables—firm characteristics—are considered, since they demonstrated little explanatory power. Instead, in the regressions presented, both firm-specific and industry-specific characteristics are used. These regressions are shown in Table 3. From the set of firm-characteristics variables I keep tangibility, log assets and log face value in the regressions as they seem to add some explanatory value. I did not find any connection between profit margin, number of issues, or duration with recovery rates. This is unlike the regressions in Acharya, et al. (2007) and Mora (2015), which show strong positive effect of profit margin on recovery. To check for robustness, I sampled profit margin at different occasions before the distress event, but the insignificance remained.[9]

Throughout the regressions, the size of assets was found to have a positive effect on recoveries, supporting the presence of fixed costs in reorganizations; and the size of debt in distress has a negative effect on recovery, which can arise from the complexity of restructure (although the number of issues itself did not prove to be significant). The first regression in Table 3 adds median industry return and Q ratio of the industry to the set of firm level variables. The industry return has a positive, significant and economically important effect on recovery, even though industry dummies are accounted for. In the second regression, industry return is replaced by a dummy variable that accounts only for episodes of very low return for the industry. Contrary to the asymmetric effect of industry return on recoveries found in Acharya, et al. (2007), the effect I find is symmetric—recoveries react both to good times and bad times in the industry, pointing to the assessment that recoveries in the Israeli case depend more on the economic worth of assets and questioning the presence of a "fire sale" effect. In regressions 3 and 4, specific industry characteristics—median leverage, assets specificity and cash ratio—are added. Several characteristics turn out to be consistently important and significant in explaining recovery rates, although the distress dummy itself becomes insignificant. (The same happens to industry return in regressions that are not shown). The coefficient on median industry Q in regressions 3 and 4 is positive and significant,

[9] This result might be explained by either inaccurate measure of EBITDA, which as I pointed out is not reported directly by firms in Israel, or by the difference in the industry affiliation of defaulted companies in the US sample and the Israeli sample.

accounting for the future growth prospects of the industry. Industry leverage has a negative and economically significant effect on recoveries—growth of 5 percentage points in median leverage for the industry reduces the recovery by about NIS 0.10. Industry cash ratio also has a significant effect on recovery—the difference between default when the industry median cash ratio is 0.03 (25^{th} percentile) and when it is 0.07 (75^{th} percentile), is associated with a lower recovery by NIS 0.14. Asset specificity, as mentioned earlier, is not significant in either of the regressions. In regression 4, an interaction term of industry distress and tangibility is added. The interaction is found to have a negative and significant effect on recoveries. This result supports some presence of asset "fire sales" effect, although the specification used in regression 4 tests for an effect at the level of the firm and not of the industry as in Acharya et al. (2007).

Table 5 compares the effect of industry conditions to those of the market on recovery rates. GDP growth and TA100 stock exchange index return do not have a significant direct effect on recoveries (regressions 1 and 2). Low rated new bond offerings have a positive effect on recoveries, as expected, supporting the idea that there is a demand effect on recoveries. However, Defaulted amount, the cumulative amount of defaulted debt, is insignificant—undermining this rationale from the supply perspective.

When market conditions are broken down into specific characteristics (regressions 6 and 7), their ability to explain variability in recoveries is superior to that of the industry. Overall market leverage has a negative effect on recoveries, stronger in magnitude than industry leverage. Cash ratio in the market is positively associated with recoveries. These results support the assessment that the value of defaulting firms in Israel was highly dependent on the liquidity of other market participants; while the market was in short supply of liquidity, recovery rates were suppressed, and when liquidity recovered, recovery rates improved as well.

6.3. Robustness

The time around default of a firm is characterized by a great deal of uncertainty regarding the status of the firm. The market price of debt varies as information about default gradually becomes public and as creditors sometimes use this time to considerably alter their stake in the firm: "Bond or equity prices often drop precipitously at or around the time of default. Empirically, given the imperfect manner in which the "surprise" may be revealed around the time of default, we would expect to see a marked increase in the volatility of bond returns during the time window bracketing default" (Duffie and Lando, 2001). This phenomenon makes the timing of the recovery rate sampling highly sensitive. To verify that the effect I found on recovery rates in previous subsections does not depend on the time that the recovery rates were sampled, the same set of regressions are run, but each time the dependent variable—recovery rates—is sampled at other periods in the time

around default. Analysis is presented for two such regressions, for which recovery rates were calculated further into the distress event compared with the baseline case analyzed in Sections 5 and 6. The average and median recovery rates of these samples are lower than in the original sample, and the number of firms in the sample is reduced because trading in the shares of several firms is suspended and there is no available market price.

Recovery rates are first sampled *around* the time of the distress event itself – I calculate average recovery over the period from half a month before the distress event to half a month after the event. This reduces the sample size to 103 firm-distress events. All of the results concerning industry conditions reported in Table 3 hold for recovery rates measures around default, both in magnitude and in significance. The effects that become insignificant for this sample are those of firm size and debt size, which were quite weak for the baseline sample as well. As for market conditions, several results from Table 4 are obtained for this sample as well; the regressions reassure that market leverage is important in explaining the variability in recovery rates, and that this effect overshadows the effect of industry conditions. The effect of market cash ratio for this sample has the correct sign but is smaller in magnitude and becomes statistically insignificant. The effects of low-rated bond issues and the interaction of tangibility and industry distress also lose their significance.

For the second robustness check I calculate recovery rates *after* the distress event has occurred. It is assumed that at this point in time it is obvious and well known to all market participants that the firm will need to restructure its debt. To calculate recovery rates I take the average market price of the bonds over the period from half a month after the distress event and up to a month and a half after the distress event. The sample that remains is 98 firm-distress events. With regard to industry conditions, the main results hold for this sample as well—I get the same magnitudes for the effects of the return for the industry, the industry distress dummy, the industry leverage and the industry cash ratio, as in the original sample. Regarding the regressions for market conditions, the market leverage effect is the only one that comes out significant for this sample, preserving its magnitude.

7. Summary

This study is the first, to my knowledge, to present a comprehensive investigation of recovery rates of public companies in Israel between 2008 and 2015. Recovery rates at the time of default were found to be mostly related to the financial conditions of market peers—in particular, average liquidity and leverage in the market had a negative effect on the anticipated recovery rate. Firm-specific characteristics were found to have negligible effect on recovery rates. These results suggest that the market interpreted the crisis as a financial crisis rather that a real economy/industry crisis, meaning that the defaulters were firms suffering from a

shortage in liquidity and not from negative economic prospects. Average recovery rates at default compare well with the experience in the US and elsewhere. The process of reorganization does not turn out to be successful in many cases—in recent years, the majority of firms becoming distressed are firms that already went through a reorganization in the beginning of the period (between 2013 and 2015, 29 firms became distressed; 17 of them were previously reorganized). In the US, the ratio of firms that emerge from reorganization and re-enter a second reorganization is about one third (LoPouki and Whitford 1993, Hotchkiss 1995, Gilson 1997), so it seems that reorganizations are not perfect in resolving financial distress in other markets either, but a follow-up on reorganized firms in Israel will allow us to assess the efficiency of the process in this market.

The surge in default rates in the Israeli bond market that began in 2009 is interesting from the Israeli point of view because it was the first time that debt workouts were negotiated for publicly traded debt at such scope. Because it was public, and because institutional investors were often the creditors, these workouts drew a lot of media attention. The nature of the companies that defaulted is also interesting—the prominent presence of holding companies among the corporations is a distinct phenomenon of the Israeli market, and as it happened, the involvement of such companies in reorganizations was high. Firms from the real estate sector were also highly involved in the crisis. In Israel, real estate firms tend to finance themselves with mezzanine debt and often have high leverage ratios, much higher than what is common in the US market, for instance. The Israeli bond market has drawn several foreign small-sized real estate firms to raise debt in Israel in recent years in the same manner. REITs are less common in Israel. Including covenants in debt agreements forces firms to enter a reorganization process at an earlier stage, yet at the same time, not having many restrictions gives firms flexibility in their attempts to avoid default, and can help to avoid selling assets at "dislocated" prices. It can even have a positive effect on the entire market since decline in collateral values can cause further decline of prices. These aspects of the Israeli bond market and their influence on the outcome of reorganizations, as well as changes, if any, that were made to the practice of raising corporate debt in the market after the crisis, are interesting subjects for further research.

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Figures and Tables

Figure 1 –Size of the Israeli corporate bond market relative to GDP

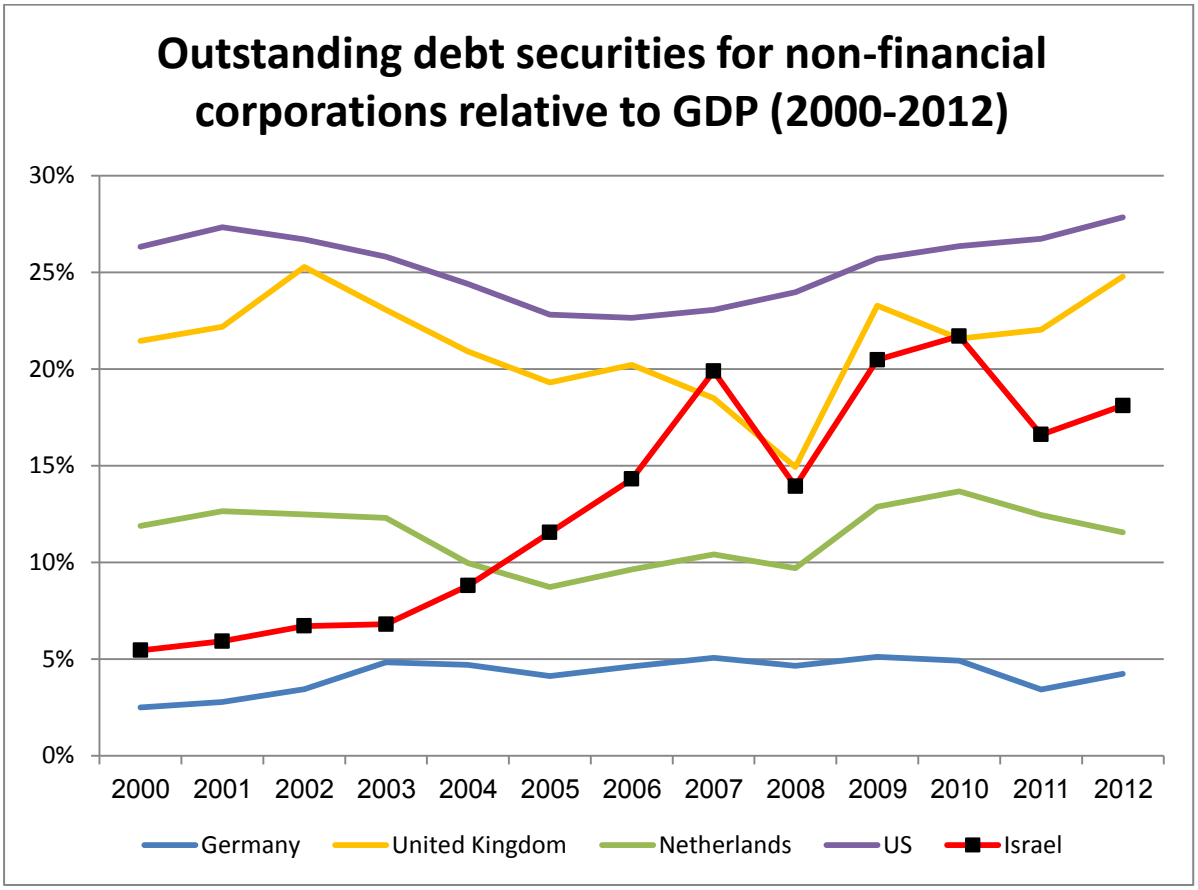

Figure 2 –Leverage of public firms, by industry

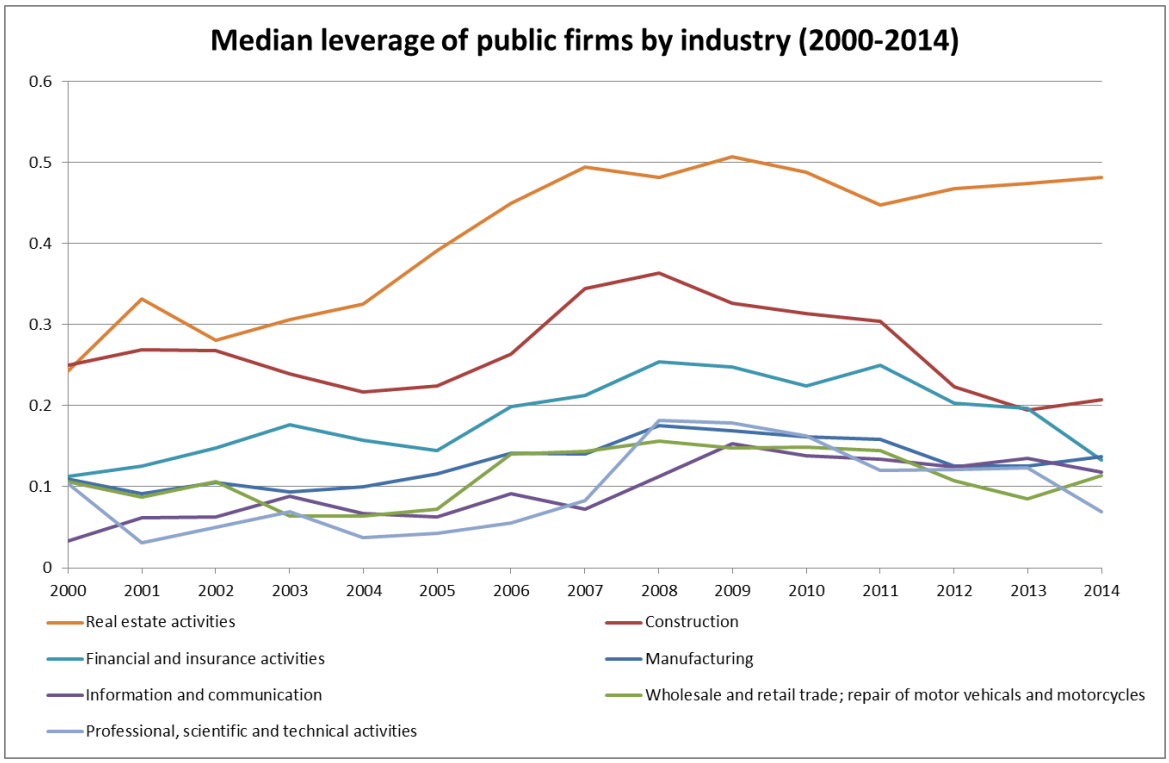

Figure 3 – Leverage of defaulted firms compared to peers from Financial, Construction and Real estate industries (median vs. median)

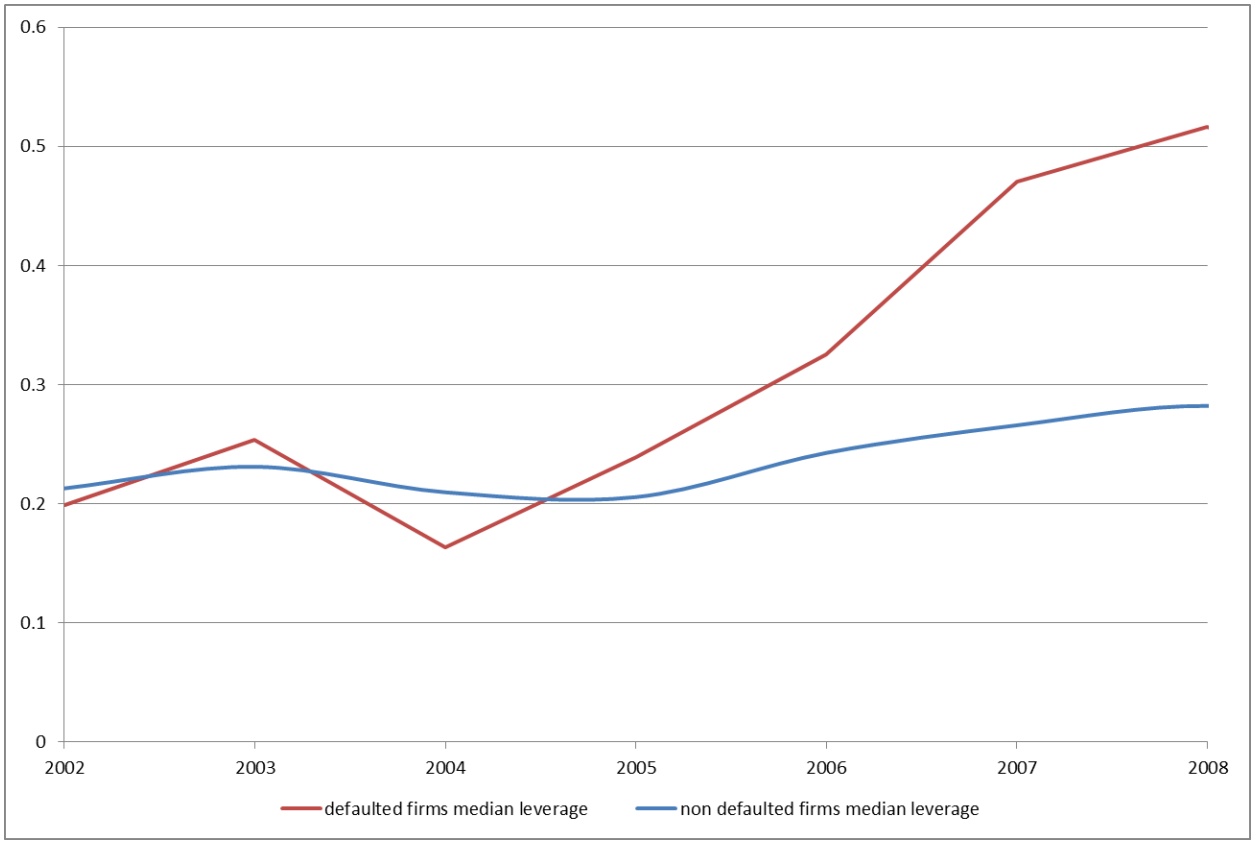

Figure 4 – Default rate and recovery rate on defaulted securities

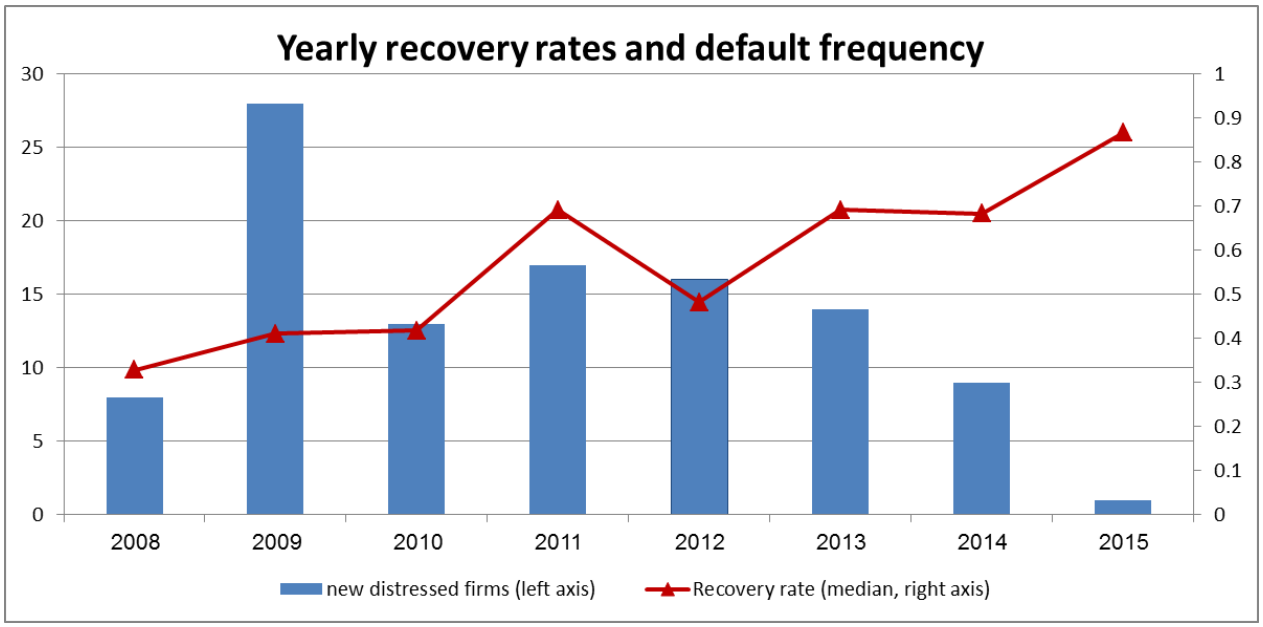

Figure 5 – Distribution of recovery rates

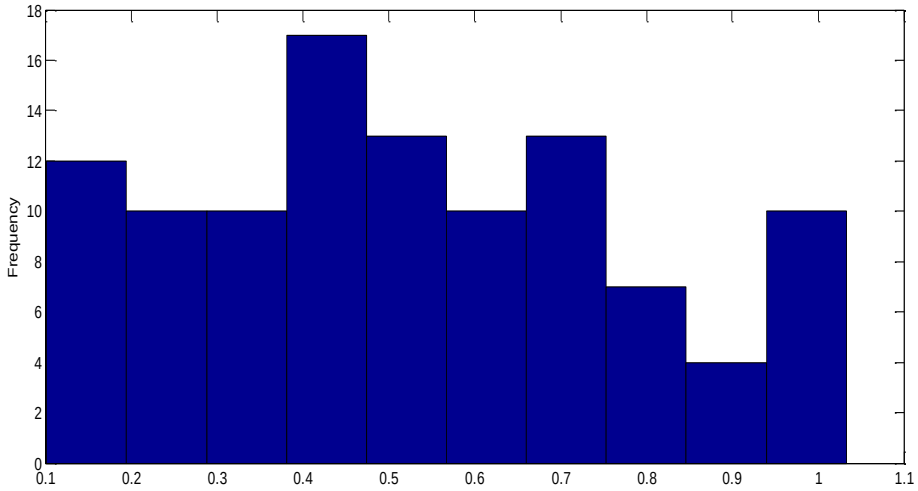

Table 1 – Recovery rates statistics - prominent industries

	(1) Non-defaulted firms (quarterly av.)	(2) Defaulted firms	(3) Defaulted par (Millions of NIS)	(4) Mean recovery	(4) Median recovery	(5) STD recovery
Overall	496	106	39,391	0.53	0.50	0.26
Unclassified	46	1	1,076	0.52	0.52	0.00
Manufacturing	100	12	2,423	0.46	0.40	0.22
Construction	40	23	12,166	0.66	0.62	0.25
Of this:						
Building contractors		8	770	0.61	0.53	0.23
Building entrepreneurship		13	11,061	0.72	0.79	0.25
Wholesale and retail trade; repair of motor vehicles and motorcycles	43	5	2,305	0.78	0.83	0.21
Information and communication	41	2	250	0.59	0.59	0.15
Financial and insurance activities	108	32	12,498	0.44	0.45	0.24
Of this:						
Activities of holding companies		9	6,509	0.36	0.26	0.17
Other financial service activities, except insurance and pension funding activities, n.e.c.		17	5,397	0.52	0.59	0.23
Real estate activities	44	28	8,074	0.49	0.44	0.24
Of this:						
Real estate activities on own property		15	2,110	0.47	0.39	0.23
Real estate activities on a fee or contract basis		6	1,502	0.48	0.41	0.21
Professional, scientific and technical activities	40	2	341	0.66	0.66	0.42
Administrative and support service activities	7	1	256	0.16	0.16	0.00

Table 2 - Summary statistics of firm, industry and macro variables

	obs.	mean	std	min	median	max
Duration	99	1.53	0.93	0.04	1.49	5.43
Recovery	106	0.53	0.25	0.10	0.50	1.03
Issues	106	1.79	1.69	1.00	1.00	13.00
Leverage	106	0.48	0.36	0.00	0.42	2.25
Cash ratio	106	0.04	0.04	0.00	0.03	0.15
Log assets	106	13.07	1.73	9.02	12.93	18.71
Tangibility	106	0.63	0.28	0.00	0.70	0.99
Profit margin	93	-2.30	12.27	-107.13	-0.01	9.41
Med. Ind. Q	106	0.36	0.19	0.14	0.31	1.55
Med. Ind. Leverage	106	0.27	0.14	0.07	0.20	0.52
Med. Asset specificity	106	3.70	6.26	0.00	1.08	23.04
Med. Ind. Cash	106	0.05	0.03	0.00	0.04	0.25
Med. Ind. Return	106	-0.02	0.38	-0.58	-0.02	1.26
Distress1	106	0.18	0.38	0.00	0.00	1.00
Peer	106	78.11	37.90	8.00	51.00	135.00
Med. Market leverage	106	0.18	0.01	0.15	0.18	0.20
Med. Market cash	106	0.00	0.00	0.00	0.00	0.03
TA100 return	106	0.01	0.11	-0.32	0.01	0.27
TA100 vol	106	0.21	0.11	0.08	0.19	0.48
GDP	106	2.94	2.56	-1.90	3.39	7.40
Log face value	106	18.72	1.30	15.62	18.61	22.74

Table 3 - Determinants of recovery – industry condition

	1	2	3	4
Tangibility	0.097	0.065	0.057	0.143
	(0.084)	(0.084)	(0.083)	(0.088)
Log assets	0.040	0.041	0.029	0.028
	*(0.022)	*(0.022)	(0.022)	(0.021)
Log face value	-0.049	-0.054	-0.037	-0.037
	(0.030)	*(0.030)	(0.029)	(0.029)
Med. Ind. Q	0.187	0.123	0.679	0.730
	(0.160)	(0.167)	**(0.284)	***(0.277)
Med. Ind. Return	0.173			
	***(0.065)			
Distress		-0.174	-0.045	0.271
		***(0.064)	(0.075)	*(0.147)
Med. Ind. Lev			-2.035	-2.117
			**(0.798)	***(0.777)
Med. Asset Spec.			0.003	0.008
			(0.024)	(0.023)
Med. Ind. Cash			-3.633	-3.761
			**(1.463)	***(1.425)
Distress #Tangibility				-0.506
				**(0.204)
Constant	0.888	1.006	1.059	0.972
	**(0.405)	**(0.409)	**(0.466)	**(0.455)
Industry dummies	Yes	Yes	Yes	Yes
Observations	106	106	106	106
Adjusted R^2	0.19	0.19	0.24	0.28

OLS estimates of regressions of recovery rates

Standard errors in parentheses

* Significant at 10%; ** significant at 5%; *** significant at 1%

Tangibility is defined as non-current assets to total assets; Log (assets) is calculated as the natural logarithm of total balance, and Log (face value) is the same for the summarized par for all traded bond issues outstanding at the time of default; Med. Ind. return is the median stock return for the industry of the defaulting firm in the year of default. Distress is equal to one if the median stock return for the industry of the defaulting firm in the year of default is less than or equal to -40 percent. Med. Ind. leverage is the median long-term debt to total assets of all the firms in the industry of the defaulted firm; Med. Ind. cash is the median ratio of cash and cash equivalents to assets in the industry; Asset specificity, the median ratio of constant assets as a percentage of total assets; Med. Industry Q, the median of the ratio of the market value of the firm (estimated as market value of equity + book value of minority interest) to the book value of the firm (estimated as book value of total assets), of all the firms in the industry of the defaulted firm.

Table 4 - Determinants of recovery – macroeconomic conditions

	1	2	3	4	5	6
Tangibility	0.082	0.065	0.080	0.071	-0.002	0.063
	(0.085)	(0.085)	(0.079)	(0.084)	(0.080)	(0.087)
Log assets	0.039	0.041	0.032	0.041	0.031	0.031
	(0.022)*	(0.023)*	(0.021)	(0.022)*	(0.021)	(0.021)
Log face value	-0.052	-0.054	-0.043	-0.051	-0.048	-0.049
	(0.030)*	(0.030)*	(0.028)	(0.030)*	(0.028)*	(0.028)*
Med. Ind. Q	0.127	0.123	0.062	0.126	0.171	0.178
	(0.167)	(0.168)	(0.158)	(0.167)	(0.157)	(0.155)
Distress	-0.118	-0.176	-0.112	-0.151	-0.015	0.204
	(0.078)	(0.084)**	(0.063)*	(0.069)**	(0.075)	(0.140)
TA100 return	0.130					
	(0.103)					
GDP		-0.000				
		(0.012)				
Low rated offerings			0.263			
			(0.071)***			
BDA				0.000		
				(0.000)		
Med. Market lev.					-6.454	-6.142
					(1.868)***	(1.853)***
Med. Market cash					13.503	12.684
					(6.649)**	(6.581)*
Distress #Tangibility						-0.370
						(0.201)*
Constant	0.991	1.008	0.904	0.930	2.116	2.030
	(0.408)**	(0.418)**	(0.386)**	(0.417)**	(0.512)***	(0.508)***
Industry dummies	yes	Yes	Yes	Yes	Yes	Yes
Observations	106	106	106	106	106	106
Adjusted R^2	0.19	0.18	0.28	0.19	0.29	0.31

Standard errors in parentheses

* Significant at 10%; ** significant at 5%; *** significant at 1%

Tangibility is defined as non-current assets to total assets; Log (assets) is calculated as the natural logarithm of total balance, and Log (face value) is the same for the summarized par for all traded bond issues outstanding at the time of default; Distress is equal to one if the median stock return for the industry of the defaulting firm in the year of default is less than or equal to -40 percent; Med. Industry Q, the median of the ratio of the market value of the firm (estimated as market value of equity + book value of minority interest) to the book value of the firm (estimated as book value of total assets), of all the firms in the industry of the defaulted firm.

TA100 return is the average quarterly return in the las quarter before default. GDP is the quarterly GDP growth, seasonally-adjusted in constant-prices; Low rated issues is the quarterly cumulative amount of par issued with low rating; BDA is the cumulative public debt par that entered into default in the past four quarters; Median market leverage is the median long-term debt to total assets of all the public firms; Median market cash is the median ratio of cash and cash equivalents to assets in the market.