

Contents lists available at [ScienceDirect](#)

Journal of Financial Economics

journal homepage: www.elsevier.com/locate/jfec

The determinants of recovery rates in the US corporate bond market[☆]



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ARTICLE INFO

Article history:

Received 19 July 2013

Received in revised form

25 November 2013

Accepted 18 December 2013

Available online 9 June 2014

JEL classification:

G12

G33

Keywords:

Credit risk

Recovery rate

Corporate bonds

Liquidity

ABSTRACT

We examine recovery rates of defaulted bonds in the US corporate bond market, based on a complete set of traded prices and volumes. A study of the trading microstructure around various types of default events is provided. We document temporary price pressure with high trading volumes on the default day and the following 30 days, and low trading activity thereafter. Based on this analysis, we determine market-based recovery rates and quantify various liquidity measures. We study the relation between the recovery rates and these measures, considering additionally a comprehensive set of bond characteristics, firm fundamentals, and macroeconomic variables.

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1. Introduction

The global financial crisis has highlighted the importance of credit risk in the pricing of financial contracts and emphasized the multifaceted nature of its key determinants: the probability of default and the recovery rate in the event of default. Traditionally, credit risk modeling has been focused on the probability of default, while the recovery rate has been set to parametric values that do not necessarily recognize its potential cross-sectional and time-series variation. However, the magnitude and variability of defaults during the crisis have emphasized the importance of obtaining more precise estimates of recovery rates, and explaining their variation across issues and issuers. It is now intuitively understood that recovery rates are potentially driven by many different factors: endogenous variables (such as specific characteristics of the assets involved and of the firm and industry), or exogenous factors (such as overall macroeconomic conditions or

[☆] We gratefully acknowledge financial support from *The Institute for Quantitative Research in Finance* (the Q Group). Furthermore, we thank Edward Altman and the Salomon Center of New York University for providing us access to the *Master Default Database*. We are grateful to the referee, Paul Schultz, and the editor, William Schwert, for valuable comments and suggestions. We would also like to thank Yakov Amihud, Pierre Collin-Dufresne, Nils Friewald, Alois Geyer, Zhiguo He, Kurt Hornik, Jing-zhi Huang, Francis Longstaff, Gyöngyi Lóránth, Miriam Marra, Bruce Tuckman, Marliese Uhrig-Homburg, Oldrich Vasicek, and Ivo Welch, and participants at the 17th Annual Meeting of the Swiss Society for Financial Market Research (SGF), the 2014 Annual Meeting of the American Finance Association (AFA), the 40th Annual Meeting of the European Finance Association (EFA), the 19th Annual Meeting of the German Finance Association (DGF), and the 2012 VGSF Conference, as well as participants at the Standard & Poor's Speaker Series and the CFA Institute Speaker Series for helpful comments and suggestions.

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market liquidity). It is important, therefore, to document the determinants of this risk factor and to analyze their interaction effects with other dimensions of default risk. This paper aims at investigating these relationships at the issue and obligor levels for the US corporate bond market.

Most credit risk instruments, such as bonds and credit default swaps (CDS), trade over-the-counter (OTC). This makes research in this area challenging, as traded prices and volumes for these instruments cannot be observed directly from a central database. Therefore, most studies have to rely, of necessity, on quotation or trade data from a particular dealer, leaving open the question of whether the data are representative of the market as a whole. This is even more of a problem for defaulted financial instruments, as their trading can often be infrequent, resulting in stale prices, with some of the quotations or trades of individual dealers even being “off market.” In contrast, the market for US corporate bonds is an ideal laboratory for this study, since detailed data on prices and volumes are available from 2002 onwards in the Trade Reporting and Compliance Engine (TRACE) database, maintained by the Financial Regulatory Authority (FINRA). This allows us to analyze, for the first time, the prices and volumes of defaulted bonds based on a complete set of transaction data, covering all trades following default events, for the period from 2002 to 2010. As a consequence, this microstructure analysis not only permits a reliable estimate of a market-based recovery rate, but also provides an opportunity to study trading activity, and hence liquidity, at different stages following default. We combine the TRACE data set with the Mergent Fixed Income Securities Database and the NYU Salomon Center Master Default Database, which allows us to consider a broad set of default events, capturing formal bankruptcy filings, distressed exchanges, and downgrades to default status by rating agencies, representing payment defaults and unlikely-to-pay events.

We make three contributions in this paper. First, we provide a detailed analysis of the microstructure of trading in defaulted bonds, working with a *complete* set of default events over the most recent decade, offering crucial and interesting new insights. The study of market prices and trading behavior around different default events is important as many institutional investors are directly exposed to these post-default prices, e.g., because they have to immediately liquidate their positions, deliver the bonds through the settlement of credit default swaps (CDS) positions, or mark down the values of the defaulted bonds on their balance sheets. Furthermore, the examination of market prices provides us the opportunity to analyze *all* default events (including, e.g., distressed exchanges), and not only the outcomes of formal bankruptcy procedures, often known only years after the actual filing dates. Overall, this analysis allows us to discuss trading activity at different stages following default and to derive market-based estimates of recovery rates, which are of fundamental relevance to various market participants.¹ Second, we quantify

the liquidity of defaulted bonds, applying different measures in our analysis, and explore the implications for recovery risk, which turn out to be of particular importance, since defaulted bonds are potentially illiquid. Consequently, we study to what extent changes in the underlying liquidity, following default, account for the observed post-default price evolution, as default might induce pressure on prices. Third, we analyze the resulting bond recovery rates, employing a broad set of explanatory variables in our regressions to capture various aspects of recovery risk originating from bond characteristics, including bond covenants, firm fundamentals, and macroeconomic conditions, in contrast to much of the previous literature in which the analysis has typically been more narrowly focused.

Our analysis of recovery rates yields several distinct sets of findings. We examine the trading activity of the defaulted bonds, as defined by traded prices and volumes, in a time window starting 90 days before and ending 90 days after the observed default event date. We find that, although the price level is already rather low before the default event, the traded price falls significantly to its lowest level on the default day itself, to around 35% of face value, on average. The price recovers, in the first 30 days following default, to about 42% of face value and shows a less volatile evolution thereafter.² Furthermore, we find that the trading volume of a defaulted bond is relatively high on the default event day, providing evidence of temporary sell-side pressure as prices are low. This high level of trading activity dies down, within the first 30 days after default, to pre-default levels. Thus, this time window apparently represents the relevant trading period following default in which investors split up and sell larger positions in defaulted bonds. Based on these findings, we define the recovery rate of a defaulted bond as the average daily traded price per unit of face value, over the default day and the following 30 days, covering the phase of high trading activity, as we conjecture that price evolution in this time window is mostly driven by the default event itself.

We analyze these recovery rates across bonds along various dimensions. First, we analyze them across different default event types, revealing that distressed exchanges have the highest recovery rates, whereas bankruptcy filings show significantly lower recoveries. This finding provides further evidence that bondholders are confronted with lower recoveries in formal legal procedures compared to in out-of-court restructurings. Second, we find significant differences in recoveries between the default grades of the major rating agencies, which represent payment defaults and unlikely-to-pay events, respectively; in particular, the rating frameworks of Moody's and Fitch seem to incorporate recovery rate information to a greater extent than that of Standard & Poor's.³ Third, we find that,

¹ These estimates should be contrasted with the *ultimate* recovery rates, which are based on the amounts paid by the firm to its bondholders at the resolution of formal bankruptcy filings.

² Note that a 40% recovery rate, which was the point estimate provided by Altman and Kishore (1996) in an early paper in this area, has been widely used in calibrations in academia and industry.

³ Note that the rating frameworks of Moody's and Fitch focus on the expected loss, (see Moody's Investors Service, 2002; FitchRatings, 2013), which involves both the probability of default and the recovery rate given

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