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The determinants of bank loan recovery rates

Hinh D. Khieu [a,*], Donald J. Mullineaux [b], Ha-Chin Yi [c]

[a] College of Business, University of Southern Indiana, Evansville, IN 47725, United States
[b] Gatton College of Business, University of Kentucky, Lexington, KY 40506, United States
[c] McCoy College of Business Administration, Texas State University-San Marcos, San Marcos, TX 78666, United States

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ABSTRACT

Using Moody's Ultimate Recovery Database, we estimate a model for bank loan recoveries using variables reflecting loan and borrower characteristics, industry and macroeconomic conditions, and several recovery process variables. We find that loan characteristics are more significant determinants of recovery rates than are borrower characteristics prior to default. Industry and macroeconomic conditions are relevant, as are prepackaged bankruptcy arrangements. We examine whether a commonly used proxy for recovery rates, the 30-day post-default trading price of the loan, represents an efficient estimate of actual recoveries and find that such a proxy is biased and inefficient.

1. Introduction

Recovery rates on defaulted loans play a critical role in credit risk modeling. Under the 2004 Basel Accord (as well as the proposed drafts of Basel III), some global banks are now permitted, and in certain cases required, to use an "internal rating-based approach" to estimate "loss-given-default". The recovery rate is measured as one minus loss-given-default. Prospective recovery is also a determinant of the value of a credit default swap (CDS). The International Swaps and Derivatives Association, Inc., reports that the global volume of credit default swaps grew from $631.5 billion in 2001 to $54.6 trillion by mid-2008, yielding a growth rate of 8546%. A better understanding of what drives loan recoveries is therefore essential. Loan recovery is largely an unexplored area, presumably reflecting a lack of adequate data. We use the Moody's Ultimate Recovery Database to analyze recovery rates on large syndicated bank loans originated in the United States during 1987–2007.

Most existing studies on loan recoveries appear in the practitioner literature, which is dominated by ratings agencies such as Standard & Poor's and Moody's. Studies in the academic literature focus primarily on *bond* recovery rates. Only a few empirical academic studies of loan recoveries exist, and these either consist of case studies on a single lender or combine bonds and loans in a single sample.

Although case studies are valuable, it is difficult to know whether their results can be generalized. When bonds and loans appear together in a single sample, the implicit assumption is that the same factors influence recovery rates in both markets in identical ways. Yet loans and bonds have different characteristics, so this assumption may not hold. For instance, bank loans are more likely to be secured than bonds, and secured lenders recover more, on average, than unsecured creditors (Acharya et al., 2007; Cantor and Varma, 2004). Bank loans also are typically senior to bonds in a company's capital structure. The absolute priority rule, which establishes the priority of claims in liquidation, implies bank lenders should recover more than bondholders in default states. In addition, banks are more involved in debt restructurings than bondholders; consequently, banks are more likely to become major shareholders, or assume director seats, or do both (Gilson, 1990). If so, loans should have lower agency costs and higher expected recoveries relative to bonds. Finally, bank loans are more likely to be restructured privately than publicly (Gilson et al., 1990), and private resolution tends to result in higher recoveries (Franks and Torous, 1994). These differences between loans and bonds warrant an investigation focused solely on loan recovery rates.

Recovery studies employ different measures of recovery rates. One common measure is the trading price of the debt instrument approximately 30 days after default (see, for example, Carty, 1998; Eberhart and Sweeney, 1992). This measure serves as a

* Corresponding author. Tel.: +1 812 465 7145; fax: +1 812 465 1044.
E-mail addresses: hdkhieu@usi.edu (H.D. Khieu), mullinea@uky.edu (D.J. Mullineaux), hy11@txstate.edu (H-C. Yi).

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proxy for the ultimate payoff creditors obtain when the defaulting entity emerges from bankruptcy or is liquidated. The assumption is that loan or bond traders rationally estimate the amount that eventually will be recovered at some future point and discount that value back to the trading date. The literature provides no strong evidence on the effectiveness of trading prices as unbiased estimators for ultimate recoveries, however. We will use an actual measure of recoveries in our analysis and examine how well trading prices can proxy for ultimate recoveries.

We first investigate the factors that drive actual bank loan recovery rates using a sample of loans originated by a great many lending institutions. Ours is one of the first academic studies to use Moody's Ultimate Recovery Database (URD) for this type of analysis.[1] To summarize the results, we find that borrower leverage before default negatively affects ultimate recoveries. Firm size also influences recoveries, but the impact differs by the type of loans. Recoveries from borrowers with a history of defaults are significantly higher than those of first-time defaulters. A variety of loan contract features are strongly related to the ultimate payoff to creditors, and the use of prepackaged bankruptcy reorganizations increases actual settlements. Loan recoveries are nonlinearly related to the length of time to emergence. The probability of default measured at the time of loan origination and the borrower's operating cash flows are not related to actual settlement values, however.

Second, we examine how well the market for bank loans anticipates settlement values in recovery. We investigate whether the trading price on loans roughly 30 days after default represents a "rational" forecast of actual recovery. A rational forecast, by definition, is unbiased, but is also "efficient" in the sense that the factors that influence the forecast are identical to those that determine the actual outcome. We find that the post-default trading price on loans is not a rational estimate of actual recovery realizations.

The paper proceeds as follows. In Section 2, we review the related literature. In Section 3, we discuss our model. In Section 4, we describe our data and present our econometric specification. Sections 5–7 contain the empirical results. Section 8 concludes.

2. Related literature

Existing empirical studies of recovery rates primarily focus on bonds. The lack of research on bank loan recoveries reflects the paucity of loan recovery data, given that loans are private debt contracts.[2] At a descriptive level, several empirical studies on defaulted loans show that the recovery rates exhibit a bimodal distribution (Araten et al., 2004; Asarnow and Edwards, 1995; Schuermann, 2004). That is, loan defaults typically result in full recovery or have a zero or very low recovery rate. Dermine and Neto de Carvalho (2006) find a similar distribution for loans in a sample drawn from one bank. However, other studies do not confirm bimodality, and instead show that loan recovery rates are skewed to the right, while bond recoveries are left skewed (Emery, 2007). The inconsistent results in these studies may reflect differences in datasets, time periods, or both.

In a practitioner study, Emery (2007) examines recovery rates on bank loans using Moody's database of ultimate recoveries and finds a mean rate of 80% at resolution, compared with 65% for bonds.[3] Emery and Ou (2004) show that loss severity in the event of default is about 2.25 times greater for bonds than loans, holding ratings constant. Asarnow and Edwards (1995) present a univariate analysis of bank loan default data on 831 commercial and industrial (C&I) loans and 89 structured loans[4] made by Citibank over 24 years and find an average recovery of 65% for C&I loans and 87% for structured loans. The higher recovery rate on structured loans reflects the fact that such loans are heavily collateralized and contain many restrictive covenants. Acharya et al. (2007) report recovery rates of 81.12% for bank loans, 59% for senior secured bonds, 56% for senior unsecured bonds, 34% for senior subordinated bonds, 27% for subordinated bonds, and 18% for junior subordinated bonds, respectively, for the period from 1982 to 1999.

Researchers have recently developed mathematical models that deal directly with recovery rates. Guo et al. (2009) extend the reduced-form approach to credit-risk modeling to explicitly model the recovery rate process in terms of the firm's assets and liabilities. Although risky debt is priced prior to default in existing models, Guo et al. (2009) present a regime-switching model and a jump diffusion process to quantify defaulted debt prices and realized recovery rates. Their recovery model differs from other reduced-form approaches by delivering a pricing formula for zero-coupon bond prices both before and after default, whereas other models price such debt instruments only at or before default.

Bakshi et al. (2006) provide a multifactor model of recovery rates. Their contributions are twofold: (1) credit spreads can be separated into default and recovery components and (2) recoveries as a fraction of the discounted par value fit a sample of BBB-rated bonds better than recoveries of face value. The former are found to reduce out-of-sample pricing errors.

Karoui (2007) also models recovery rates and derives pricing formulas for risky debt instruments. His model is more tractable than comparable models because recovery rates follow a discrete – rather than continuous – time process. He estimates the model using BBB and B Standard & Poor's yield indices and shows that the implied loss given default is approximately 27% for the BBB index and 74% for the B spreads.

Most early academic studies on credit risk assume that probabilities of default (PD) and recovery rates (RR) are uncorrelated (see, for example, Jarrow et al., 1997). There are reasons to doubt this assumption, however. For instance, research on credit rating transitions shows that recovery and default are each related to conditions external to the firm such as macroeconomic, industrial, geographic, and temporal factors. Altman (2009) notes that collateral values, which affect bond and loan recovery rates, decline as economic conditions deteriorate, whereas the number of defaults increases in a weak economy. Altman et al. (2005) report a significant negative relation between aggregate default rates and recovery rates on bonds over the period 1982–2002. They show that previous studies, which ignore this correlation, understate both expected and unexpected losses. Jokivoulle and Peura (2000), Hu and Perraudin (2002), and Das and Hanouna (2009) support Altman et al.'s (2005) findings.

Our paper differs from the existing literature on recovery rates in that we (1) use a direct measure of recoveries – discounted settlement rates from Moody's URD – rather than a trading price proxy, (2) focus on defaulted bank loans rather than a combination of bonds and loans, and (3) use a sample of loans originated by a variety of financial institutions to many companies rather than a sample of loans made by a single bank.

[1] A study by Zhang (2009) also uses the Moody's URD data.

[2] Frye (2000) attempts to explain the apparent doubling of loan loss severity over the period 1970–1999, but notes that the data required for loan defaults are not available. Instead, he fits his model to bond data.

[3] Emery (2007) defines *ultimate* recoveries as "the recovery values that creditors actually receive at the resolution to default". In Altman's (2009) literature review, "ultimate recovery rates refer to the nominal or discounted value of bonds or loans based on either the price of the security at the end of the reorganization period (usually Chapter 11) or the value of the package of cash or securities upon emergence from restructuring".

[4] Asarnow and Edwards (1995, p. 13) elaborate on the structured loans they study as follows: • The loans are very closely monitored – the bank directly controls the company's cash receipts and disbursements. • The loans are highly structured and contain many restrictive covenants. • The loans are highly collateralized, and lending is done on a formula basis, for example, having a pre-determined advance rate against customer receivables as collateral."