



Liquidity risk and expected corporate bond returns [☆]

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ABSTRACT

This paper studies the pricing of liquidity risk in the cross section of corporate bonds for the period from January 1994 to March 2009. The average return on bonds with high sensitivities to aggregate liquidity exceeds that for bonds with low sensitivities by about 4% annually. The positive relation between expected corporate bond returns and liquidity beta is robust to the effects of default and term betas, liquidity level, and other bond characteristics, as well as to different model specifications, test methodologies, and a variety of liquidity measures. The results suggest that liquidity risk is an important determinant of expected corporate bond returns.

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1. Introduction

Financial theory suggests that expected asset returns are related to systematic risk associated with common factors. In equilibrium, an asset whose returns are more sensitive to risk factors should offer higher returns to compensate investors for holding the asset. The literature has presented several stock market and term structure factors important for the cross section of asset returns (see, for example, Fama and French, 1992, 1993; Gebhardt, Hvidkjaer, and Swaminathan, 2005a). Recent studies have

further suggested liquidity as another good candidate for a priced state variable. Liquidity is often viewed as an important feature of the investment environment. All else equal, investors should require higher returns on assets whose returns have greater sensitivities to marketwide liquidity.

Pastor and Stambaugh (2003) investigate whether marketwide liquidity is a state variable important for pricing stocks. Their study focuses on a particular dimension of liquidity associated with temporary price fluctuations induced by order flow. They find that expected stock returns are positively related cross-sectionally to the sensitivities of returns to fluctuations in aggregate liquidity. Acharya and Pedersen (2005) develop a liquidity-adjusted capital asset pricing model (CAPM) under time-varying liquidity and demonstrate that the required return of an asset depends on expected liquidity and covariances of its returns and liquidity with market returns and liquidity. Empirical evidence shows that liquidity risk is important beyond the effects of market risk and the level of liquidity in the equity market.

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While both studies provide insight into the role of liquidity in equity pricing, neither examines the effect of liquidity risk on expected returns of corporate bonds. Pastor and Stambaugh (2003) suggest that “[i]t would also be useful to explore whether some form of systematic liquidity risk is priced in other financial markets, such as fixed income markets or international equity markets.” The corporate bond market is much less liquid than the equity market with most corporate bonds trading infrequently. Thus, the level of liquidity is a serious concern for participants in the corporate bond market. However, it remains unclear whether unanticipated shocks to aggregate liquidity translate into a significant premium for liquidity risk for corporate bonds.¹

Understanding how corporate bonds are priced is essential for developing a unified theory of asset pricing. The corporate bond market is a large sector of the US financial system with an outstanding issuance totaling more than \$5 trillion.² How financial markets price corporate bonds and what are the key determinants of required returns are issues of fundamental importance to academics and practitioners. For academics, exploring the role of liquidity risk in corporate bond pricing is a necessary step toward understanding the determinants of the cost of borrowing. For financial managers, knowledge of sensitivities of bond prices to liquidity and other risk factors aids in firms’ issuance decisions.

Our focus on liquidity risk in corporate bond pricing differentiates our work from previous studies that examine the effect of liquidity level or transaction cost on asset returns (see, for example, Amihud and Mendelson, 1986, 1991; Brennan and Subrahmanyam, 1996; Brennan, Chordia, and Subrahmanyam, 1998; Amihud, 2002).³ Chen, Lesmond, and Wei (2007) examine the cross-sectional relation between corporate yield spreads and liquidity. Using bond-specific liquidity measures as explanatory variables, they find that liquidity is priced in corporate bond yield spreads. That the level of liquidity can affect expected bond returns or yield spreads is not surprising because investors incur transaction cost, which lowers the bond value by reducing its cash flow. In this paper, we focus on the issue of whether expected corporate bond returns are significantly related to systematic liquidity risk in returns, as opposed to the level of liquidity. The liquidity risk investigated is not the risk that liquidity will be low when investors need to trade but that the bond’s value will drop when aggregate liquidity deteriorates. More specifically, this risk is determined by how a corporate bond’s return fluctuates in association with a state variable and not by how the bond’s liquidity fluctuates.

Corporate bonds provide fertile ground for studying the effect of liquidity risk relative to other variables on asset pricing because risk factors are easier to identify. Fama and French (1993) first show that default and term premia are important factors for corporate bond pricing, and Gebhardt, Hvidkjaer, and Swaminathan (2005b) confirm this finding. These studies have laid a solid foundation for the pricing model of corporate bonds. Built on these frameworks, we explore the effects of the liquidity factor and bond characteristics on corporate bond pricing. De Jong and Driessen (2007) find that corporate bond returns are sensitive to fluctuations in liquidity of the Treasury and equity markets. Beber, Brandt, and Kavajecz (2009) and Li, Wang, Wu, and He (2009) show that persistent liquidity shocks have pervasive impacts on government bond pricing. Our work complements these studies by examining the sensitivities of corporate bond returns to fluctuations in marketwide liquidity and assessing their importance in the pricing of corporate bonds.

This paper provides comprehensive empirical analysis on the effect of liquidity risk on expected corporate bond returns using an extensive transaction data sample. We consolidate transaction data sets from the Trade Reporting and Compliance Engine (TRACE) of the National Association of Securities Dealers (NASD) and National Association of Insurance Commissioners (NAIC). This results in a long-span, large data sample that permits estimation of reliable aggregate liquidity and systematic liquidity risk measures to conduct cross-sectional tests on corporate bond pricing more efficiently. We construct aggregate liquidity measures using the Amihud (2002) and Pastor and Stambaugh (2003) methods, which are two of the most widely used techniques for extracting the latent liquidity factor in the literature. Based on these liquidity measures, we examine the effect of liquidity risk on expected corporate bond returns using the regression approach of Fama and MacBeth (1973) and the portfolio-based approach, which can be dated back to Black, Jensen, and Scholes (1972). In regression analysis, we employ both the linear factor model and the extended Acharya and Pedersen model to assess the importance of liquidity risk relative to the effects of other risk factors, liquidity level, and bond characteristics on expected corporate bond returns. In portfolio-based analysis, we create portfolios whose liquidity betas are sufficiently disperse to examine the cross-sectional variation in corporate bond returns related to liquidity beta.

Empirical evidence from both analyses strongly suggests that the liquidity risk factor is priced in corporate bond returns. We find significant monotonic variations in returns of beta-sorted portfolios related to liquidity risk, which are independent of the effects of default and term betas and ratings. The average return on bonds with high sensitivities to innovations in aggregate liquidity exceeds that for bonds with low sensitivities by about 4% annually. A significant positive relation exists between expected corporate bond returns and liquidity beta in the cross-sectional regression. A one standard deviation of Pastor and Stambaugh liquidity beta above the cross-sectional mean is associated with a return increase of 97 basis

¹ Assets with low liquidity tend to have high liquidity risk. This is especially the case if drops in market liquidity cause investors to flee to more liquid assets.

² See the *Global Financial Stability Report* of the International Monetary Fund (IMF), October 2008.

³ Also, Chordia, Roll, and Subrahmanyam (2000, 2001) and Hasbrouck and Seppi (2001) find commonality in liquidity. Chordia, Subrahmanyam, and Anshuman (2001) uncover a significant cross-sectional relation between equity returns and liquidity variability.

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