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Idiosyncratic volatility vs. liquidity? Evidence from the US corporate bond market

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ABSTRACT

Our objective in this paper is to determine empirically the extent to which fixed-income investors are concerned about the relative effects of equity volatility and bond liquidity in the cross-section of corporate bond spreads. Our tests reveal that while both volatility and liquidity effects are significant, volatility, representing ex-ante credit shock, has the first-order impact, and liquidity represented by bond characteristics and price impact measure has the secondary impact on bond spreads. Conditional analysis further reveals that distressed bonds and distress regimes are both associated with significantly higher impact of volatility and liquidity shocks. However, the relative impact of these effects varies conditional on the underlying bond attributes and overall market conditions.

1. Introduction

Our objective in this paper is to study the relative impact of idiosyncratic volatility and liquidity on corporate yield spreads (i.e., excess of bond yields over equal maturity benchmark yields) cross-sectionally, and empirically disentangle both the effects. Overall we find that both volatility and liquidity matter separately for the cross-section of bond yields, with the relative importance of volatility and liquidity changing with firm-specific and economic conditions.

Idiosyncratic equity volatility refers to the firm-specific risk after controlling for systematic market risk factors, and *reflects* the residual stock volatility of a firm. In their influential paper, Campbell and Taksler (2003) show that idiosyncratic equity volatility has a significant role in explaining corporate

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bond spreads even after conditioning for ratings, bond and firm-specific characteristics and macroeconomic variables.[2,3] While idiosyncratic equity volatility captures ex-ante default risk, other studies reveal that credit risk determinants *alone* cannot adequately explain the levels or changes in the corporate bond spreads (e.g., Collin-Dufresne et al., 2001; Huang and Huang, 2003). If non-default sources of risk such as illiquidity matter in bond spreads, then by ignoring liquidity, structural models can overprice bonds, resulting in the so-called "credit puzzle" (Covitz and Downing, 2007; Driessen, 2005).[4]

While corporate debt constitutes a significant proportion of capital structure of firms, the underlying bond market remains highly illiquid.[5] Extant work documents the significant effect of illiquidity on bond prices (e.g., Longstaff et al., 2005; Driessen, 2005; and Chen et al., 2007).[6] If individual bond liquidity matters, and is not controlled for, then volatility effects on bond spreads as documented in Campbell and Taksler may be difficult to interpret.[7] While higher idiosyncratic equity volatility can imply higher ex-ante credit risk and bond spreads, it is not obvious from the Campbell and Taksler results whether higher spreads are attributable to higher equity volatility, lower bond liquidity, or both.

In this paper, we extend Campbell and Taksler (2003) by conditioning for underlying bond liquidity, and exploring the relative contribution of equity volatility and bond liquidity in the cross-sectional pricing of corporate bond spreads. We tease out the volatility impact from the liquidity effects, and examine whether idiosyncratic risk subsumes the information in liquidity in explaining corporate bond prices. We explore the roles of volatility and liquidity on *cross-sectional* bond prices unconditionally, as well as conditional on several underlying *distress features*. High-distress issues are defined as bonds with low ratings, low liquidity, or high underlying equity volatility. High-distress periods refer to low-growth or recessionary periods, and periods of high aggregate equity market volatility or low aggregate bond market liquidity in the economy.

We employ over 195,000 secondary trades of option-free corporate bonds issued by 818 firms over an 11-year period, 1994–2004. We measure idiosyncratic equity volatility as the variance of multifactor risk-adjusted residual returns, and quantify bond liquidity in terms of price impact of bond trades as well as several underlying bond characteristics.[8] Our work is unique in that it focuses on a large sample of corporate bonds over an extended period, uses an exhaustive list of volatility and liquidity variables, and provides a comprehensive study of the volatility and liquidity effects in cross-sectional bond pricing.[9]

[2] An increase in idiosyncratic equity volatility increases the ex-ante probability of firm default, thereby depressing corporate bond prices and inflating bond spreads (Merton, 1974). Equivalently, a lower stock price causes higher volatility due to leverage (Black, 1976) and volatility feedback (Bekaert and Wu, 2000) effects, and implies higher default intensity and bond spreads (Das and Sundaram, 2007). In fact, the KMVMoody's model employs the distance-to-default (DTD), expressed as a function of firm-value volatility, to measure the implied credit risk of a firm.

[3] In Merton's model, the volatility that is relevant for option value and hence value of corporate debt is the total firm volatility that includes both idiosyncratic and systematic (or market-wide) volatility. However, as Campbell et al. (2001) point out, while idiosyncratic volatility has trended upwards since the mid-1970s, market-wide volatility has undergone temporary fluctuations but no definite trend increase. Hence, following Campbell and Taksler, (2003), we use idiosyncratic stock volatility as a proxy for total firm or asset volatility.

[4] Liquidity reflects the ability to trade large quantities of a security quickly (and at a price close to its value in frictionless markets) with minimal trading costs and little price impact.

[5] For example, Henderson et al. (2006) report that convertible and non-convertible debt together account for 83% (90%) of domestic (international) capital raised by firms during 1990–2001. Edwards et al. (2007) however reveal that the median corporate bond on the Trade Reporting and Compliance Engine (TRACE) system trades on only 48% of all days during 2003–2005 period.

[6] Lack of liquidity impacts bond spreads in many ways. Lack of liquidity imposes search costs, thereby inhibiting the frequency of trading and increasing the hedging risk for bond investors. As a result, investors demand an additional ex-ante liquidity risk premium and therefore higher bond spreads (Lo et al., 2004). Higher adverse selection and/or inventory control costs lead to wider bid-ask spreads, and hence higher required rates of return (Brennan and Subrahmanyam, 1996). Moreover, renegotiation during financial distress and hence underlying bond spreads can be influenced by the illiquidity in the distressed debt market (Ericsson and Renault, 2006).

[7] Campbell and Taksler (2003) employ an aggregate liquidity variable called TED spread, defined as 30-day Eurodollar yield *minus* Treasury yield, in lieu of individual bond liquidity measures; this makes it hard to decipher the individual contribution of *firm-specific* liquidity effects on bond spreads.

[8] Though bond volatility too can impact bond spreads, low trading frequency in corporate bonds precludes us from constructing a meaningful proxy for bond market volatility.

[9] For comparison, Longstaff et al. (2005) use data for 68 firms from 03/2001 to 10/2002, Driessen (2005) considers data for 104 firms from 02/1991 to 02/2000, and Chen et al. (2007) employ data for 4000 corporate bonds during 1995–2003.