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Suppliers' and customers' information asymmetry and corporate bond yield spreads

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ABSTRACT

This study investigates the information asymmetry effects of suppliers and customers on a firm's bond yield spreads by employing American bond market data from 2001 to 2008. This study finds that both suppliers' and customers' information asymmetry effects significantly explain a firm's bond yield spreads. Besides, the information asymmetry effects of more important suppliers and customers are more significant than those of less important ones. The results are robust even after controlling for other well-known firm specific and economic variables.

1. Introduction

The recent global financial crisis reveals that supplier/customer relationship magnifies the domino effects of firms' default risk and liquidity crunch among business counterparties because business relationship provides a connection for transmitting a firm's risks to its business counterparties. The risks transmitted through a firm and its suppliers and customers are the variations of inventory flows, cash flows and information flows. The inventory and cash flows occur between a firm and its suppliers and customers whenever they have business transactions and constitute the main components of a firm's working capital which is related to a firm's trade credit policy, inventory policy and customers' demand uncertainty (Merville and Tavis, 1973; Tsai, 2008; Hill et al., 2010). These two flows are mainly driven by market conditions as well as firm-specific characteristics. The information asymmetry (later denoted as IA) of a firm's suppliers and customers augments the uncertainty (variation) of inventory flow (Blinder, 1986; West, 1986; Kahn, 1987),[1] and in turn affects the variations of the firm's cash flow and operating performance (Porter, 1979; Chopra and Meindl, 2001; Tsai, 2008). As a result, the IA of a firm's business counterparties materially affects its asset value distribution and therefore its credit quality. Few existing studies consider the suppliers' and customers' IA effects on a firm's credit risk (measured by bond yield spreads). Lu et al. (2010) find that a firm's IA plays a significant role in determining its bond yield spreads.[2] Other studies discuss the wealth effects of financial distress between a firm and its suppliers and customers. They investigate the effects of bankruptcy announcements on the equity values of a bankrupt firm's competitors (Lang and Stulz, 1992), customers, and suppliers (Hertzel et al., 2008). Kale and Shahrur (2007) explore the relationship between corporate capital structure and the characteristics of suppliers and customers without investigating the issues of credit risk.[3] To address this issue, the current study empirically examines whether or not business counterparties' (suppliers' and customers') IA significantly influences a firm's bond yield spreads when controlling for well-known variables affecting corporate bond yield spreads, such as the

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[1] Blinder (1986) and West (1986) document that inventory behaviors include the excess volatility of production phenomenon. Kahn (1987) also presents the production counter-smoothing hypothesis to explain the stylized fact associated with inventory behavior that the variance of production exceeds the variance of sales with demand uncertainty.

[2] Duffie and Lando (2001) and Yu (2005) demonstrate that incomplete accounting information significantly explains the bond yield spreads.

[3] Kale and Shahrur (2007) find that a firm's leverage is positively related to the concentration levels in its supplier and customer industries. Additionally, firms dealing with R&D-intensive suppliers (customers) and firms with high intensities of strategic alliances and joint ventures with suppliers (customers) choose lower leverage.

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firm's own leverage ratio, equity volatility, maturity, coupon, issuance amount, credit rating, R&D intensity, and firm size.

Literature also shows that the variations of suppliers' and customers' flows (inventory flow, cash flow and information flow) have salient influence on a firm's inventory behavior (Kahn, 1987) and cash flow (Tsai, 2008). More specifically, if a firm's suppliers have a higher degree of IA, the firm faces higher uncertainty in the supply of production inputs or inventory and higher uncertainty in the costs of both production and goods sold, which affect not only the firm's inventory behavior but also the firm's cash outflows (Blinder, 1986; West, 1986; Kahn, 1987). Besides, if a firm's customers have a higher degree of IA, the firm encounters higher uncertainty in the customers' demand (or sales) and higher uncertainty in the collection of account receivables, which affect the firm's trade credit policy (Smith, 1987; Lee and Stowe, 1993; Pike et al., 2005), operating performance and cash inflows (Tsai, 2008). These lead to the deduction that the variations of business counterparties' operating performance influence a firm's asset value distribution and hence its credit risk (and also its bond yield spreads) (Merton, 1974; Duffie and Lando, 2001).

The current research uses American bond market data from 2001 to 2008 to examine the suppliers' and customers' IA effects on a firm's bond yield spreads. The sample covers 57,457 monthly bond observations (among them, 24,745 with supplier identifications, 15,965 with customer identifications and 6151 with both supplier and customer identifications). This paper uses the structural credit model framework of Merton (1974) and Duffie and Lando (2001) to assess and test the hypotheses that the IA of a firm's suppliers and customers positively relates to its credit risk and bond yield spreads. Similar to Lu et al. (2010), Chen et al. (2011), and Akins et al. (2012), the current study uses the probability of information-based trading estimated by an extended PIN model (ADJPIN) (Duarte and Young, 2009)[4] as a market-based proxy for the degree of a firm's IA. The proxy for the information asymmetry between a firm and its business counterparties assumes that the relation between a firm and its business counterparties is similar to that between informed and uninformed investors of an asset. Higher IA of a firm's business counterparties causes the firm to face higher information uncertainty which increases the firm's credit risk.

Empirical results of this study show that both suppliers' and customers' IA play an important role in explaining a firm's bond yield spreads. When controlling for the firm's suppliers'/customers' sizes and R&D intensities, the firm's own leverage ratio, equity volatility, firm size, R&D intensity, credit rating, and other well-known spread determinant variables, the influence of suppliers' (customers') IA on bond yield spreads is higher than (approximately equal to) that of credit rating. In addition, the IA effects of more important suppliers/customers are more economically significant than those of less important ones.

The remainder of this paper is organized as follows. Section 2 introduces the concept of information asymmetry and the main proxy proposed by Duarte and Young (2009). Section 3 presents the hypotheses. Section 4 summarizes major variables used in the empirical examinations. Section 5 presents and analyzes empirical results. Finally, Section 6 offers concluding remarks.

2. Information flow risk proxy: information asymmetry

Due to unequal information sets held by business counterparties, information flow is an important mechanism for the coordination in a business relationship. However, a perfect information sharing is not easy to achieve in practice because a firm usually can benefit more if it has information advantages over its business counterparties. This study employs a firm's IA to describe the unequal information held by the firm and its business counterparties. A firm and its business counterparties may have different degrees of IA. A firm with a higher IA level than its business counterparties has information advantages in the business relationship. The IA proxy used in this study is the informed trading probability in trading processes extracted from stock market order flow data. A firm with lower IA should have less informed trades of equity shares if it is listed in a liquid exchange.

2.1. The proxy for information asymmetry of business counterparties

Although IA plays a significant role in the fundamental value risks of business counterparties, the degree of IA is not directly observable. The first market measure for IA is the probability of information-based trading (PIN) developed by Easley et al. (1996).[5]

This study employs the extended PIN model, as shown in Eq. (1), developed by Duarte and Young (2009) which more precisely measures the degree of IA than the original PIN model. The extended PIN model differs from the original PIN model in two ways. First, the extended PIN model has additional branches for days in which both buys and sells increase (i.e. the symmetric order flow shocks, Δ_b and Δ_s for buys and sells in Eq. (1), respectively). These days happen with probability θ' when private information arrives and with probability θ in the absence of private information. Second, the number of buyer-initiated informed trades (denoted as u_b) has a different distribution than the number of seller-initiated trades (denoted as u_s). Due to the two differences, Duarte and Young (2009) decompose the original PIN into two components, one related to IA, and the other related to illiquidity. Eq. (1) calculates the ratio of expected informed orders to the total expected order flow. In Eq. (1), the a is the probability that a private information event occurs on a given day and the d indicates the conditional probability that a positive private information event occurs; analogously, $1 - d$ indicates the conditional probability that a negative private information event happens. In addition, buys arrive at a rate of ε_b and sells arrive at a rate of ε_s when there is no private information.[6]

$$ADJPIN = \frac{a \times (d \times u_b + (1-d) \times u_s)}{a \times (d \times u_b + (1-d) \times u_s) + (\Delta_b + \Delta_s) \times (a \times \theta' + (1-a) \times \theta) + \varepsilon_s + \varepsilon_b} \qquad (1)$$

2.2. Estimation methods of the above proxies

Generating the IA proxy (ADJPIN) needs data of the number of buyer- and seller-initiated trades for each firm-day. The intraday data is obtained from the NYSE Trade and Quote (TAQ) database for computing the number of buyer- and seller-initiated trades for each day. The selection criteria of trades and quotes follow

[4] Duarte and Young (2009) decompose the original PIN of Easley et al. (1996) into two components, an information asymmetry component (ADJPIN) and a liquidity component. Therefore, ADJPIN should be a more accurate surrogate for information asymmetry than PIN.

[5] The PIN is extracted from an asset's "bid and ask" trading prices. The equation below calculates the PIN value, which is the probability of an information-based trade. It indicates that the probability of an informed trade is the ratio of expected informed orders to the total expected order flow. $PIN = \frac{a \times u}{a \times u + \varepsilon_s + \varepsilon_b}$. Where a is the probability that a private information event occurs on a given day and u indicates trades are conditional on the occurrence of a private information event. When there is no private information, buys arrive at a rate of ε_b and sells arrive at a rate of ε_s.

[6] The PIN and ADJPIN models both identify the arrival of private information during abnormal order flow imbalances. However, abnormal order flow imbalances may be not the result of informed trades, and may only reflect liquidity shocks or inventory concerns (Grossman and Miller, 1988). To partially reflect the non-informed trade causes of abnormal order flow imbalances, the extended PIN model also considers the probability of a symmetric order flow shock (PSOS) as shown below. The PSOS is the probability that a given trade will come from a shock to the order flows of both buys and sells. Duarte and Young (2009) view this PSOS as a component of PIN related to the illiquidity effect. $PSOS = \frac{(\Delta_b + \Delta_s) \times (a \times \theta' + (1-a) \times \theta)}{a \times (d \times u_b + (1-d) \times u_s) + (\Delta_b + \Delta_s) \times (a \times \theta' + (1-a) \times \theta) + \varepsilon_s + \varepsilon_b}$