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Risk-shifting, equity risk, and the distress puzzle

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ABSTRACT

Higher default probabilities are associated with lower future stock returns. The anomaly cannot be explained by strategic shareholder actions, traditional risk factors, characteristics, or mispricing, but, instead, is consistent with a risk-shifting hypothesis. Consistent with the risk-shifting hypothesis, we find that distressed firms tend to overinvest, destroy value, and exhaust their cash flows. Effects are concentrated in firms with wide credit spreads, firms with no convertible debt, and in cases where CEOs receive above-average equity-based compensation. As default risk rises, credit spreads rise, equity betas fall, and equity returns fall.

1. Introduction

Financial distress risk is commonly cited as an underlying cause of several stock return anomalies. In a rational market, investors should demand higher premiums for holding stocks with higher distress risk. However, studies show returns are lower for firms with high distress risk (Griffin and Lemmon (2002) and Campbell et al. (2008)). Behavioral explanations of the "distress risk puzzle" focus on market mispricing — investors underestimate the implications of high distress risk, and, consequently, fail to demand appropriate risk premiums.

In contrast, the distress risk anomaly might be explained by more complex mechanisms related to the agency theory of debt. In particular, Jensen and Meckling's (1976) offer a risk-shifting hypothesis in which managers of financially distressed firms maximize the limited liability option of shareholders by accepting excessive risk, whereby distressed firms invest in risk-increasing projects offering improbable high pay-offs at the expense of bondholders. Distressed firms generally have abnormally large leverage ratios and proportions of equity that are small relative to their capital structure. Shareholders are likely to lose as high interest payments detract from cash flows. Even trivial shocks to a firm's cash flows may result in default. In these situations, shareholders have little to lose, and, therefore, prefer management to accept risky projects. When these projects are successful, shareholders repay the bondholders and retain the surplus. Conversely, when these projects fail, shareholder downside risks are limited to their stake in the firm upon bankruptcy. As a result, risky projects undertaken by distressed firms lead to a transfer of risk from shareholders to bondholders.

Prior literature related to risk-shifting behavior predominately focuses on the mechanisms that may reduce agency conflicts from a theoretical standpoint.[1] There is very little empirical evidence whether the problem actually exists. Gilje (2016) finds that firms reduce investment risk as they approach financial distress, disputing the risk-shifting hypothesis. Diamond (1989) and Hirshleifer and Thakor (1992) suggest that managers may avoid risk shifting behavior due to reputational concerns. Similarly,

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[1] Theoretical work related to the risk shifting hypothesis includes: Smith and Warner (1979), Barnea et al. (1980, 1981), Green (1984), and John and John (1993).

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Almeida et al. (2012) suggest risk-shifting behavior could be trumped by concerns regarding the ability to fund future projects. Hernández-Lagos et al. (2017) conduct experiments that provide evidence of both risk-shifting behavior and reputational concerns. These studies add to our understanding of risk-shifting behavior – but offer conflicting evidence. We add to the literature by investigating the relationship between risk-shifting behavior and distress risk.

Previous studies relate risk-shifting behavior with liquidation costs. Specifically, risk-shifting behavior is more likely when shareholder advantages and bargaining powers inflate liquidation costs for distressed firms. Alderson and Betker (1996) provide direct estimates of liquidation costs for a sample of bankrupt firms and study their association with a number of commonly used proxies. They conclude that fixed assets, market-to-book ratio, and R&D expenses are the best variables to use to proxy for liquidation costs. Similarly, Garlappi et al. (2008) and Garlappi and Yan (2011) contend that strategic actions by shareholders during distressed firm debt renegotiation might explain the distress puzzle. In particular, Garlappi et al. (2008) argue default probabilities for distressed firms do not adequately capture equity risks associated with default, especially for firms with strong shareholder advantage. The authors define shareholder advantage as shareholders' capacities to take advantage of other claimholders. Shareholder advantage is proxied by asset size, R&D intensity, and liquidation cost, and is expected to be high for large firms with lower R&D costs and higher liquidation costs (proxied by asset specificity variables such as the Herfindahl industry concentration index and the Berger et al. (1996) asset tangibility measure). Garlappi et al. (2008) show that shareholders actions can reduce the effective leverage of equity such that, when default probability is high, equity risk and expected returns are lower for firms with greater shareholder advantage.

In their study of risk-shifting behavior, Davydenko and Strebulaev (2007) examine shareholder bargaining powers. Bargaining power is higher for more obscure firms that are not followed by credit rating agencies, do not have convertible debt, and firms in which the CEO holds equity. Notably, the authors show standard proxies for risk-shifting behavior explain very little of the cross-sectional variation of corporate bond prices.

We find distress risk is a robust and negative predictor of future stock returns even after controlling for the effects of strategic shareholder actions. The negative relation is not concentrated in the post-1980s period, is not sample specific, and is not due to different proxies for distress risk. The relation is less likely caused by mispricing issues, as event-time analyses show persistent underperformance patterns and lower equity returns for high default risk firms. Our analysis demonstrates that the distress effect cannot be explained by strategic shareholder actions, traditional risk factors, stock characteristics, or mispricing.

Our results are consistent with a risk-shifting hypothesis. Three major findings support this claim. First, high default firms overinvest, earn low profits, and exhaust their cash flow. These effects are concentrated in low-growth-opportunity firms and in hard-to-value firms. Second, distress effects are concentrated in firms without a credit rating or convertible debt and in firms where CEOs hold equity, all of which are consistent with effects of strategic actions of shareholders. Third, high distress firms tend to exhibit higher credit spreads, lower equity betas, and lower stock returns, even after controlling for stock and bond characteristics and shareholder strategic action effects.

2. Data and estimation

We use Center for Research in Securities Prices (CRSP) daily and monthly stock files and COMPUSTAT quarterly and annual research files of firms listed on NYSE, AMEX, and NASDAQ. Unless otherwise noted, the sample period ranges from January 1971 to December 2014. As noted in Campbell et al. (2008), bankruptcies were extremely infrequent until the late 1960s. We eliminate financial and utility companies, as these firms have restricted capital structures. Many studies remove stocks with prices of less than $5 to reduce market microstructure issues, but low-priced stocks tend to have much higher default probabilities. Therefore, to reduce effects of liquidity and other market microstructure complications yet maintain otherwise legitimate high risk observations, we only exclude stocks with prices less than $1. To be included in the analysis, firms are required to have at least 36 monthly observations. We conduct our analysis with quarterly accounting data from COMPUSTAT and monthly stock market data from CRSP.

We use corporate bond yield data for July 2002 to December 2014 drawn from the TRACE (Trade Reporting and Compliance Engine) database. These data include FINRA over-the-counter (OTC) corporate bond market real-time prices, as well as details on all eligible corporate bonds including investment grade, high yield, and convertible debt. TRACE represents 100% of OTC activity and over 99% of total U.S. corporate bond market activity. We also use ExecuComp data on executive stock and option holdings and on CEO characteristics.

2.1. Default probability

We use the default probability measure presented in Campbell et al. (2008). Following their methods, we combine quarterly accounting data from COMPUSTAT with monthly stock market data from CRSP by lagging two months in the accounting data. We estimate time-varying distress probabilities (*DP*) using the Campbell et al. (2008) "best" model:

$$DP_{i,t} = P_{i,t}\left(Y_{i,t} = 1\right) = \frac{1}{1 + \exp\left(-z_{i,t}\right)} \tag{1}$$

where

$$\begin{aligned} z_{i,t} = {} & -9.08 - 29.67 NIMTAAVG_{i,t} + 3.36 TLMTA_{i,t} - 7.35 EXRETAVG_{i,t} + 1.48 SIGMA_{i,t} \\ & + 0.082 RSIZE_{i,t} - 2.40 CASHMTA_{i,t} + 0.054 MB_{i,t} - 0.937 PRICE_{i,t} \end{aligned} \tag{2}$$