Finance Research Letters 7 (2010) 232–237

Contents lists available at ScienceDirect

Finance Research Letters

journal homepage: www.elsevier.com/locate/frl

Risk-shifting and investment asymmetry

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ARTICLE INFO

Article history:
Received 9 December 2009
Accepted 28 May 2010
Available online 4 June 2010

JEL classifications:
G11
G31
G32
G33

Keywords:
Risk-shifting
Investment

ABSTRACT

I show that when shareholders can change not only the variance of the future firm value, but also its asymmetry, they can shift costly risk to bondholders while *lowering* the firm risk, and more importantly, the equity risk and the probability of bankruptcy. The implication of this result is that risk-shifting behavior can be more beneficial to shareholders than currently perceived in the literature.

1. Introduction

The risk-shifting (asset substitution) problem introduced by Jensen and Meckling (1976) suggests that shareholders can transfer wealth from bondholders by engaging in risky projects. This agency problem has attracted a great deal of interest in the literature, mainly in attempting to identify ways to mitigate the problem, and to assess its magnitude.

The common assumption in analyses of risk-shifting is that in order to transfer wealth from bondholders, the shareholders must increase the risk of the firm's total assets. As a result of the higher firm risk, the risk of the equity also rises, and the probability of bankruptcy either increases or remains the same, but cannot decrease. Thus the extra risk the shareholders must bear when engaging in risk-shifting behavior, as well as the costs associated with a potentially higher bankruptcy risk, may significantly reduce or even offset the benefits of the wealth transfer.

In this paper, I argue that if shareholders can change not only the variance of the future firm value, but also its asymmetry, they can shift costly risk to bondholders while *lowering* the firm risk, and more importantly, the equity risk and the bankruptcy risk. To see the intuition of this argument consider a

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doi:10.1016/j.frl.2010.05.005

project with low likelihood to exhibit a dramatic failure, and high likelihood to gain a moderate success (i.e., a negatively skewed payoff distribution). Accepting such a project can reduce the firm risk, as well as the equity risk, due to the heavy concentration of possible positive outcomes in a fairly narrow range; it also reduces the bankruptcy risk due to the low likelihood that the project will fail; but at the same time it imposes higher risk on the bondholders who will bear large costs in case of failure. Using a standard two-date setup, I show that when investments with non-symmetric payoffs are available, shareholders can shift costly risk to bondholders while decreasing both the equity risk and the default risk, and moreover, that this form of risk-shifting is not driven by specific scenarios and can be very feasible to shareholders.

It is important to note that negatively skewed investment opportunities are rather common in financial markets, and thus allow shareholders to exercise the non-symmetric form of risk-shifting analyzed in this study. For example, there is strong evidence that aggregate stock returns exhibit negative skewness, both in the US (see, e.g., Glosten et al., 1993; David, 1997; Harvey and Siddique, 1999; Hong and Stein, 2003) and in most developed countries (see, e.g., Das and Uppal, 2004; Poon et al., 2004). Another example is the distribution of changes in exchange rates, which are typically skewed to the left (see, e.g., Hsieh, 1989; Hausmann et al., 2006).

The paper contributes to the corporate finance literature by identifying an investment strategy that allows shareholders to enjoy the traditional risk-shifting benefits, without bearing any costs associated with additional equity risk and typically a higher probability of bankruptcy. This suggests therefore that the well-documented risk-shifting problem may be more severe than it is perceived in the literature.

2. Risk-shifting and payoff distributions

Since Jensen and Meckling (1976) uncovered the shareholders' incentive to engage in risk-shifting behavior to transfer wealth from bondholders, many studies have attempted to identify ways to mitigate this agency problem. These include debt covenants (Smith and Warner, 1979), debt maturity (Barnea et al., 1980), convertible debt (Green, 1984), and managerial compensation (Brander and Poitevin, 1992; John and John, 1993). Other studies have tried to assess the magnitude of the risk-shifting problem, using theoretical frameworks (Leland, 1998; Ericsson, 2000), simulation techniques (Parrino and Weisbach, 1999), managerial surveys (De Jong and Van Dijk, 2001; Graham and Harvey, 2001), and empirical evidence (Eisdorfer, 2008).

These analyses and others assume that in order to shift risk to the bondholders, the shareholders must increase the risk of the firm's total assets, and thereby the risk of the equity and the probability of bankruptcy. The common ways assumed in the literature to increase firm risk is changing only the variance of a given distribution (see, for example, Jensen and Meckling, 1976; Eisdorfer, 2008) and switching from a safe project to a risky one (see, for example, John and John, 1993). Although some of the risk-shifting studies allow the investment's payoffs to follow an asymmetric distribution, no study has directly addressed the effect of payoff asymmetry on the risk of the firm's claims.

I show first that if only symmetric payoff distributions are available, shifting risk to bondholder can be achieved only by increasing the firm risk, and thereby the equity risk, where the probability of bankruptcy either rise or does not change; all are well-known consequences of the standard risk-shifting problem. I then show that if the shareholders can change the asymmetry of the payoffs, they can shift costly risk to the bondholders while lowering the firm risk, the equity risk, and the bankruptcy risk.

2.1. Standard risk-shifting assuming symmetric payoffs

Consider a standard two-date setup. Let V be the expected value of the firm at date 0, reflecting two possible realizations of firm value at date 1: $V - \frac{\delta}{2}$ and $V + \frac{\delta}{2}$ with equal probability. The firm's capital structure includes common equity and debt, with a face value of $F \leqslant V$, that matures at date 1. For simplicity, assume no taxes, no bankruptcy costs, and that the risk-free rate is zero. At date 0, the value-maximizing shareholders control the firm risk using the parameter δ. At date 1 the firm value is realized, and the firm is liquidated.