



Corporate hedging versus risk-shifting in financially constrained firms: The time-horizon matters!

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ABSTRACT

The paper presents an intertemporal theory of the optimal risk policy in shareholder-managed firms, which face future financing constraints and act under moral hazard as well as limited liability. Our model provides an integrated framework that overcomes the dilemma of “conflicting motives” of risk-shifting (Jensen and Meckling, 1976) on the one hand and corporate hedging (Smith and Stulz, 1985) on the other hand by considering time-effects. Shareholders face a trade-off between a risk-shifting incentive if the investment horizon is short, and a hedging incentive that becomes dominant if the investment horizon is sufficiently long. Within an infinite-time investment horizon, Jensen and Meckling's risk incentive problem can be fully solved as permanent hedging is optimal except for firms in financial distress, which constantly opt for risk-shifting. We further show that the value of corporate hedging increases if financing constraints become more severe. Our results suggest that life-cycle features play a significant role in the firm's propensity to hedge. They also coincide with existing empirical evidence, which shows that only highly leveraged firms facing financial distress will primarily opt for risk-shifting.

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1. Introduction: The dilemma of “conflicting motives”

The optimal design of corporate risk policies in shareholder-managed firms is still a puzzling topic in modern corporate finance. In practice, many firms make extensive use of hedging instruments like futures, options, and swaps (e.g., Guay and Kothari, 2003), but there is also recent evidence of the opposite behavior of risk-shifting, especially in firms that are operating near bankruptcy (Eisdorfer, 2008). The objective of our analysis is to provide new arguments why those contrary types of corporate risk management are not inconsistent, but constitute two sides of the same coin called rational firm behavior.

In this paper, we show that the dilemma of “conflicting motives” (Rauh, 2009, p. 2487) can be overcome if corporate risk management is analyzed within an intertemporal context that explicitly takes time effects into account. As a distinguishing feature from the separate, and one-period, settings of either risk-shifting or corporate hedging in the prevalent literature (e.g., Jensen and Meckling, 1976; Smith and Stulz, 1985), we provide an integrated model of *both* hedging *and* risk-shifting motives that yields the optimal design of corporate risk policies *over time*. This allows to elaborate how rational shareholders should balance their temptation of short-term risk-shifting against positive long-term effects of corporate hedging, such as stabilizing business returns over time. In particular, our main finding is that shareholders of firms facing financial constraints after default exhibit a natural hedging motive in the long-run, while their option like payoff prescribes a preference for risk-shifting in the short-run.

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Financial theory has offered some well-known academic explanations for “conflicting motives” in corporate risk management. On the one hand, risky debt financing engenders Jensen and Meckling’s (1976) risk-shifting (or asset substitution) story, by which shareholders’ convex payoff provokes them to increase risk as soon as the firm becomes more leveraged. In the sequel of Jensen and Meckling’s seminal paper, numerous incentive compatible designs have been developed that might ameliorate the risk-shifting problem; financing with convertible debt (Green, 1984), including collateral (Bester, 1987), or employing the positive effects of joint liability lending (Ahlin and Townsend, 2007) are prominent examples of that large body of literature. On the contrary, extensive effort has been devoted to understand why shareholder-managed firms, notwithstanding Jensen and Meckling’s incentive to risk-shift, should hedge. Most of these contributions have been inspired by Smith and Stulz’ (1985) idea¹ of incorporating some nonlinear and convex external costs as, for example, costs of progressive taxation, costs of external funding, or costs of financial distress (e.g., Graham and Smith, 1999; Froot et al., 1993; Stulz, 1996). As reducing volatility decreases the value of those convex costs, the shareholders’ residual claim may benefit from hedging. Empirical support for Smith and Stulz’ corporate hedging model, however, is “limited and mixed” (MacKay and Moeller, 2007, p. 1379) and also Jensen and Meckling’s risk incentive problem shows, with the exception of firms in financial distress as in Eisdorfer (2008), “little direct evidence in practice” (Almeida et al. 2011–this issue, p. 2).

Altogether, neither do the predictions on the relative importance of these “conflicting motives” appear clear-cut, nor is an integrated analysis of risk-shifting and corporate hedging in the focus of research in corporate finance. In a recent study, Purnanandam (2008) provides a first attempt to address those issues. That model provides an interesting link between the “conflicting motives” by separating the final state of default from an intermediate state called financial distress. Similar to the approach developed here, there is a trade-off between risk-shifting and corporate hedging in Purnanandam’s model; however, and more restrictive than this paper, shareholders can decide on risk only at a single point of time, so the model does not allow to determine the optimal sequel of corporate risk decisions over time.

Besides Purnanandam (2008), attention to the dilemma of “conflicting motives” is sparse. A few authors provide a rather general enumeration of “costs and benefits” of corporate risk management, or are restricted to contrary incentives in the risk policy of corporate pension plans from an empirical point of view (e.g., Fatemi and Luft, 2002; Rauh, 2009). Other authors contend that hedging, financing, and investment decisions are jointly intertwined, but do not explicitly address possible trade-offs between the “conflicting motives” as we do (e.g., Lin et al., 2008; Leland, 1998; Morellec and Smith, 2007, among others). Related to this paper is Almeida et al. 2011–this issue who argue in the spirit of Froot et al.’s (1993) idea to align corporate investment with financing policies and show that future financing constraints can offset a firm’s incentive to risk-shift. However, their analysis is based on additional convexity assumptions governing the shape of deadweight costs. Also, and similar to Purnanandam (2008), Almeida et al. 2011–this issue cannot look at genuine time-effects as their model is again restricted to a fixed two-period investment horizon. Finally, in Panageas (2010) “conflicting motives” gained fresh attention from the adjacent issue of financial crises and regulation in the banking industry. If outside stakeholders have an incentive to bail out firms as bankruptcy looms, bank shareholders face a risk-shifting incentive in order to exploit the implicit protection; however, they will balance that temptation against the stakeholders’ threat to withdraw their guarantee if shareholders increase risk too much.

Our analysis adds to previous work in several ways. First, we contribute to hedging models belonging to Smith and Stulz’ (1985) external costs approach. While virtually all these proposals are one-period models, we submit a genuine *intertemporal* theory of corporate risk management, which allows to identify the length of the firm’s investment horizon as a crucial parameter of the firm’s hedging policy and thus goes beyond the single-period models developed so far. Hereat, our approach does *not* rely on the common assumption of convex external costs that “make the firm’s payoff a concave function of some state-contingent variable” (Spano, 2004, p. 176). Instead we consider, as a rather “intuitive” type of financial constraint, the firm’s possible cut-off from the debt market after default and show that this financial constraint provides a robust rationale for corporate hedging, without presuming any cost convexities and the ambiguities that are induced thereby (see Frestad, 2010; MacKay and Moeller, 2007). We also analyze optimal intertemporal hedging policies from the direct perspective of *the shareholders*, instead of the perspective of the total firm. In the literature, the distinction between those two objective functions is not always clear-cut, though they are not in any case equivalent.²

We formalize these arguments in a simple framework. The central idea is that, in every single period, shareholders select one of two possible investment projects with equal expected value but different risk. We show that shareholders, due to their convex option-like payoff, act risk-prone and follow Jensen and Meckling’s one-shot risk-shifting incentive model if their investment horizon is short. On the contrary, with an increasing number of time-periods being expected in the future, shareholders’ behavior changes towards risk aversion and hedging *though* their one-period claim is still option-like and convex. This *change of motives* constitutes a distinguishing feature from the separating settings in the prevalent literature and, to our knowledge, we are the first to resolve the dilemma of “conflicting motives” by considering multi-period time effects. Our model sheds new light on the empirical evidence that reports an ambiguous relationship between firm characteristics such as firm size or growth opportunities, and the firm’s propensity to hedge (e.g., Booth et al., 1984; or Nance et al., 1993). Especially, our results suggest that corporate risk policies are governed by life-cycle features.

¹ Another extensively used setting is focused on risk-averse entrepreneurial agents who derive utility from cash flows of a single firm (e.g., Adler and DeTemple, 1988; Duffie and Richardson, 1991, among others). However, that approach is obviously not adequate for modeling risk management by widely held corporations that are operating in the shareholders’ interests. See also Bessembinder (1991, p. 519), and Froot and Stein (1998) for the limitations of the utility-based approach.

² Frestad (2010), with a revision of Brown and Toft (2002), considers hedging in terms of shareholder value (p. 236) and expected profit maximization (p. 239), simultaneously. Similarly, Almeida et al. 2011–this issue both refer to Jensen and Meckling’s (1976) risk-shifting incentive (which is an incentive of the shareholders), and use total firm value, net of deadweight costs, as their objective function (see Eq. (1)). While these authors’ focus on total firm value sounds adequate as long as the firm has no risky debt outstanding, including risky debt as in this paper may turn over the results (see the appendix for an example and proof).

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