The Risk Management Paradox
Why Firms Should Hedge and Why Many Don’t

Adriano A. Rampini
Duke University

Fuqua LinkedIn Live
March 3, 2021
The Risk Management Paradox

- Why firms should hedge and why many don’t

- Motivating evidence on risk management

- Why should firms hedge? – Existing theory
  - Ensure sufficient funds if cash flows or net worth drops

- Why do many firms not hedge? – Our theory
  - Hedging requires collateral that firms rather use elsewhere

- Which firms hedge? – Empirical evidence on risk management
  - Fuel price risk management by airlines
  - Basic pattern: firms with limited internal funds hedge less

- Paradox: Financing is reason for and obstacle to hedging
Research Agenda on Risk Management

- Research agenda with S. “Vish” Viswanathan (Duke) and others

- **Theory**

- **Evidence**
Motivating Evidence on Risk Management

- **Substantial variation in fuel price hedging across airlines**

Fig. 2. Fuel expense hedging by airline. This figure presents the average fraction of next year’s fuel expenses hedged for each airline. The average is computed over all years the airline is in the sample. Panel A includes the full sample. Panel B excludes any airline that has a fuel pass through agreement at any point in the sample.

- **Airlines as empirical laboratory**
- **Data: 1996-2009**
- **Airlines hedge \approx 20\% on average**
- **Southwest hedges most (\geq 50\%)**
- **Many airlines hedge very little**
- **What explains this variation?**
Why Firms Should Hedge – Existing Theory

- Firms should hedge to ensure sufficient funds when cash flows drop


---

### Figure 3

<table>
<thead>
<tr>
<th>State</th>
<th>0</th>
<th>1</th>
<th>2</th>
</tr>
</thead>
<tbody>
<tr>
<td>π(H)</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>s = H: μ₁(H)</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>s = L: μ₁(L)</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>π(L)</td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

No need for financing

Complete hedging: μ₂(H) = μ₁(L)

Firms risk neutral

- Suppose two states
  - High state plenty of funds
  - Low state too few funds; forced to downsize

Hedging transfers funds from high to low state

Avoids downsizing

Conclusion: Firms should hedge when concerned about limited funds

Puzzle: Why do firms (especially with limited funds) hedge so little?

- Stulz (1996): “The actual corporate use of derivatives, however, does not seem to correspond closely to the theory.”
**Collateral, Risk Management, and the Distribution of Debt Capacity**

ADRIANO A. RAMPINI and S. VISWANATHAN

**ABSTRACT**

Collateral constraints imply that financing and risk management are fundamentally linked. The opportunity cost of engaging in risk management and conserving debt capacity to hedge future financing needs is forgone current investment, and is higher for more productive and less well-capitalized firms. More constrained firms engage in less risk management and may exhaust their debt capacity and abstain from risk management, consistent with empirical evidence and in contrast to received theory. When cash flows are low, such firms may be unable to seize investment opportunities and be forced to downsize. Consequently, capital may be less productively deployed in downturns.

**FINANCING AND RISK MANAGEMENT** are fundamentally linked as both involve promises to pay that are limited by collateral constraints. Engaging in risk management and conserving debt capacity have an opportunity cost—current investment is forgone. This cost is higher for more constrained firms. This insight has important implications for the extent of corporate risk management.

We develop a dynamic model of collateralized firm financing in which firms have access to complete markets, subject to collateral constraints due to limited enforcement, and hence are able to engage in risk management. Firms may choose to conserve debt capacity to take advantage of future investment opportunities. Our model predicts that firms with less internal funds exhaust their debt capacity rather than conserve it, rendering them unable to seize investment opportunities.

"Adriano A. Rampini and S. Viswanathan are at Duke University. We thank Michael Fishman, Donna Gezmar, Jeremy Stein, two referees, and the Acting Editor, as well as Amir Dagan and Dougl.

---

**1. Introduction**

We argue that collateral determines the capital structure and develops a dynamic, agency-based model of firm financing. We develop a dynamic model of firm financing in which financing is subject to collateral constraints. We explicitly consider firms renting capital. Of course, a frictionless rental market for capital would obviate financing constraints. We explicitly consider firms renting capital. Of course, a frictionless rental market for capital would obviate financing constraints. We explicitly consider firms renting capital. Of course, a frictionless rental market for capital would obviate financing constraints.

"Adriano A. Rampini and S. Viswanathan are at Duke University. We thank Michael Fishman, Donna Gezmar, Jeremy Stein, two referees, and the Acting Editor, as well as Amir Dagan and Dougl.

---

**Collateral and capital structure**

Adriano A. Rampini, S. Viswanathan

Duke University, Fuqua School of Business, 100 Page Drive, Durham, NC 27708, USA

E-mail address: rampini@duke.edu (A.A. Rampini).

## Why Many Firms Don’t Hedge – Our Theory

### Risk management subject to financial constraints

**Collateral, Risk Management, and the Distribution of Debt Capacity**

ADRIANO A. RAMPINI and S. VISWANATHAN

**ABSTRACT**

Collateral constraints imply that financing and risk management are fundamentally linked. The opportunity cost of engaging in risk management and conserving debt capacity to hedge future financing needs is forgone current investment, and is higher for more productive and less well-capitalized firms. More constrained firms engage in less risk management and may exhaust their debt capacity and abstain from risk management, consistent with empirical evidence and in contrast to received theory. When cash flows are low, such firms may be unable to seize investment opportunities and be forced to downsize. Consequently, capital may be less productively deployed in downturns.

**FINANCING AND RISK MANAGEMENT** are fundamentally linked as both involve promises to pay that are limited by collateral constraints. Engaging in risk management and conserving debt capacity have an opportunity cost—current investment is forgone. This cost is higher for more constrained firms. This insight has important implications for the extent of corporate risk management.

We develop a dynamic model of collateralized firm financing in which firms have access to complete markets, subject to collateral constraints due to limited enforcement, and hence are able to engage in risk management. Firms may choose to conserve debt capacity to take advantage of future investment opportunities. Our model predicts that firms with less internal funds exhaust their debt capacity rather than conserve it, rendering them unable to seize investment opportunities.
Why Many Firms Don’t Hedge – Our Theory

- Hedging requires funds (or collateral)

![Diagram](image)

- Hedging requires funds
- Firms constrained now
- Borrow funds from future states
- Hedging would shift funds to low state tomorrow
- But financing operations today more urgent

- Constrained firms use limited funds for operations not hedging
Empirical Patterns in Risk Management

- Evidence on airlines

Basic pattern: financially constrained firms hedge less or not at all
Evidence on Airline Fuel Price Risk Management

- Substantial variation in fuel price hedging across airlines

![Graph](image)

**Fig. 2.** Fuel expense hedging by airline. This figure presents the average fraction of next year's fuel expenses hedged for each airline. The average is computed over all years the airline is in the sample. Panel A includes the full sample. Panel B excludes any airline that has a fuel pass through agreement at any point in the sample.

- Airlines as empirical laboratory
- Data: 1996-2009
- Airlines hedge \(\approx 20\%\) on average
- Well-capitalized Southwest hedges most (> 50%)
- Many, especially small airlines hedge very little
- Does net worth explain the variation?
Evidence on Airline Fuel Price Risk Management

- **Airlines with stronger balance sheets hedge more**

![Graph showing cross-sectional evidence on the correlation between measures of net worth and the fraction of fuel expenses hedged.](image)

**Fig. 4.** Fuel expense hedging and net worth: cross-sectional evidence. This figure presents cross-sectional scatter plots of the fraction of next year’s fuel expenses hedged and measures of net worth in the current year. All variables are averaged across years for each firm. The size of the circles reflects total assets, and the regression lines are based on (firm-mean) asset-weighted regressions. Panel A: Net worth to assets; Panel B: Net worth (mv) to assets; Panel C: Net worth; Panel D: Net worth (mv); Panel E: Credit rating; and Panel F: Operating income to assets.

- Measures of financial constraints
  - Net worth (market value) (Panel B)
  - Credit rating (Panel E)

- Evidence from cross section: comparing across airlines

- Mechanism
  - Southwest Airlines explicitly pledged aircraft as collateral to hedging counterparties (2010 10-K)
Evidence on Airline Fuel Price Risk Management

- **Airlines that approach financial distress cut hedging**

![Graph](image)

**Fig. 5.** Fuel expense hedging around distress. This figure provides evidence on fuel expense hedging around distress, where an airline is defined to be in distress when it is rated CCC+ or worse or, when unrated, when it is in bankruptcy. Panel A shows the fraction of next year’s fuel expenses hedged for airlines that enter distress at \( t=0 \). Each time period reflects a year. Panel B shows the fraction of airlines mentioning collateral or their financial position as a restriction on hedging activities.

- American Airlines 2009 10-K: “[a] deterioration of the Company’s financial position could negatively affect the Company’s ability to hedge fuel in the future.”

- Evidence from within variation: comparing same airline over time

- Distress: drop in rating to CCC+ or below

- Airlines in distress cut hedging almost completely

- Slow recovery after distress

- Collateral or financial position mentioned as obstacle in annual reports (“smoking gun?”)
Financing Insurance

Adriano A. Rampini
Duke University

S. Viswanathan
Duke University

May 2019

Abstract

Insurance has an intertemporal aspect as insurance premia have to be paid up front. We argue that the financing of insurance is key to understanding basic insurance patterns and insurers’ balance sheets. Limited enforcement implies that insurance is globally monotone increasing in household net worth and income, incomplete, and precautionary. These results hold in economies with income risk, durable goods and collateral constraints, and durable goods price risk, under quite general conditions.

In equilibrium, insurers are financial intermediaries with collateralized loans as assets and diversified portfolios of insurance claims as liabilities. Collateral scarcity lowers the interest rate, reduces insurance, and increases inequality.

JEL Classification: D91, E21, G22.

Keywords: Household finance; Collateral; Insurance; Risk management; Financial constraints

---

Ongoing research

More financially constrained households buy less insurance

Life, property & casualty, health insurance

Why?

Similar mechanism: insurance premium needs to be paid up front
The Risk Management Paradox

- **Paradox: Financing is reason for and obstacle to hedging**
  - Reason for hedging is avoiding financial constraints
  - Firms use limited funds for operations instead of hedging

- Empirical puzzles call for new theory

- Theory helps understand facts and provides useful practical guidance
Why Many Firms Don’t Hedge – Our Theory

- **Firm’s dynamic problem**: choose policies for
  - investment \( (k) \), financing \( (b) \), hedging \( (h') \), and payout \( (d) \)

  to maximize value

  \[
  v(w, s) = \max_{\{d, w', k, b, h'\}} \left\{ d + \beta E[v(w', s')] \right\}
  \]

  subject to budget and **collateral constraints** for all states

  \[
  w + b + R^{-1} E[h'|s'] \geq d + k
  \]
  \[
  A' f(k) + k(1 - \delta) \geq Rb + h' + w'
  \]
  \[
  \theta k(1 - \delta) \geq Rb + h'
  \]

  and limited liability \( d \geq 0 \)

- Both financing and hedging require collateral (or funds upfront)