

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

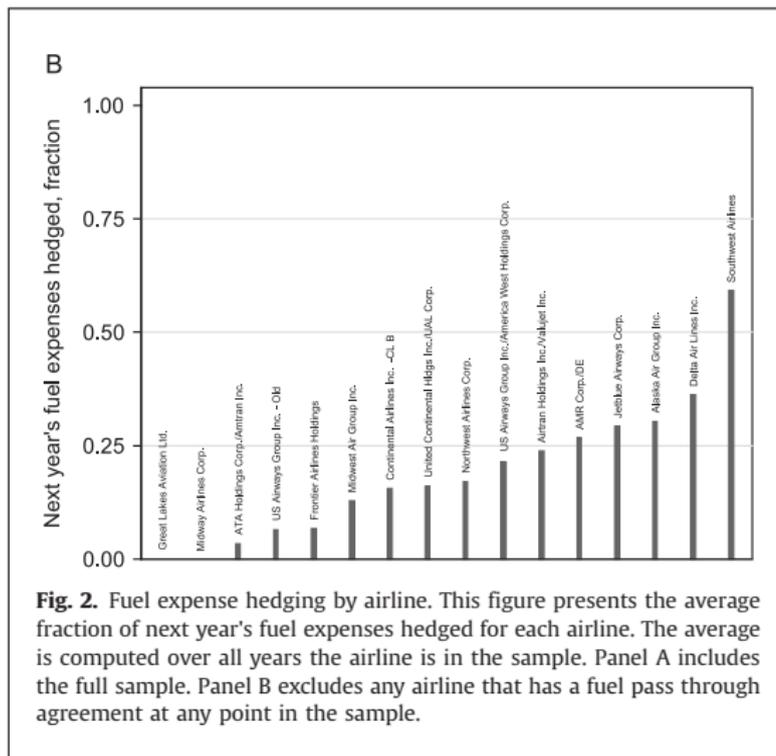
- Rampini/Viswanathan, Collateral, risk management, and the distribution of debt capacity, *Journal of Finance* 65 (2010) 2293-2322
- Rampini/Viswanathan, Collateral and capital structure, *Journal of Financial Economics* 109 (2013) 466-492
- Rampini/Viswanathan, Financing insurance, Working paper (2019)

■ Evidence

- Rampini/Sufi/Viswanathan, Dynamic risk management, *Journal of Financial Economics* 111 (2014) 271-296

Motivating Evidence on Risk Management

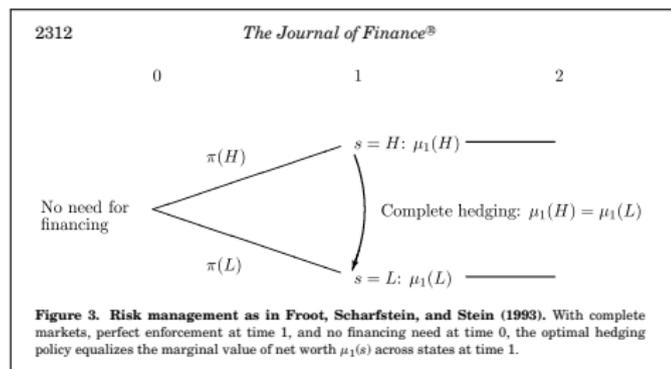
■ Substantial variation in fuel price hedging across airlines



- Airlines as empirical laboratory
- Data: 1996-2009
- Airlines hedge $\approx 20\%$ on average
- Southwest hedges most ($> 50\%$)
- 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
 - Froot/Scharfstein/Stein, Risk management: coordinating corporate investment and financing policies, *Journal of Finance* 48 (1993) 1629-1658



- 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."

Why Many Firms Don't Hedge – Our Theory

■ Risk management subject to financial constraints

THE JOURNAL OF FINANCE • VOL. LXXI, NO. 4 • DECEMBER 2006

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 obtain from risk management, consistent with empirical evidence and in contrast to neoclassical theory. When cash flows are low, such firms may be unable to secure investment opportunities and be forced to divest. 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 provide 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

*Adriano A. Rampini and S. Viswanathan are at Duke University. We thank Michael Fishman, Denis Gromb, Jeremy Stein, two referees, and the Acting Editor, as well as Anil Dasgupta, Douglas Diamond, Emmanuel Farhi, Alexander Gimbai, Yoram Lesho, Christine Parlour, Guillaume Plantin, David Scharfstein, David Shaw, René Stulz, and seminar participants at the Federal Reserve Bank of New York, Southern Methodist, Duke, Michigan State, INSEAD, Verona, Stockholm School of Economics, Mannheim, Illinois, ETH Zurich, British Columbia, Toronto, Minnesota, ETH Zurich, Ohio State, Columbia, Maryland, Washington University in St. Louis, the European Reserve Bank of St. Louis, Calypso Carlo Alberto, the European University Institute, the Jackson Hole Finance Group, the University of Chicago CRIS conference, the European Meeting on Financing in Finance and Macroeconomics, the 2006 Basel Committee/CEPR/IFPI conference, the Paul Woolley Centre conference at LSE, the 2006 North American Summer Meeting of the Econometric Society, the 2006 SED Meeting, the 2006 NBER Summer Institute in Capital Markets and the Economy, the 2006 Minnesota Workshop in Macroeconomics, the 2006 Washington University Conference on Corporate Finance, the 2006 Conference of Swiss Economists Abroad, the 2006 AEA Meeting, the European Winter Finance Conference, and the 2006 FIES Conference for helpful comments and Wei Wei for research assistance. This paper was previously circulated under the title "Collateral, Financial Intermediation, and the Distribution of Debt Capacity."

2293

Journal of Financial Economics 80 (2005) 401–420

Contents lists available at ScienceDirect.com

Journal of Financial Economics

Journal homepage: www.elsevier.com/locate/jfec

Collateral and capital structure[☆]

Adriano A. Rampini^a, S. Viswanathan^b

^aDuke University, ^bOhio State University

ARTICLE INFO

Article history:
Received 15 February 2002
Received in revised form
16 October 2003
Accepted 12 November 2003
Available online 18 March 2005

ABSTRACT

We develop a dynamic model of investment, capital structure, hedging, and risk management based on firms' need to collateralize promises to pay with tangible assets. Both financing and risk management involve promises to pay subject to collateral constraints. Hedging is viewed as collateralized equity financing and growth greater leverage. More constrained firms hedge less and have more. Both vice-versa hold. Cash flows are low and cash flows are high. Prominence of publicly traded securities reduces the benefits to hedging for cash flows and can lead firms not to hedge at all.

© 2005 Elsevier B.V. All rights reserved.

1. Introduction

We argue that collateral determines the capital structure and develops a dynamic agency-based model of firms.

© 2005 Elsevier B.V. All rights reserved.

Keywords: Collateral; Capital structure; Risk management

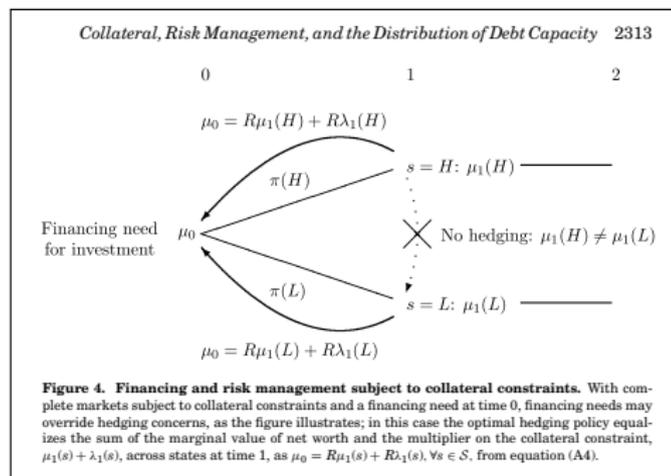
☆ This paper is based on the 2006 North American Summer Meeting of the Econometric Society, the 2006 SED Meeting, the 2006 NBER Summer Institute in Capital Markets and the Economy, the 2006 Minnesota Workshop in Macroeconomics, the 2006 Washington University Conference on Corporate Finance, the 2006 Conference of Swiss Economists Abroad, the 2006 AEA Meeting, the European Winter Finance Conference, and the 2006 FIES Conference for helpful comments and Wei Wei for research assistance. This paper was previously circulated under the title "Collateral, Financial Intermediation, and the Distribution of Debt Capacity."

© 2005 Elsevier B.V. All rights reserved.
<http://dx.doi.org/10.1016/j.jfec.2005.03.002>

■ Insight: Collateral needed to raise financing and for risk management

Why Many Firms Don't Hedge – Our Theory

■ Hedging requires funds (or collateral)



- 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

Model

Empirical Patterns in Risk Management

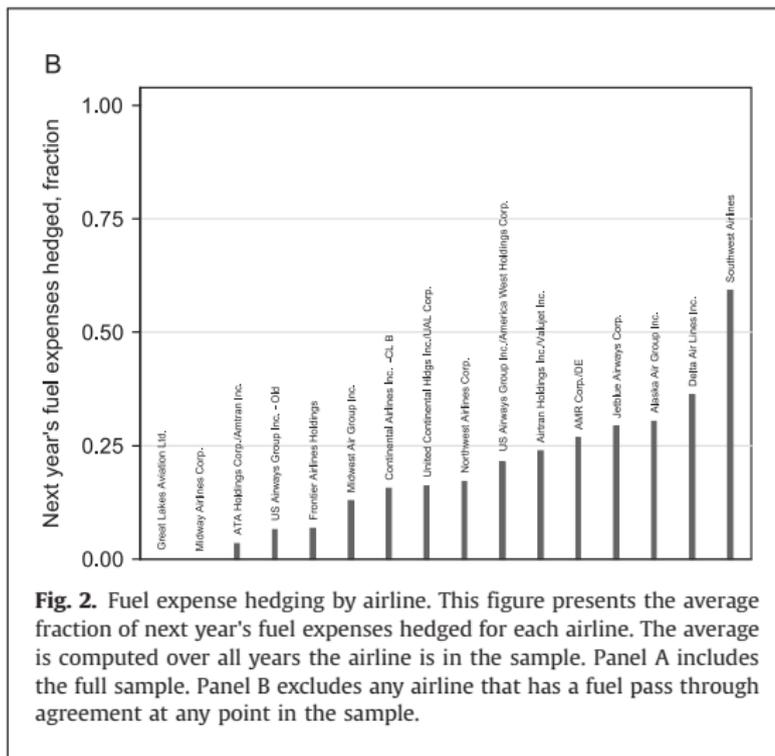
■ Evidence on airlines



■ Basic pattern: financially constrained firms hedge less or not at all

Evidence on Airline Fuel Price Risk Management

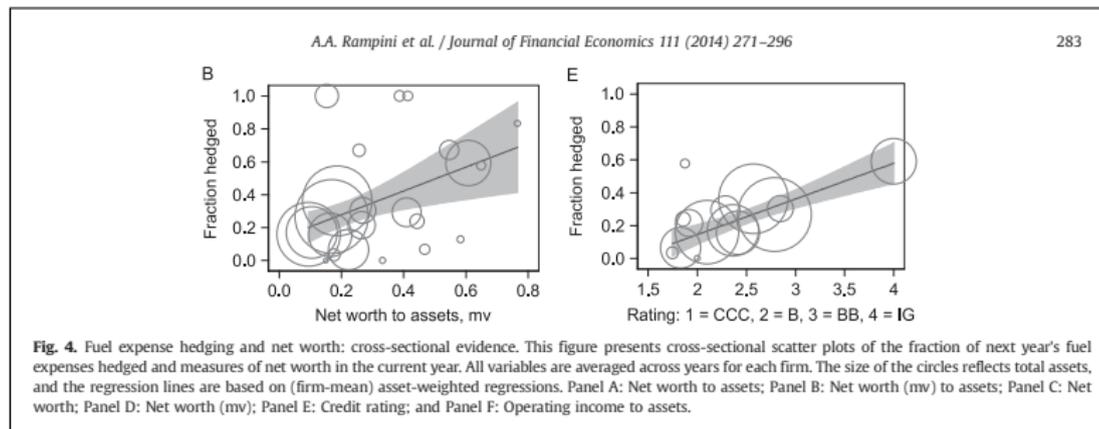
■ Substantial variation in fuel price hedging across airlines



- 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



■ Measures of financial constraints

- Net worth (market value) (Panel B)
- Credit rating (Panel E)

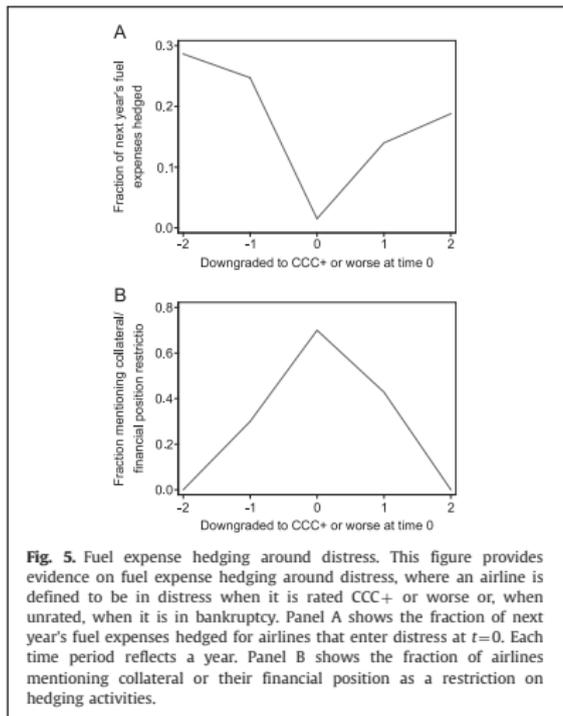
■ Evidence from **cross section**: comparing across airlines

■ 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



- 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?”)

Aside: Household Risk Management

■ Similar patterns and trade off in household insurance

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

*We thank Hengjie Ai, Mariacristina De Nardi, Emmanuel Farhi, Nobu Kiyotaki, Ralph Koijen, David Laibson, Martin Oehmke, Tomek Palorski, Alp Simsek, Jeremy Stein, Moto Yogo, George Zanjani, and seminar participants at the AEA Annual Meeting, Duke, the NBER-Oxford Saïd-CFS-EIEF Conference on Household Finance, the HBS Finance Unit Research Retreat, the Asian Meeting of the Econometric Society, MIT, UC Berkeley, Harvard, USC, the WFA Annual Conference, the SED Annual Meeting, the Bank of Canada and Queen's University Workshop on Real-Financial Linkages, Chung King GSB, Cornell, DePaul, Princeton, BYU, Carnegie Mellon, Indiana, Wharton, Chicago, Amsterdam, UCL, Imperial College, Warwick, the CEPR European Summer Symposium in Financial Markets, the Washington University Conference on Corporate Finance, the AFA Annual Meeting, Houston, Minnesota, Illinois, Virginia, the Conference in Honor of Robert M. Townsend, the FRS Conference, the NBER SI on Capital Markets and the Economy, the FTG Summer School on Liquidity in Financial Markets and Institutions, and UC Santa Cruz for helpful comments. Earlier versions of this paper were circulated under the title "Household risk management." Rampini is a Research Associate of the NBER and a Research Fellow of the CEPR. Viswanathan is a Research Associate of the NBER, Duke University, Fuqua School of Business, 100 Fuqua Drive, Durham, NC, 27708. Rampini: (919) 660-7797, rampini@duke.edu. Viswanathan: (919) 660-7784, viswanat@duke.edu.

- 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

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

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

$$\begin{aligned} w + b + \underbrace{R^{-1}E[h'|s']}_{\text{hedging claims}} &\geq d + k \\ A'f(k) + k(1 - \delta) &\geq Rb + h' + w' \\ \underbrace{\theta k(1 - \delta)}_{\text{collateral}} &\geq \underbrace{Rb}_{\text{financing}} + \underbrace{h'}_{\text{hedging}} \end{aligned}$$

and limited liability $d \geq 0$

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