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

Adriano A. Rampini
Duke University

Fuqua Forum – Finance
November 13, 2020
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
  - Airlines (fuel price); banks (interest rates and foreign exchange)
  - 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

- 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?

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.
Why Firms Should Hedge – Existing Theory

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


![Figure 3. Risk management as in Froot, Scharfstein, and Stein (1993).](image)

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 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 opportunities.

"Adriano A. Rampini and S. Viswanathan are at Duke University. We thank Michael Fishman, Dana Gross, Jeremy Stein, two referees, and the Acting Editor, as well as Amil Dagenito, Douglass Diamond, Emmanuel Farhi, Alexander Gamble, Yaron Leitner, Christine Plantin, David Schorlemer, David Staiger, Ben Stiller, and seminar participants at the Federal Reserve Bank of New York, Southern Methodist, Duke, Michigan State, INSEAD, Vienna, Stockholms School of Economics, Mannheim, Illinois, Zurich, British Columbia, Toronto, Minnesota, ETH Zurich, Ohio State, Columbia, Maryland, Washington University in St. Louis, Johns Hopkins University, University of Chicago, Harvard, University of Copenhagen, European University Institute, the Jackson Hole Finance Conference, the European Finance Association, the European Summer Symposium in Financial Markets, the 2009 SED Annual Meeting, the 2009 CEPR Programme Meeting, the 2009 Econometric Society World Congress, and the 2010 FIRS 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."

Insight: Collateral needed to raise financing and for risk management
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

Figure 4. Financing and risk management subject to collateral constraints. With complete markets subject to collateral constraints and a financing need at time 0, financing needs may override hedging concerns, as the figure illustrates; in this case the optimal hedging policy equalizes the sum of the marginal value of net worth and the multiplier on the collateral constraint, \( \mu_1(s) + \lambda_1(s) \), across states at time 1, as \( \mu_0 = R\mu_1(L) + R\lambda_1(L) \), \( \forall s \in S \), from equation (A4).
Empirical Patters in Risk Management

Evidence on airlines and banks

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

Risk Management in Financial Institutions

ADRIANO A. RAMPINI, S. VISWANATHAN, and GUILLAUME VUILLEMEY

ABSTRACT

We study risk management in financial institutions using data on hedging of interest rate and foreign exchange risk. We find strong evidence that institutions with higher net worth hedge more, controlling for risk exposure, across institutions and within institutions over time. For identification, we exploit net worth shocks resulting from loan losses due to declines in house prices. Institutions that sustain such shocks reduce hedging significantly relative to otherwise-similar institutions. The reduction in hedging is differentially larger among institutions with high real estate exposure. The evidence is consistent with the theory that financial constraints impede both financing and hedging.

Despite much debate about bank risk management and its purported failure during the financial crisis, the basic patterns of risk management in financial institutions are not known and the main determinants of banks’ risk management are not well understood. Since financial institutions play a key role in the macroeconomy and in the transmission of monetary policy, understanding their exposure to shocks is essential for monetary and macro-prudential policy. Financial institutions can manage the risk exposures arising from lending and

firms more likely to face financial constraints, such as small firms, are more likely to manage risk. The main robust pattern that emerges from this literature is that small firms exhibit a lower risk management trading strategy than large firms. Nevertheless, the empirical findings do not support the prediction that motivated a large number of empirical papers. However, this insight has

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

Adriano A. Rampini

The Risk Management Paradox
Evidence on Airline Fuel Price Risk Management

- Substantial variation in fuel price hedging across airlines

Airlines as empirical laboratory

- Data: 1996-2009

- Airlines hedge ≈ 20% on average

- Well-capitalized Southwest hedges most (> 50%)

- Many, especially small airlines hedge very little

- Does net worth explain the variation?

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.
Evidence on Airline Fuel Price Risk Management

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

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**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.

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- **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 counterparties (2010 10-K)
Evidence on Airline Fuel Price Risk Management

- Airlines that approach financial distress cut hedging

A. 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.”

B. Evidence from within variation: comparing same airline over time

C. Distress: drop in rating to CCC+ or below

D. Airlines in distress cut hedging almost completely

E. Slow recovery after distress

F. Collateral or financial position mentioned as obstacle in annual reports (“smoking gun?”)

G. But is relation between hedging and net worth causal?

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.
Evidence on Bank Risk Management

- For causal inference, need exogenous shocks to net worth

![Figure 1. Distribution of main measures of net worth.](image)

- Interest rate hedging by financial institutions
  - largest such market
- Data: 1995-2013
- Banks’ net worth drops substantially during financial crisis
- Why? – Loan losses due to drop in real estate prices
- Idea: exploit variation in exposure across banks
- Need to construct treatment and control group
Evidence on Bank Risk Management

- Banks that sustain net worth shocks cut hedging

- Treatment vs. control group
- Treatment: lend where real estate prices drop more than median
- Treated banks reduce hedging significantly relative to control
- Substantial effect: cut by $\approx \frac{1}{2}$
- Both interest rate and foreign exchange hedging reduced
- Causal interpretation: banks cut hedging because net worth drops

Figure 2. Difference-in-differences: effect of treatment on hedging. This figure plots hedging in the treatment and control groups used in the difference-in-differences estimation. Panel A plots gross interest rate hedging and Panel B plots gross foreign exchange hedging. The sample is restricted to institutions that hedge at least once before the treatment year. The data are at the BHC level and cover the period 2005Q1 to 2013Q4. Variables are defined in Table A.I. (Color figure can be viewed at wileyonlinelibrary.com)
Aside: Household Risk Management

Similar patterns and trade off in household insurance

Financing Insurance*

Adriano A. Rampini  S. Viswanathan
Duke University  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 Piskorski, Alp Simsek, Jeremy Stein, Moto Yogo, George Zanjani, and seminar participants at the AEA Annual Meeting, Duke, the NBER-Oxford Said-CFS-EIEF Conference on Household Finance, the HRS 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, Cheung Kong 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 FIRS 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
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

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

and limited liability \(d \geq 0\)

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