The Risk-Shifting Hypothesis: Evidence from Sub-Prime Originations

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THE RISK-SHIFTING HYPOTHESIS
EVIDENCE FROM SUBPRIME ORIGINATIONS

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Scope of the Paper

- Characterize portfolio choice of a financial institution in distress
- Forensic analysis of lending behavior of a large US mortgage originator prior to the crisis
  - New Century, who defaulted on Feb 2007
    - one of the largest subprime mortgage originators
    - Representative of industry
- Internal data on loan applications & repayment histories
Findings

- canonical model of risk-shifting $\rightarrow$ 2 predictions
  - $RS = \text{leveraged bet on own survival} (=\text{home prices})$
    1. Issue more « home price-sensitive » loans
    2. Issue more loans in regions whose property prices are correlated with own assets

- NC did exactly that, starting in 2004
  - Monetary tightening: NC in financial distress b/c owned a large loan portfolio (exposed to credit & interest risk)
  - NC made leveraged bet on own survival
    1. Massive issues of deferred amot. loans (home price sensitive)
    2. Issued massively in regions correlated with own asset
Originators with large loan portfolios also risk-shifted
Contributions

- Crisis narrative
  - OTD mortgage issuers carried large balance sheets in 2004
    - Skin in the game is bad, ex post
  - 2004 Monetary Tightening $\rightarrow$ Risk Shifting
    - Franchise value of weak intermediaries went down
    - Macro & micro prudential intertwined

- Costs of financial distress literature
  - Look @ micro-data from a distressed firm
  - Characterize empirical « signature » of risk-shifting
    - Distressed firms overinvest in « survival contingent » assets
Road Map

1) A simple risk-shifting framework

2) Impact of 2004 monetary shock on NC’s assets

3) Subsequent portfolio choice
Simple Risk-shifting framework
What kind of risk matters in risk shifting?

- Assume risk neutral investors
- \( S=1 \) if NC survives: \( P(S=1)=p \)
- marginal project’s gross return: \( R=1+\alpha+\beta.(S-p)+\epsilon \)
- Expected return: \( E(R) = 1+\alpha \)
- ...but value for shareholders:
  \[ pE(R\mid S=1) = p\,(1+\alpha) + \beta.(1-p)\,p \]
- Shareholders are biased towards high \( \beta \) projects
  - ... not any kind of risk
  - distortion can be quite big, even far from insolvency
The 2004 Monetary shock
Impact of tightening on NC’s assets

- Less growth options
  - increase in monthly payment / less refinancing (60% of sales)

- FRM holdings: interest rate risk
  - $2.4bn FRM held as investment end 2003…
  - …but financing is variable rate, indexed on LIBOR
  - $360m of cash flows disappear (2003 equity=$500m)

- ARM holdings: default risk
  - About 5bn of ARMs held as investment end of 2003
  - Became riskier as monthly payments went up
  - ARM delinquency rate went up from 10 to 30%
Evidence of Risk-Shifting
Prediction #1

- NC issues more loans correlated with Survival
- Survival = « property prices continue going up »
  → NC should issue « home-price sensitive » loans

- Deferred amortization loans
  - Started in 2004
  - Became big
  - Are more home-price sensitive than ARMs or FRMs
    - After 2 years: big payment shock
    - If home price go up, easy to refinance
    - If they go down, borr. cannot refinance / default strategically
% loans with deferred amortization

Interest Only  Balloon Loans

Diagram showing the percentage of loans with deferred amortization from 2000 to 2006, with separate bars for Interest Only and Balloon loans.
The monthly payment shock: growth of payment at reset compared to origin
Refinancing spike when monthly payment spikes
I/O loans: more « home price sensitive »

- Unconditional probability of delinquency
  - Higher if price growth is slow (<10% since origination)
    - For FRMs & ARMs: +9ppt
      - Some strategic default
      - (small) payment shock on ARMs as rates go up
  - Effect much bigger for I/O loans
    - For I/O: +16ppt
      - Difference is statistically significant

- this is related to difficulties to refinance
  - increase in delinquencies takes place after 2 years
Prediction #2

- NC issues more loans correlated with Survival
- Survival = home prices of loans in portfolio go up
  → NC should issue more loans, and more I/O loans, in regions whose home prices are correlated with loans in portfolio

- Regress:

\[
\text{Total loans}_{\text{region } s} = a + b \beta_{\text{region } s/\text{NC loan portfolio}} + \text{controls}
\]
\[
\%\text{I/O}_{\text{region } s} = a + b \beta_{\text{region } s/\text{NC loan portfolio}} + \text{controls}
\]
more loans in correlated regions

Table 5: MSA level amount of loans originated in 2004

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<th>MSA level log of origination</th>
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<td></td>
<td>Whole sample</td>
<td>Non-core states</td>
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<tr>
<td><strong>β</strong></td>
<td>2***</td>
<td>.38***</td>
<td>.37***</td>
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<td></td>
<td>(7)</td>
<td>(3.6)</td>
<td>(3.4)</td>
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<td>β Q2</td>
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<td>β Q3</td>
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<td>β Q4</td>
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<tr>
<td>log(Origination 2003)</td>
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<td>1***</td>
<td>1***</td>
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<tr>
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<td>(30)</td>
<td>(29)</td>
<td>(29)</td>
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<td>Low income</td>
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<td>(-.28)</td>
<td>(-.41)</td>
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<tr>
<td>Low education</td>
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<td>(-.19)</td>
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<td>(58)</td>
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<tr>
<td>R²</td>
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more I/O loans in correlated regions

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<th>Fraction of IO loans</th>
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<tr>
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<td>(1)</td>
<td>(2)</td>
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<td>$R^2$</td>
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Barlevy & Fisher effect
Conclusion

- Monetary policy led NC to take on more risk to maximize shareholder value

- Alternative interpretations?
  - « Interest-only » made loans affordable as rates rose.
    - But then, why not stop lending? Which assumption on risk preference?
  - Governance: these guys didn’t care
    - Top executives hold more than 7% in 2005, didn’t sell
  - It was pure optimism
    - Hard to fight this but…
    - RS imposes more structure on data.