Financial Crises and Amplification Mechanisms

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Some financial events lead to severe crises:

- US subprime crisis, Euro sovereign debt crisis...
- The triggering event seems “small” in retrospect.

Some others are relatively mild: The tech bubble...

**Today:** Intro to transmission and amplification mechanisms.

- But first a case study to fix ideas.
1. The subprime crisis of 2007-2009
2. Why did sophisticated players make losses?
3. Transmission mechanisms
4. Amplification mechanisms
Financial system channels resources to uses

Suppliers of capital
- Households with savings
- Firms with cash

Intermediaries and markets

Users of capital
- Firms that invest
- Governments that spend
- Households buying a house

Regulators

United States Federal Reserve System
Mortgages: Loans collateralized by houses

Suppliers of capital
- Households with savings
- Firms with cash

Users of capital
- Firms that invest
- Governments that spend
- Households buying a house

Problem: Mortgage too risky for lenders' taste

DECIDES TO BUY HOME HE SAW 2 WEEKS AGO
Securitization diversifies and tailors mortgage risks

Suppliers of capital
- Households with savings
- Firms with cash

Investors that can handle risk

Riskier pieces

Safer pieces (AAA)

Solution: Securitization
Risks are diversified and tailored

Users of capital
- Firms that invest
- Governments that spend
- Households buying a house
Securitization is in principle a useful financial innovation.

Vulnerable to a drop in nationwide house prices. Why?
Figure 1. The Housing Price–Rent Ratio in the United States: 1983:Q1–2010:Q1

Sources: National house price series from the Office of Housing Enterprise Oversight (OFHEO). Owner’s equivalent rent series from the Bureau of Labor Statistics (BLS).
 Defaults and delinquencies increase

Past Due Mortgages

Percent

Prime Past due  SubPrime Past due


0 5 10 15 20 25 30
Markets recognize risks in “safe” (AAA) pieces

Figure: From Brunnermeier (2009), “Deciphering the Liquidity and the Credit Crunch 2007-08.” The spreads are calculated from CDS prices. They provide a measure of the probability of default for the corresponding tranches.
Key aspect: Financial intermediaries suffer losses


<table>
<thead>
<tr>
<th>Table 3</th>
<th>Losses, by Financial Institution and Debt Instrument (billions of dollars)</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Amounts outstanding ($ billions)</td>
</tr>
<tr>
<td></td>
<td></td>
</tr>
<tr>
<td>Real estate loans</td>
<td>7,100</td>
</tr>
<tr>
<td>Asset-backed securities (ABS) + collateralized debt obligations of ABS</td>
<td>2,150</td>
</tr>
<tr>
<td>Prime mortgage-backed securities</td>
<td>3,800</td>
</tr>
<tr>
<td>Commercial mortgage-backed securities</td>
<td>940</td>
</tr>
<tr>
<td>Corporate debt + collateralized loan obligations</td>
<td>4,650</td>
</tr>
<tr>
<td>Total</td>
<td>17,920</td>
</tr>
</tbody>
</table>

Their default risks increase

Figure: From Brunnermeier (2009).
Some of them become bankrupt

Some others (Bear Sterns, Freddie, Fannie, AIG) are bailed out by the government.
Crisis moves to other asset classes


Heat map: An asset class moves to red when its price drops and/or when its volatility increases.

Stock market crashes

S&P 500 index


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The US economy enters the great recession
Unemployment rate increases and remains high

Figure: CBO Forecast, August 2012.
Economic activity falls below potential

GDP and Potential GDP

(Trillions of 2005 dollars)

Sources: Congressional Budget Office; Department of Commerce, Bureau of Economic Analysis.

Notes: Potential gross domestic product (GDP) is CBO’s estimate of the output the economy would produce with a high rate of use of its capital and labor resources.
Monetary policy appears to be constrained

- Triggered unconventional policies: Quantitative easing etc.
Similar effects in most developed countries

Figure: From Blanchard (2009).

Figure 9.

Real and Potential GDP Forecasted Growth Rates for 2009; in percent

United States  |  Euro Area  |  Japan  |  Emerging & Developing Economies
-0.7           |  -0.4      |  -0.2   |  5.2

**Figure:** From Blanchard (2009).
The shock is too small relative to the effects.

Figure: From Blanchard (2009).
Questions raised by the crisis

1. **Trigger:** Why did the sophisticated players (FIs) make losses?

2. **Transmission:** Why did Wall Street affect Main Street?
   - Why not in other episodes, e.g., the tech bubble?

3. **Amplification:** Why did things get out of control?
Roadmap

1. The subprime crisis of 2007-2009

2. Why did sophisticated players make losses?

3. Transmission mechanisms

4. Amplification mechanisms
Two main theories for financial intermediaries’ losses:

   - **Compensation contracts**: Poor incentives for traders.
   - **Government guarantees**: Poor incentives for the institution.

2. **Collective optimism**: To-err-is-human principle.
   - House prices had not fallen at the national level since the Great Depression.
Titanic: A tragedy of collective optimism

From Shleifer (2011), AFA address:

- When built, Titanic was described as the safest, largest ship ever.
- **Insiders and financiers were on board:** They believed it was safe.
- Many lifeboats on board, enough for 1/3 of passengers. Consistent with regulation.
- 1500 people died. Some rescue boats were not full. **Almost all the crew died.**

What happened to insiders during the subprime crisis?
Insiders were also on board during the crisis

- Cheng et al. (2012): **Personal positions** of sec. managers.

Evidence suggests optimism, possibly amplified by moral hazard.
1. The subprime crisis of 2007-2009

2. Why did sophisticated players make losses?

3. Transmission mechanisms

4. Amplification mechanisms
A birds-eye view of the crisis

To create damage, the storm must hit critical regions.

**Perfect storm:** Hits all critical regions at once.
Transmission to the real economy

Some transmission mechanisms (there are more):

**Indirect effects:** Banks’ losses and financial troubles.

⇒ **Credit crunch:** Reduced loans to the real sector.

**Direct effects:** Borrowers’ (households/firms) losses and financial troubles.

⇒ Reduced consumption and investment.

**Keynes:** Output/employment falls through aggregate demand.

- Especially when monetary policy is constrained.
Credit crunch: Banks reduce loans

**Syndicated loans**: Large loans originated by one bank and held by multiple banks. Main source of bank loans for large corporations.
Constrained firms reduce investment

Figure: From Campello, Graham, Harvey (2009). Constrained firms are those that answered “yes” to the question “Are you affected by difficulties in accessing credit markets?”
Constrained households reduce consumption

Figure: Mian, Rao, and Sufi (2011), “Household balance sheets, consumption, and the economic slump.”
Reduction in demand reduces employment

Figure: Mian and Sufi (2011), “What Explains High Unemployment?”
Reduction in demand reduces employment

Cross-county effects show up in non-tradable industries (restaurants etc.) but not in tradable industries (manufacturing, software etc.).
Roadmap

1. The subprime crisis of 2007-2009
2. Why did sophisticated players make losses?
3. Transmission mechanisms
4. Amplification mechanisms
How can a small shock have large effects?

But why do small losses generate large effects?

Some amplification mechanisms (there are more):

1. High leverage
2. High uncertainty
3. Liquidity trap
US financial sector is highly leveraged


### Exhibit 4.5 Leverage of Various Financial Institutions

<table>
<thead>
<tr>
<th></th>
<th>Assets ($bn)</th>
<th>Liabilities ($bn)</th>
<th>Capital ($bn)</th>
<th>Leverage</th>
</tr>
</thead>
<tbody>
<tr>
<td>Commercial banks</td>
<td>11194</td>
<td>10050</td>
<td>1144</td>
<td>9.8</td>
</tr>
<tr>
<td>Savings Inst</td>
<td>1815</td>
<td>1607</td>
<td>208</td>
<td>8.7</td>
</tr>
<tr>
<td>Credit Unions</td>
<td>759</td>
<td>672</td>
<td>87</td>
<td>8.7</td>
</tr>
<tr>
<td>Finance Companies</td>
<td>1911</td>
<td>1720</td>
<td>191</td>
<td>10.0</td>
</tr>
<tr>
<td>Brokers/hedge funds</td>
<td>5597</td>
<td>5390</td>
<td>207</td>
<td>27.1</td>
</tr>
<tr>
<td>GSEs</td>
<td>1669</td>
<td>1598</td>
<td>71</td>
<td>23.5</td>
</tr>
<tr>
<td>Leveraged Sector</td>
<td>22945</td>
<td>21037</td>
<td>1908</td>
<td>12.0</td>
</tr>
</tbody>
</table>

Source: Authors’ calculations based on Flow of Funds, FDIC Statistics on Banking, Adrian and Shin (2007), and balance sheet data for Fannie Mae, Freddie Mac, and broker-dealers under Goldman Sachs equity analysts’ coverage.
US households are also highly leveraged


<table>
<thead>
<tr>
<th></th>
<th>2000</th>
<th>2008</th>
</tr>
</thead>
<tbody>
<tr>
<td>US</td>
<td>96</td>
<td>128</td>
</tr>
<tr>
<td>UK</td>
<td>105</td>
<td>160</td>
</tr>
<tr>
<td>Spain</td>
<td>69</td>
<td>130</td>
</tr>
</tbody>
</table>

A cautionary tale of high leverage: LTCM

Figure: Jorion (2000), “Risk management lessons from LTCM.”

LTCM: Genius team. Failed in 1998 and bailed out by the NY Fed.
High leverage: Large losses and fire sales

LTCM had $5B capital and $125B assets. **Leverage ratio is 25.**

First effect: **Amplified losses.**
- It takes about 2% reduction in asset prices for LTCM to lose about 50% of its capital.

Second effect: **Deleveraging and fire sales.**
- LTCM close to bankruptcy. Lenders become nervous.
- Fire sales: Forced to sell assets to pay back debt.
- Asset prices fall further. **Downward spiral.**
High leverage: Large losses and fire sales

Figure: From Brunnermeier (2009).
High uncertainty: Further reduction in asset prices

Further amplification from risks and risk attitudes:

- Uncertainty of various kinds increase during crises. Examples:
  - Counterparty risk increases.
  - Complexity increases (Caballero and Simsek, 2012).
  - Political uncertainty also increases.

- Economic agents also become more risk averse. Examples:
  - Psychological factors.
  - Disaster risk...

These effects further lower risky asset prices and amplify losses.
Low interest rates can trigger a liquidity trap

- Deleveraging and uncertainty also lower interest rates.
- Low interest rates can trigger a **macro liquidity trap**:

![Diagram]

- "Natural" interest rates fall
- Liquidity trap: Monetary policy constrained
- Output/employment falls
- Deleveraging and uncertainty
- Aggregate demand falls
- Inflation falls
- Fisher effect: Real debt burdens increase
Low interest rates during and after the crisis

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**Notes:** The data are daily and extend through July 13, 2012. The 10-year Treasury rate is the constant-maturity yield based on the most actively traded securities. The dates on the horizontal axis are those of regularly scheduled Federal Open Market Committee meetings. Source: Department of the Treasury and the Federal Reserve.
Low inflation during the crisis

Inflation
(Percentage change in prices from same quarter of previous year)

Sources: Congressional Budget Office; Department of Commerce, Bureau of Economic Analysis.

Notes: The overall inflation rate is based on the price index for personal consumption expenditures; the core rate excludes prices for food and energy.
Household deleveraging during and after the crisis

- **Good news:** Leverage and inflation back to “normal.”
- **Bad news:** Uncertainty and Euro zone. MP looks constrained.

*Chart: Household debt service, 1984–2012*

*Note: The data are quarterly and extend through 2012:Q1. Debt service payments consist of estimated required payments on outstanding mortgage and consumer debt.*

Conclusion: Crises and amplification mechanisms

Taking stock:

1. To create damage, financial events must hit critical regions.
   - Intermediaries, borrowers, monetary policy...

2. Intermediaries’ (sophisticated players’) losses particularly damaging. Some reasons: Optimism and/or moral hazard.

3. Some transmission mechanisms (supported by subprime crisis):
   - Intermediaries reduce loans.
   - Firms/households reduce investment/consumption.
   - Output/employment falls through aggregate demand.

4. Some amplification mechanisms (rather speculative):
   - Leverage, uncertainty, liquidity trap...

Macro-finance: Very active research area!