The Financial Crisis of 2007-08

Borja Larrain
Today:

• What started the financial crisis of 2007-2008?

• How did it get so big?

• What is going to happen next?
1 The spark that started the fire

• A mix of two things:

  – Problems in the mortgage market: people defaulting on their mortgages.

  – Financial instruments based on mortgages had the wrong prices.
1.1 Mortgage defaults

• Not really as important as people think: recent experience is not so different from historical average of foreclosures in recessions.

• The subprime market (e.g., NINJA mortgages) is only part of the problem.
3.2 Fact 2: Higher foreclosure rates stem from falling house prices

The easiest way to show the tight link between house prices and foreclosures is to plot the data, as is done in Figure 5. The foreclosure rate is calculated directly from the Warren Group data, and house price growth is based on the repeat-sales index we constructed from the same dataset. The figure shows that Massachusetts house prices declined in the early 1990s and late 2000s, precisely the times when foreclosures rose. In this section, we provide evidence that this relationship is causal, in that falling housing prices cause foreclosures. While a causal relationship between prices and foreclosures is a long-standing tenet of housing research, we also argue that this relationship is more complex than it is typically modelled in the literature.

Figure 5: Foreclosures and Housing Prices in Massachusetts, 1990:q1–2008:q1

3.2.1 Falling prices, negative equity, and foreclosures

There are strong theoretical reasons to believe that falling house prices lead to rising foreclosures. Lower prices increase the likelihood that a borrower has negative equity, which occurs when the outstanding balance on the mortgage exceeds the value of the house. Negative equity, in turn, is a necessary condition for default. A borrower whose house is worth more than the mortgage can always sell the home, discharge the mortgage, and
Figure 15: 2006–2007 Massachusetts Foreclosures by Type of Residence, Purchase Year, and Subprime-Purchase Status
1.2 Mortgage-backed securities

- The "true" source of the problem in my opinion.
- These securities were highly overvalued.
- Credit rating agencies didn’t do a good job.
- Poor oversight of regulators.
- Diversification (do not put all your eggs in the same basket) works, but not to the extent credit agencies thought it worked.
- In layman terms: the baskets where not really all that different.
- Coordinated failure is terrible for these securities.
Table 1

Historical Default Experience of Bonds Rated by Fitch

<table>
<thead>
<tr>
<th>Rating</th>
<th>AAA</th>
<th>AA+</th>
<th>AA</th>
<th>AA-</th>
<th>A+</th>
<th>A</th>
<th>A-</th>
<th>BBB+</th>
<th>BBB</th>
<th>BBB-</th>
</tr>
</thead>
<tbody>
<tr>
<td>10-yr Default Prob.</td>
<td>0.19%</td>
<td>0.57%</td>
<td>0.89%</td>
<td>1.15%</td>
<td>1.65%</td>
<td>1.85%</td>
<td>2.44%</td>
<td>3.13%</td>
<td>3.74%</td>
<td>7.26%</td>
</tr>
<tr>
<td>Default Rate (ann.)</td>
<td>0.02%</td>
<td>0.06%</td>
<td>0.09%</td>
<td>0.12%</td>
<td>0.17%</td>
<td>0.19%</td>
<td>0.25%</td>
<td>0.32%</td>
<td>0.38%</td>
<td>0.75%</td>
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</tbody>
</table>

<table>
<thead>
<tr>
<th>Rating</th>
<th>BB+</th>
<th>BB</th>
<th>BB-</th>
<th>B+</th>
<th>B</th>
<th>B-</th>
<th>CCC+</th>
<th>CCC</th>
<th>CC</th>
<th>C</th>
</tr>
</thead>
<tbody>
<tr>
<td>10-yr Default Prob.</td>
<td>10.18%</td>
<td>13.53%</td>
<td>18.46%</td>
<td>22.84%</td>
<td>27.67%</td>
<td>34.98%</td>
<td>43.36%</td>
<td>48.52%</td>
<td>77.00%</td>
<td>95.00%</td>
</tr>
<tr>
<td>Default Rate (ann.)</td>
<td>1.07%</td>
<td>1.45%</td>
<td>2.04%</td>
<td>2.59%</td>
<td>3.24%</td>
<td>4.30%</td>
<td>5.68%</td>
<td>6.64%</td>
<td>14.70%</td>
<td>29.96%</td>
</tr>
</tbody>
</table>
Figure 2

Sensitivity of CDO and CDO$^2$ to Changes in Default Probability
Figure 1

Sensitivity of CDO and CDO$^2$ to Changes in Default Correlation
2 How did it get so big?

- Two propagation mechanisms:
  - Leverage.
  - Network effects.
2.1 Leverage

- Small cash flow fluctuations get you into a lot of trouble.

- Why are these financial institutions taking so much leverage?

- Picking up pennies in front of a steamroller?

- Losses (e.g., from mortgage-backed securities) leads to selling to cover up short-term obligations, which leads to even lower prices...downward spiral.
implying an effective margin of 100 percent, i.e., zero lending. This extreme reaction occurred when suddenly ABCP could no longer be considered a cash substitute. That is, while overcollateralization prior to the crisis guaranteed that highly rated ABCP was almost like cash—i.e., credit-risk free—the sudden increase in the volatility of the collateral made it necessary to evaluate the credit risk of ABCP more carefully, requiring an expertise that the typical ABCP investor does not have. Since it takes time to gain this expertise, the first natural response is to withdraw from the ABCP market altogether. Again, this increase in margins occurs even though the hedge fund might face a great buying opportunity at the time of crisis if the price dip turned out to be only temporary.34

An increase in asymmetric information induces financiers to increase margins. Financiers become especially careful about accepting assets as collateral if they fear receiving a particularly bad selection of existing assets. They might, for example, be worried that the SIV that issues ABCP sold the good, “sellable” assets and left as collateral the bad, less valuable “lemons.”

34Of course, every cash-strapped hedge fund manager would like to convince his prime broker that the price decline is only temporary, even when it is not true. The consequence is that hedge fund managers cannot credibly communicate the likely nature of the crisis to their financiers, their prime brokers, and their client investors.
2.2 Network effects

- A bank going bankrupt because it has bad loans does not necessarily affect other banks with a different pool of loans.

- But investment banks and hedge funds have very similar asset pools (to a first approximation at least).

- The selling of one troubled fund hurts the others.
• Funkier network effects: e.g., counterparty risk in the credit default swap (CDS) market.

• $5 trillion in corporate bonds outstanding, $30 trillion in CDS!

• Netting out obligations would reduce the extent of the problem, but some investors are not willing to do it.
Figure 5: A network of interest rate swap arrangements which theoretically could be fully netted in a multilateral netting agreement. However, since each party knows only its own contractual obligations, Goldman's doubts about Bear Stearns's creditworthiness make netting impossible, which creates additional funding needs.

has made the web of obligations in the financial system opaque, consequently increasing systemic risk.

4.5 Aversion to Knightian Uncertainty

One of the central puzzles related to the current financial crisis is that only a few players are willing to step in when prices drop. While the above mentioned mechanisms rely on financial frictions and lack of expertise, Caballero & Krishnamurthy (2008) argue that, in times of crisis, investors have a difficult time assigning probabilities to the different possible outcomes. This argument seems reasonable, especially for structured products, since there is only limited historical data available for forecasting. Since investors are averse to not being able to assign probabilities—i.e., they dislike what economists call “Knightian uncertainty”—they will ask for an additional uncertainty premium for holding risky assets. This uncertainty-aversion effect comes on top of the increased volatility. It helps explain why asset prices can drop significantly even in situations where the financial system as a
3 What is going to happen next?

- The purpose of economic predictions is twofold:
  - Make astrology look respectable.
  - Humiliate the speaker.

- Therefore, I will remain silent.

- For how long will this recession last? Only God knows, but it is going to be much harder than the previous recession of 2001.
Final Exam

- "Pecking order" for your study:
  - Lecture notes.
  - Assignments.
  - Material covered in sections.
  - Book.

- The exam will have (most likely) 6 questions.

- Since it is a 3-hour exam: 1/2 hour per question.

- Mostly quantitative questions, not long essay questions.
• Coverage: from the first lecture until today, evenly spread (approximately, of course).

• I will NOT repeat questions from the assignments. That was too easy. However, the assignments should still be very useful when you study.

• You can bring a one-page summary of formulas, ideas, etc. (one page written on both sides).

• You should bring a calculator.
THANKS!