Teaching the Great Recession: Securitization Simulation

Classroom simulation showing how the incentives behind securitization played out in the lead-up to the Great Recession of 2008.

**Grade level:** 9 - 12  
**Relevant standards:**  
CEE National Standards: 12 - Interest Rates; 18 - Economic Fluctuations  
AP Macroeconomics Standards: Unit IV - Financial Sector

Developed by Todd Miller (AP Macroeconomics teacher)
Students will

1. Learn the incentives behind why and how banks choose to loan out mortgages.
2. Understand how Wall Street practices incentivized subprime mortgages and contributed to the housing bubble.
3. Get a first-hand feel for how the housing bubble grew and then burst.
4. Understand the impact of the collapse of the housing industry on banks, individuals, and the economy as a whole.

Standards

Standards II (Buying Goods and Services) and IV (Using Credit) of CEE’s National Standards for Financial Literacy.

Materials

- Pre-Simulation Activity handout (pg. 8 of this simulation guide)
- Simulation Activity handout (pgs. 9–12 of this simulation guide)
- Example Chart 1 handout (pg. 13 of this simulation guide)
- To share the activity handouts with students electronically, send them to: https://www.mruniversity.com/securitization/. Students can then click File > Make a copy... to create their own version which they can fill in on their device.
- Dice (one per student—free electronic dice at https://www.random.org/dice/)

Procedure

Before class

1. At the end of the previous class period, assign the Pre-Simulation Activity handout for homework (or do in class). Instruct students not to worry about the amount of the investment or the duration, but to focus on risk and net return on investment.

During class

1. Distribute the Simulation Activity handout. Allot a full class period to play the game.
2. Tell students they will each play the role of a top loan advisor at a major bank. The bank has set aside $1,000,000 to loan out to potential home buyers. Each house costs
$100,000, which means the bank can make up to ten loans. The game will be played in three rounds, during which students will have opportunities to make loans. Each round represents one year. The goal of the game is to make the most profit you can after the three rounds of play.

3. Before beginning, make sure students understand the following information:
   a. Banks make a one-time processing fee for each new loan ($5000/loan).
   b. Banks also make yearly interest on loans, for every year until the loan is paid off or the loan defaults and the bank forecloses on the house. The amount of interest depends on how risky the loan is: riskier loans give more interest.
   c. Banks lose $40,000 for every foreclosure. They do not lose more because after foreclosure, banks can re-sell the house.
   d. FICO numbers represent a borrower’s ability to pay back a loan. The higher the number the greater likelihood they will pay back the loan. The riskier the loan, the lower the FICO score and higher the interest rate.
   e. Chart A shows the interest and riskiness of different FICO scores. If the die lands on one of the numbers in the “Foreclosure Roll” column of Chart A, that means that loan defaults and the bank must foreclose on the house. Confirm that students understand this. It may help to go over an example (e.g., a FICO score of 640 has an interest rate of 5%, which will win the bank $3,108.50 in interest in one year if the loan does not foreclose. Each round, this FICO score has a ⅓ chance of foreclosure).
   f. Chart B lists the FICO number for each person interested in a loan. Students should check off a FICO score whenever they loan out to it. Each FICO score represents a unique person seeking a loan, so students may not lend out to the same FICO score more than once.
   g. Every round (year), students will have to roll the foreclosure roll for every loan that has not been sold or foreclosed (even if it is not a new loan).
   h. Students can make as many or as few loans per round as allowed. There is no need to loan out as much as possible per round.
   i. The goal of the game is to make as much profit as possible, where profit is fees plus interest minus foreclosure losses. There is NO incentive to have remaining loan balance left at the end of the game!
**Round 1: Chart 1**

1. Let students know that banks have high standards and they can only lend out to FICO scores of **630 or higher**.

2. Give students a few minutes to decide which of the 8 eligible FICO scores to loan out to. They can choose to loan all 8 or none. Encourage students to at least make one loan. Instruct them to **place a check-mark next to the FICO numbers they are loaning to**. This is to keep track of who they’ve lent to: once a FICO number has a check-mark, it cannot be lent to again for the whole game.

3. Show students the filled out **Example Chart 1** as you explain how to fill it out:
   a. In Column 1, fill in the FICO scores of the loans they are making.
   b. In Column 2, put in $100,000 for each loan (note the minus in the column heading, meaning this is money the bank is loaning out).
   c. In Column 3, put in $5000 for each loan (note to students the plus in the column heading, which means this is money made by the bank).
   d. Give students a moment to roll their dice once for each loan and write down their roll in Column 4.
   e. For each loan, if the roll was a foreclosure roll, write $40,000 in Column 5 for that loan and write $0 in Column 6. If it wasn’t, write $0 in Column 5 and the appropriate 1 yr. interest number from Chart A (depending on FICO score) in Column 6.
   f. Have students add up the totals for each of Column 2, 3, 5, and 6 and fill them into the Total row.
   g. Remind students that they started with $1,000,000. From this they should subtract the total from Column 2. The difference should be entered as the **Round 1 Balance of Potential Loans. This is how much the bank has left to loan out for remaining rounds**.

4. Ask students to note how much they’ve made from interest (Column 6) and how much from fees (Column 3). Students will have made much more from fees. Ask students to think about what this incentivizes.
Round 2: Chart 2

1. Instruct students to add the FICO scores of any loans they’ve already made that have not foreclosed to Column 1 in Chart 2. Tell them to put in nothing in Columns 2 and 4 for these loans, since they are old loans.

2. Warn students that the Column numbers have changed slightly because of the new Column 3. Tell them that you will explain Column 3 shortly, but they should ignore it for now.

3. Let students know that banks have lowered their standards and can now loan out to any FICO scores. Remind students that they can only lend out as much as they have left in the Round 1 Balance of Potential Loans. Give students a few minutes to choose their new loans for this round. Instruct them to also add these new loans to Column 1. Since these are new loans, students should include the $100,000 loan and $5,000 fee in Columns 2 and 4. However, tell students not to do the foreclosure rolls yet and to ignore Columns 3 and 5–7 for now.

4. After students have made their choices, let them know that due to the huge success of Mortgage Backed Securities, Wall Street is buying out mortgages regardless of FICO score. Students now have a choice. For any loan in Column 1 (old or new), they can sell it to Wall Street. Wall Street will pay the bank the $100,000 it initially loaned out. Any loans sold to Wall Street will not make the bank any more interest starting this round and will not have to do a foreclosure roll. Any loans not sold to Wall Street will have to do the foreclose roll as before.

5. Give students a few minutes to make their choice whether to sell or roll for each loan. Explains that loans sold should get a $100,000 in Column 3. Loans not sold get nothing in Column 3 and need a foreclosure roll. If there is foreclosure, write $40,000 in Column 6; if not, write down the appropriate yearly interest for the FICO score in Column 7.

6. Give students a few minutes to calculate the totals of Columns 2, 3, 4, 6, and 7.

7. Instruct students to calculate their Round 2 Balance of Potential loans by taking the Round 1 Balance minus the total from Column 2 plus the total from Column 3. This is how much the bank has to lend out in the last round.
Round 3: Chart 3

1. Remind students that this will be the last round and that Wall Street is still interested in buying out loans. Also remind them that, just as before, they can only loan out as much as they have in the Round 2 Balance of Potential Loans. Finally, remind them that they have no incentive to have a positive loan balance at the end—profit is all that matters!

2. Instruct students to enter all the old, not foreclosed loans they’ve made into Column 1 (with nothing in Columns 2 and 4), just as they did in Round 2.

3. Give students a few minutes to make any new loans. Just as in Round 2, they should enter these into Column 1 and since they’re new loans, include the $100,000 in Column 2 and $5,000 in Column 4. And just as in Round 2, they should wait before doing anything else, including foreclosure rolls or selling to Wall Street.

4. Once students’ choices are made, let them know that Wall Street has suddenly decided not to buy out any new mortgages after all. Instruct students to leave Column 3 empty for all loans and to do a foreclosure roll for all loans.
   a. IMPORTANT: Do not let your students change their decisions. Students should be mad at this point. They made loans they did not think were smart because they were counting on Wall Street to buy them. But that is the point!

5. Have students add up the totals of Columns 2, 4, 6, and 7 just as before.

6. Instruct students to calculate each of the following:
   a. Total Banking Fees (Column 3 total from Chart 1 + Column 4 totals from Charts 2 and 3).
   b. Total Interest Earned (Column 6 total from Chart 1 plus Column 7 totals from Charts 2 and 3).
   c. Total Foreclosure Losses (Column 5 total from Chart 1 plus Column 6 totals from Charts 2 and 3).
   d. Total Profit (Total Fees plus Total Interest minus Total Foreclosure Losses).

7. Ask students, by show of hand, who had a positive Total Profit and who had a negative. Discuss.

8. Identify the student who has the highest profit by asking “who’s total profit is higher than X?” until there is only one student left. This student won the game.
**Bonus Round**

1. Have students take out their homework with the Investment Options. Explain that the investment options were:
   a. **Option 1** represents a treasury bond, the safest type of investment. Students who chose this option made $221.30 in 10 years.
   b. **Options 2, 3, and 4** represent Mortgage Backed Securities. Explain to students that they will have to roll based on how risky these are. Option 2 will default on the loan if students roll a 1. Option 3 defaults with a roll of 1, 2, or 3. Option 4 with a roll of 1, 2, 3, or 4.
   c. **Option 5** represents Collateralized Debt Obligations (CDO’s). These were created from the highest risk mortgages and repackaged in a way that would receive AAA ratings and make them seem safe. In fact, they turned out to be very risky investments. Option 5 loans default with a roll of 1, 2, 3, 4, or 5.

2. Give students a moment to roll for their investment option. Ask students, by show of hands, how many lost their initial $1,000 investment.
**Discussion**

Discuss the simulation with students. **Good questions to ask:**

- What strategies did you use for each round and why?
- When it first became allowed to loan out to low FICO scores, did you? Why or why not?
- What did you think when Wall Street started buying out mortgages? How did it affect your strategy at the beginning of Round 3?
- How did you feel when Wall Street stopped buying out those mortgages? Why? How did it affect your strategy?
- What was higher, your Total Fees or Total Interest Earned? Why? What does that incentivize?
- Which Investment Option did you choose? Why? How did it turn out? Why?

**Observations to share with students during the discussion:**

- As Wall Street demanded more mortgages the standards for these mortgages decreased. In the beginning of the simulation students were only lending to prime borrowers. As the simulation progressed and Wall Street demanded more mortgages, the minimum requirements for a mortgage dropped.
- At the end of the simulation banks were stuck holding bad mortgages. The situation was so bad the government that the federal government had to bail out the big banks.
- This crisis was not limited just to Wall Street. It also hit main street, as seen in the Investment Options. Investors that choose Options 2–5 experienced huge losses.
- The **number of subprime mortgages** (FICO scores below 600) soared. In 2002, less than 10% of U.S. mortgages were subprime. Three years later, approximately 25% were.
- Approximately 11 million homebuyers faced foreclosure from 2008 to mid-2012.
- The role of bank loans and Wall Street is only part of the picture. There was plenty more, including the role of government, that went into the Great Recession.
## Pre-Simulation Activity

### Investment Options

<table>
<thead>
<tr>
<th>Type</th>
<th>Interest (%)</th>
<th>Duration</th>
<th>Ratings</th>
<th>Amount</th>
<th>Interest ($)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Option 1</td>
<td>1%</td>
<td>120 Months</td>
<td>Gov’t Backed</td>
<td>$1,000</td>
<td>$221.30</td>
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<tr>
<td>Option 2</td>
<td>2%</td>
<td>120 Months</td>
<td>AAA</td>
<td>$1,000</td>
<td>$491.33</td>
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<tr>
<td>Option 3</td>
<td>4%</td>
<td>120 Months</td>
<td>BBB</td>
<td>$1,000</td>
<td>$1,222.58</td>
</tr>
<tr>
<td>Option 4</td>
<td>5%</td>
<td>120 Months</td>
<td>BB</td>
<td>$1,000</td>
<td>$1,722.58</td>
</tr>
<tr>
<td>Option 5</td>
<td>3%</td>
<td>120 Months</td>
<td>AAA</td>
<td>$1,000</td>
<td>$820.75</td>
</tr>
</tbody>
</table>

**Instructions:** You are married and have two children, four and three years old. You and your spouse want to start saving for their college education. Your financial advisor provides you with five options. She explains that the ratings are measures of how safe the loans are and the interest ($) is the return on your loan after 120 months. Your goal is to accumulate as much as possible for the college fund. You can only choose one option.

Which option would you choose? Explain your choice below.
### Securitization Simulation

#### Chart A — Bank Information for Loan Officer

<table>
<thead>
<tr>
<th>Percent</th>
<th>FICO Range</th>
<th>1 Yr. Interest</th>
<th>Foreclosure Roll</th>
</tr>
</thead>
<tbody>
<tr>
<td>3%</td>
<td>700 – 800</td>
<td>1,725.90</td>
<td>1</td>
</tr>
<tr>
<td>5%</td>
<td>600 – 699</td>
<td>3,108.50</td>
<td>1, 2</td>
</tr>
<tr>
<td>5.5%</td>
<td>500 – 599</td>
<td>3,480.13</td>
<td>1, 2, 3</td>
</tr>
<tr>
<td>6%</td>
<td>300 – 499</td>
<td>3,861.00</td>
<td>1, 2, 3, 4</td>
</tr>
</tbody>
</table>

#### Chart B — FICO scores of individual loan-seekers

<p>| | | | |</p>
<table>
<thead>
<tr>
<th></th>
<th></th>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>700</td>
<td>710</td>
<td>760</td>
<td>780</td>
</tr>
<tr>
<td>630</td>
<td>640</td>
<td>650</td>
<td>660</td>
</tr>
<tr>
<td>560</td>
<td>580</td>
<td>600</td>
<td>610</td>
</tr>
<tr>
<td>450</td>
<td>500</td>
<td>525</td>
<td>550</td>
</tr>
<tr>
<td>330</td>
<td>390</td>
<td>400</td>
<td>440</td>
</tr>
<tr>
<td>320</td>
<td>310</td>
<td>305</td>
<td>300</td>
</tr>
<tr>
<td>Column 1</td>
<td>Column 2</td>
<td>Column 3</td>
<td>Column 4</td>
</tr>
<tr>
<td>----------</td>
<td>----------------</td>
<td>-------------------</td>
<td>--------------------</td>
</tr>
<tr>
<td>FICO</td>
<td>Loaned</td>
<td>Banking Fees</td>
<td>Roll of Dice</td>
</tr>
<tr>
<td>Scores</td>
<td>–$100,000</td>
<td>+$5,000</td>
<td></td>
</tr>
</tbody>
</table>

**Total**  
–$ +$ $\text{------------------------} -$ +$

**Round 1 Balance of Potential Loans:**  
($1,000,000 \text{ minus Column 2 Total}$)
# Chart 2 — Round 2

<table>
<thead>
<tr>
<th>Column 1</th>
<th>Column 2</th>
<th>Column 3</th>
<th>Column 4</th>
<th>Column 5</th>
<th>Column 6</th>
<th>Column 7</th>
</tr>
</thead>
<tbody>
<tr>
<td>FICO Scores</td>
<td>Loaned –$100,000</td>
<td>Sold to Wall Street +$100,000</td>
<td>Banking Fees +$5,000</td>
<td>Roll of Dice</td>
<td>Foreclosure Losses –$40,000</td>
<td>1 yr. Interest (+)</td>
</tr>
<tr>
<td>Total</td>
<td>–$</td>
<td>+$</td>
<td>+$</td>
<td>–$</td>
<td>+$</td>
<td></td>
</tr>
</tbody>
</table>

**Round 2 Balance of Potential Loans:**

(Round 1 Balance minus Column 2 Total plus Column 3 Total)
## Chart 3 — Round 3

<table>
<thead>
<tr>
<th>Column 1</th>
<th>Column 2</th>
<th>Column 3</th>
<th>Column 4</th>
<th>Column 5</th>
<th>Column 6</th>
<th>Column 7</th>
</tr>
</thead>
<tbody>
<tr>
<td>FICO Scores</td>
<td>Loaned $100,000</td>
<td>Sold to Wall Street $100,000</td>
<td>Banking Fees +$5,000</td>
<td>Roll of Dice</td>
<td>Foreclosure Losses $40,000</td>
<td>1 yr. Interest (+)</td>
</tr>
<tr>
<td></td>
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<td></td>
<td></td>
</tr>
<tr>
<td><strong>Total</strong></td>
<td>−$</td>
<td>+$</td>
<td>+$</td>
<td>−$</td>
<td>+$</td>
<td></td>
</tr>
</tbody>
</table>

**Total Fees** (from all rounds):

**Total Interest** (from all rounds):

**Total Foreclosure Losses** (from all rounds):

**Total Profit**:

(Total Fees plus Total Interest minus Total Foreclosure Losses)
# Example Chart 1

<table>
<thead>
<tr>
<th>Column 1</th>
<th>Column 2</th>
<th>Column 3</th>
<th>Column 4</th>
<th>Column 5</th>
<th>Column 6</th>
</tr>
</thead>
<tbody>
<tr>
<td>FICO Scores</td>
<td>Banking Fees</td>
<td>Loaned</td>
<td>Roll of Dice</td>
<td>Foreclosure Losses</td>
<td>1 Yr. Interest (+)</td>
</tr>
<tr>
<td>700</td>
<td>$5000</td>
<td>$100,000</td>
<td>3</td>
<td>0</td>
<td>$1,752.90</td>
</tr>
<tr>
<td>710</td>
<td>$5000</td>
<td>$100,000</td>
<td>5</td>
<td>0</td>
<td>$1,752.90</td>
</tr>
<tr>
<td>760</td>
<td>$5000</td>
<td>$100,000</td>
<td>4</td>
<td>0</td>
<td>$1,752.90</td>
</tr>
<tr>
<td>780</td>
<td>$5000</td>
<td>$100,000</td>
<td>3</td>
<td>0</td>
<td>$1,752.90</td>
</tr>
<tr>
<td>630</td>
<td>$5000</td>
<td>$100,000</td>
<td>2</td>
<td>$40,000</td>
<td>0</td>
</tr>
<tr>
<td>640</td>
<td>$5000</td>
<td>$100,000</td>
<td>4</td>
<td>0</td>
<td>$3,108.50</td>
</tr>
<tr>
<td><strong>Total</strong></td>
<td><strong>+$30,000</strong></td>
<td><strong>$600,000</strong></td>
<td><strong>$1,752.90</strong></td>
<td><strong>$40,000</strong></td>
<td><strong>+$10,012.10</strong></td>
</tr>
</tbody>
</table>

**Round 1 Balance of Potential Loans:** $400,000

($1,000,000 minus Column 3 Total)
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