



Subprime Mortgage Crisis

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Quote to Describe the Crisis

- The first major financial crisis of the 21st century involves esoteric instruments, unaware regulators, and skittish investors. It also follows a well-trodden path laid down by centuries of financial folly.
 - Reinhart, Carmen and Kenneth Rogoff, “Is the 2007 US Sub-Prime Financial Crisis so Different?,” NBER Working Paper 13761, January 2008



Simple Financial Crisis Story

- As U.S. housing prices accelerated, so did the amount of mortgages to subprime borrowers
- Mortgage credit was promoted by securitization, and misguided and incomplete regulation
- When housing prices started to fall, the weakest borrowers defaulted on their mortgages
- The mortgages had been repackaged—who holds them? All lenders require a premium
- There is little liquidity in the system, which has affected all borrowers—financial crisis



Two Kinds of Financial Crises

- “For a [financial crisis] to qualify as a banking crisis, we must observe ... erosion ... of aggregate banking system capital”
- “For a [financial crisis] to qualify as a currency crisis, we must observe ... abandonment of a pegged exchange rate ...”
- Financial crises may result in output decline
 - “Is the Crisis Problem Growing More Severe?” Michael Bordo, Barry Eichengreen, Daniela Klingebiel and Maria Soledad Martinez-Peria, December 2000



Outline of Presentation

- 1. Famous financial crises
- 2. Common elements
- 3. Real estate prices
- 4. Subprime mortgage lending
- 5. Securitization
- 6. Regulation
- 7. Federal Reserve policies

Tulips





1. Famous Financial Crises

- Tulip Mania
 - Holland in 1634-7 (Rembrandt: painter & investor)
- 1907 Crisis
 - USA
- 1929 Stock Market Crash
 - USA
- 1992 Banking Crisis
 - Japan
- 1997 Currency Crisis in South East Asia



1907 Crisis (Moen & Tallman)

- Two kinds of depository institutions
- Banks hold reserves against deposits
 - NY banks had 25% reserve requirement
 - Bank assets doubled between 1897 and 1907
- Trusts had no reserve requirements before 1906
 - Only 5% of deposits is kept in form of vault currency
 - Trust assets more than tripled (1897-1907) and were almost as large as bank assets in 1907



Balance Sheets of Banks & Trusts

■ Assets

- Reserves = 25%
(or 5%) of Deposits
 - Essence of a “bank”
run—the financial
system is fragile
- Loans and other
assets

■ Liabilities

- Deposits
- Borrowing
- Capital = NW = A - L



Trusts

- Specialized in mortgages (~S&L), which banks could not originate
- Hold riskier assets than banks (stocks ~ hedge funds)
- Were not integrated in the NY Clearing House
 - Local lender of last resort
 - Just like investment banks are not part of the Fed
- We see riskier assets in the less regulated, more fragile part of the banking system



Knickerbocker Trust

- Stock market peaked in March 1906 and fell dramatically—weakened trust assets
- Knickerbocker Trust experienced a run in October 1907 and went bankrupt because
 - The Trust President (Charles Barney) had used loans to take part in cornering the copper market
 - The price of copper fell (corner was unsuccessful) and the loans became worthless
- Two more large trusts also experienced runs



Role of J. P. Morgan

- Some bankers wanted the trusts to fail
 - Trusts had left the Clearing House in 1903
- Morgan recognized the potential impact—contagion—failures could impose on NY banks
- He helped raise private and public funds (along with the U.S. Treasury) to add reserves to other, fundamentally healthy, trusts
- As more bankers did not want to see another cliff hanger, they accepted the need for a larger lender—Federal Reserve System (1913)



2. Common Elements of a Crisis

- Bubble in the price of an asset
 - Tulip bulbs, equity shares, copper—housing
- Credit expansion
 - People hold less cash and more real assets—houses
- Euphoria
 - Easing of lending standards—mortgage lenders
- Change in psychology
 - People start to ignore potential signs of trouble (2005)



Common Elements—Downturn

- Leveling of prices
 - A variety of reasons (2006)
- Start of a crisis
 - People are eager to switch back to holding money
- Fall of asset prices
 - As people sell assets
- Cascade of bankruptcies
- Possible deflation



Why This Pattern?

- Assume that investors forecast a 10% increase in asset prices (bulbs or stocks) per year
- Asset prices then rise by 10%
- This process repeats for several years
- Investors see their expectations confirmed and they start to believe them
 - This is sometimes called a rational bubble
- More investors become speculators: they borrow on expectations of higher prices



Downturn

- Such a large increase in prices cannot be sustained over the long term
- But no one knows how long the short term is
 - So investors and speculators keep buying
- Inevitably, the price increase stops
- When it stops, speculators have accumulated a lot of loans (liabilities)
- As prices (bulbs or stocks) fall, the loans are worth more than the assets—bankruptcies start



3. Real Estate Prices

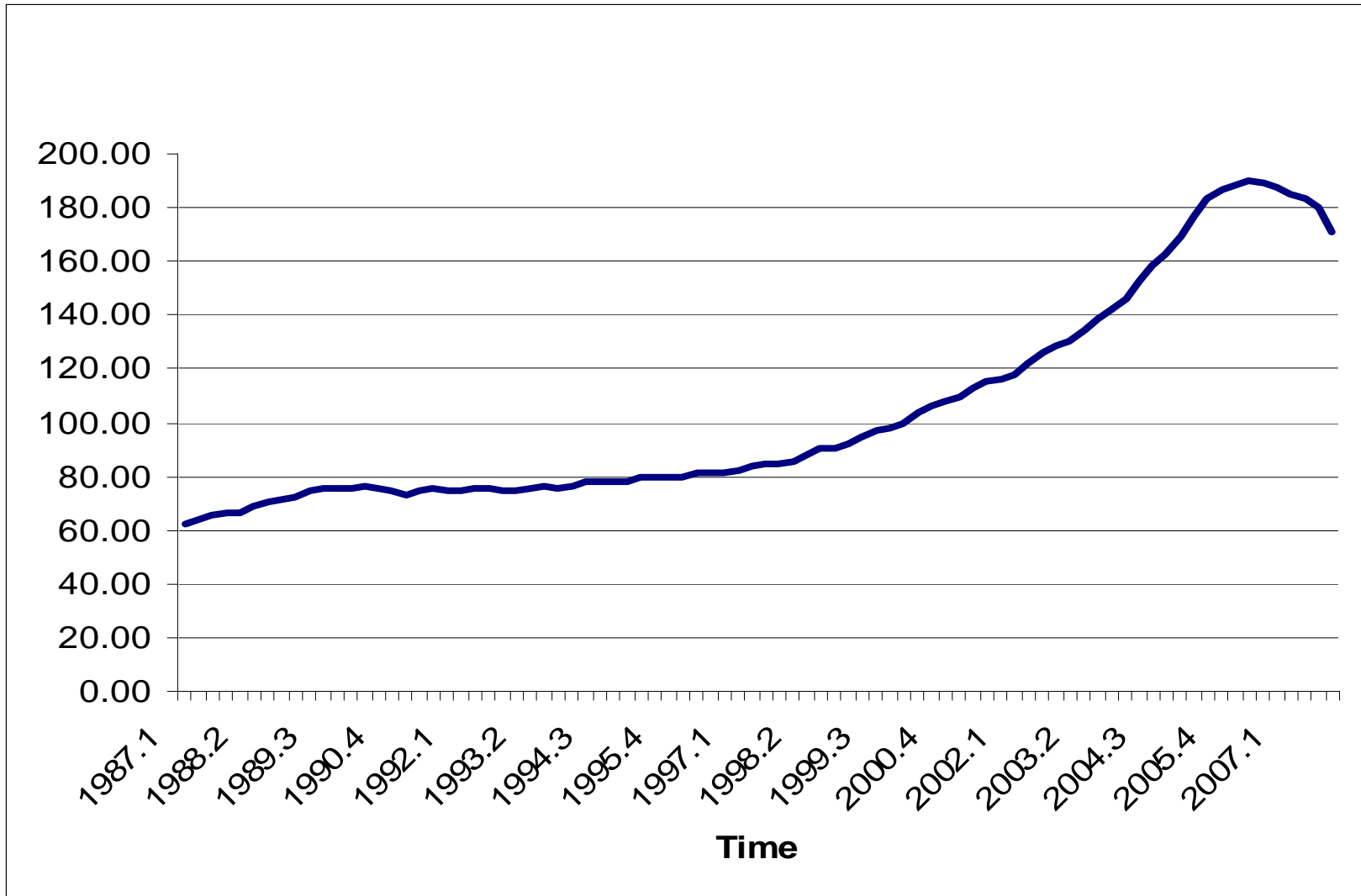
- Real estate prices are constant in real terms
 - Holland: 300 years of data
 - Manhattan: 100 years of data
- Land prices rise with population but fall with improvements in transportation technology
 - Construction costs tend to be constant, too
- Real estate prices fall or rise in different decades
- If we see a sharp continuous increase in housing prices, a bubble may be present



Case-Shiller Real Estate Indices

- Launched in 1987 in USA
- They use prices of the same of houses to hold constant the quality of housing
 - Repeat sales index technique
- Include 20 U.S. metropolitan areas monthly
- One index is a national quarterly average
- 2006: 31.5% of home purchases for investment

Case-Shiller Home Price Index



Three Different Periods of Index

- 1987-I: 62—2000-I: 100; Increase = 61%
 - Annual rate of return = 3.74%
 - Annual inflation (1926-2006) = 3.1%
 - Range: -2.8 (1990) to 8.6 (1988 and 1999)
- 2000-I: 100—2006-II: 190; Increase = 90%
 - Annual rate of return = 10.8%
 - Range: 8 (2001) to 15.6 (2004)
- 2006-II: 190—2007-IV: 171; Decrease = 10%
 - Annual rate of return = -8.1%



Warning Signs: City Prices

- Housing prices peaked at different times
- Prices in nine cities peaked in 2005 and should have given a warning
 - September: Boston & Cleveland
 - October: Denver
 - November: San Diego, San Francisco & Minneapolis
 - December: Dallas, Detroit & Charlotte

4. Subprime Mortgages

Loan-to-value ratio

Credit score	<80 Percent	80-90 Percent	>90 Percent
660 or higher	Prime	Near-prime	<u>Subprime</u>
581 to 659	Near-prime	Near-prime	Subprime
580 or lower	Subprime	Subprime	Subprime

SOURCE: Hancock, Diana; Lehnert, Andreas; Passmore, Wayne and Sherlund, Shane M. "An Analysis of the Potential Competitive Impacts of Basel II Capital Standards on U.S. Mortgage Rates and Mortgage Securitization." Basel II White Paper No. 4, Board of Governors of the Federal Reserve System, 2005

From St. Louis Fed website



Features of Subprime Mortgages

- Low credit score of borrowers
 - Low or no documentation required
- High loan-to-value ratios
 - Same as low down-payments
- Adjustable rates
 - Low “teaser” rates
- Interest only payments
 - Negative amortization
- Higher rates (2-4%) eventually
 - Real attraction—early ones had positive NPV
 - Prime mortgages earn zero economic profit (~IBM: no PC)



Mortgage Banks/Lenders

- Are not depository institutions
 - Depository institutions traditionally keep their loans on the balance sheet
- Specialize in making mortgages, but they do not hold them in their portfolios—they sell them
- May service them by collecting monthly payments
- Are regulated (but not supervised) and have low capital requirements
 - They need them for returned mortgages
 - New Century went bankrupt (had lowered standards)
 - Imposed losses on its creditors (Morgan Stanley, Goldman Sachs...)

Balance Sheets of Banks

■ Assets

- Reserves = 10% of Deposits
- Loans and other assets

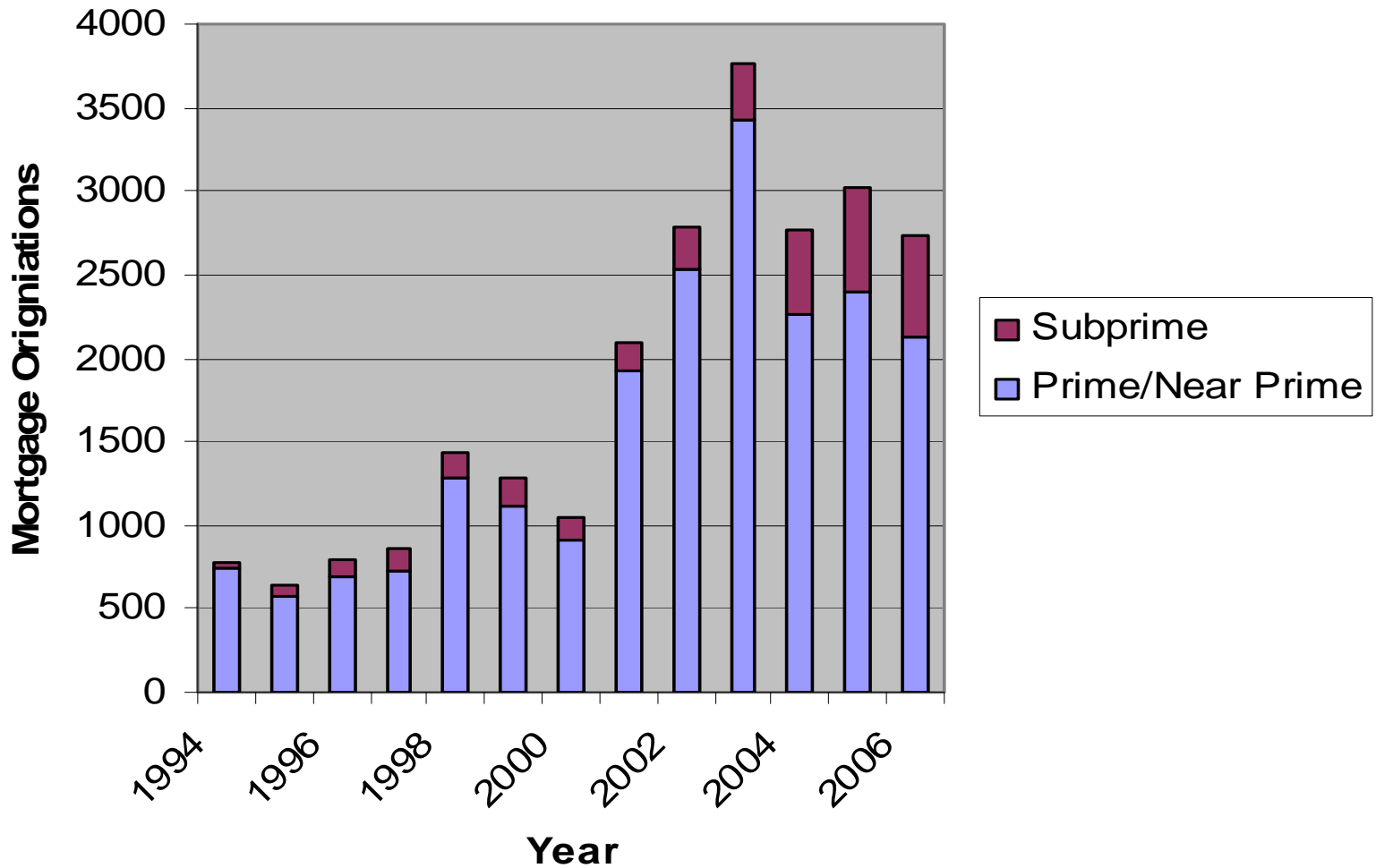
■ Liabilities

- Deposits
- Borrowing

■ Capital = NW = 8% of Assets

- Too high for prime mortgages

Breakdown of Mortgages





5. Securitization

- Mortgages are heterogeneous
- They vary by property; amount; loan-to-value ratio; interest rate
- A secondary market does not develop spontaneously; aided by the government
- Securitization started in the mortgage market in the 1970s—was promoted by the federal government
 - Ginny Mae insured flows from mortgage pools
 - No capital requirements for securitized mortgages



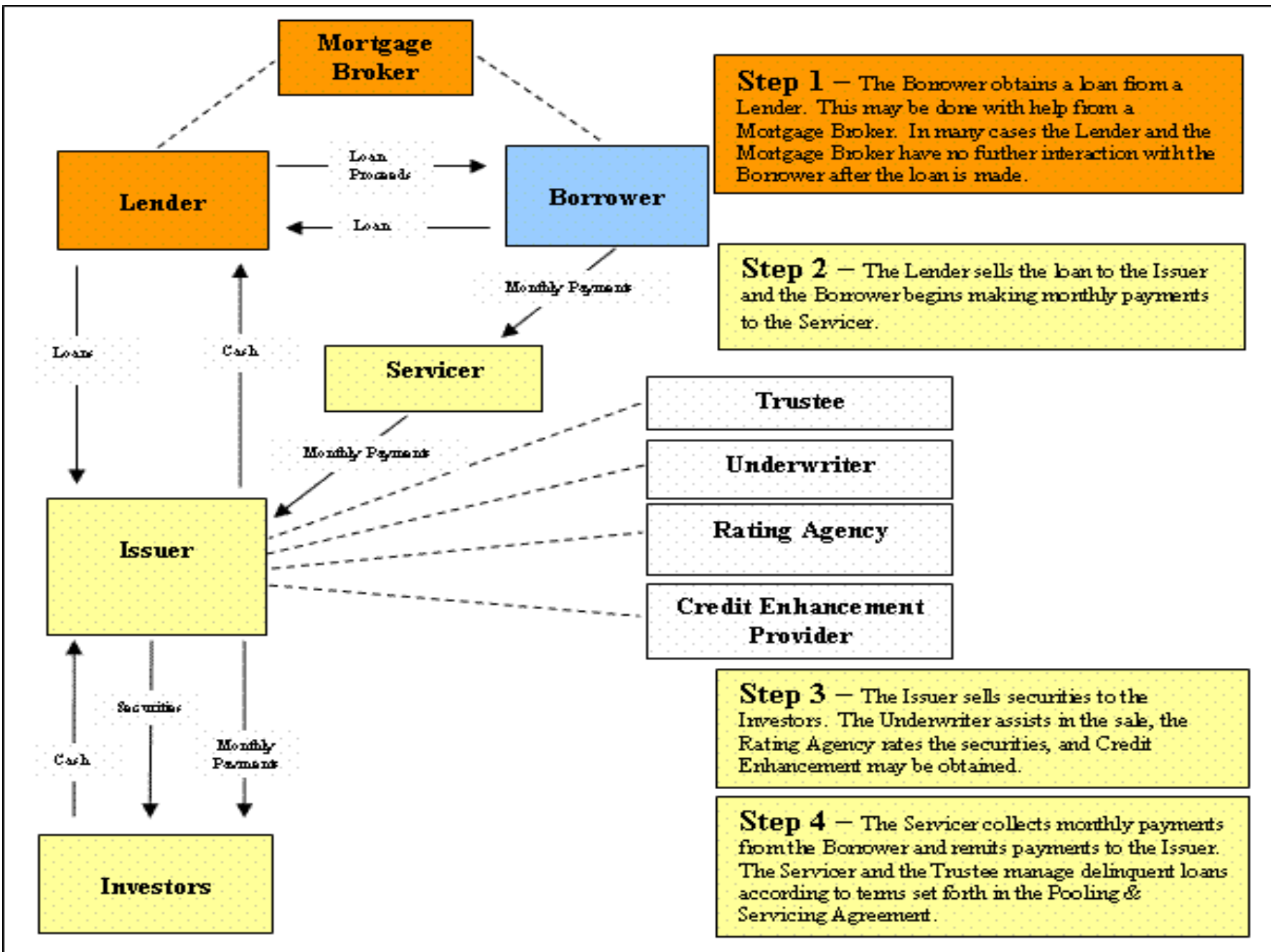
Mortgage Brokers

- Are like independent insurance agents who find the best policy for their clients
- Screen borrowers, find lenders, and write mortgage contracts
 - Developed automated screening to speed up the screening process – what happened to quality?
- Along with mortgage bankers, they increased the volume of originated loans
 - Are these institutions more careful in screening borrowers than commercial banks?



Securitization Process

- An intermediary (Issuer--Special Purpose Vehicle/Entity)
- Buys many mortgages and **pools** their cash flow
- Sells this cash flow in the form of a new security (Mortgage Backed Security—MBS)
- Creates new cash flow: in larger blocks and maybe less frequently
- Reduces transparency






Example of Securitization

- There are 8 households; each one makes regular mortgage payments: \$8000, \$7000, \$6000, ..., \$1000
- \$36,000 each month—\$216,000 semiannually
- Can be sold as a new security to 20 investors (around the world) who want to receive \$10,000 semiannually (leaving \$16,000 “as insurance”)
 - The payments can be monthly, too
- FNMA (Fannie Mae) and Freddie Mac now issue MBS



Slicing of Mortgage Pools

- Each pool is divided in several tiers (tranches)
 - The top tier has first claim on the available cash flow
 - The last tier has the last claim on the cash flow
- Assume that there are five tranches and that half the borrowers default
 - The bottom two tranches receive no payment
 - The middle tranche receives half
- Investors rely on rating agencies
- Agencies assumed that the top tiers are risk-free



Securitization & Housing Prices (Mian and Sufi)

- They look at a cross section of neighborhoods
- There were many neighborhoods in which potential home buyers were frequently rejected in the 1990s
- These buyers applied again in the 2000s and were extended subprime mortgages—while their credit score did not improve (relaxed standards)



Impact of Securitization

- The neighborhoods in which lending rose the most were also the neighborhoods in which
 - Prices rose the fastest
 - Securitization increased the most
 - Defaults (since 2005) rose the most
 - Especially when securitized loans were sold to non-affiliates
 - Evidence of moral hazard



6. Regulation as a Problem

- 1977 Community Reinvestment Act
- 1980 DIDMCA eliminated usury ceilings
- Federal Housing Administration guaranteed more mortgages
 - Pushed homeownership
 - Increased competition in the subprime market



Regulation as a Solution

- Economist: Capital requirements should rise in a boom (move against the tide)
- No preferential treatment for risky borrowers (homeownership)
- It is very hard to provide adequate oversight of balance sheets, timely intervention when balance sheets weaken, and satisfactory resolution when they are weak



7. Federal Reserve Policies

- Goals of Central Bank
 - Price level and output stability
 - Not asset price stability
- Greenspan was worried about the increase in the stock market but kept interest rates low to promote economic expansion & indirectly mortgage demand
- Bear Stearns and the trusts of 1907



Summary

- There was a bubble in the U.S. housing market
- Prime lending yields “normal returns”
- Subprime mortgages were promoted by securitization, misguided and incomplete regulation & expectations of higher house prices
- When housing prices started to fall, the weakest borrowers defaulted on their mortgages
- The mortgages had been repackaged
- Who holds subprime mortgages? Financial crisis

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- http://www.mbaa.org/files/Research/Historical_Mortgage_Origination_Estimates.pdf



FICO scores

- A FICO score is between 300 and 850, exhibiting a left-skewed distribution with 60% of scores between 650 and 799.^[2] According to Fair Isaac the median score is 723 (half of scores above and below) whereas according to Experian (using the Fair Isaac risk model) the average credit score is 678 (lowest scores are farther from the median than the highest scores)
- Wikipedia