Collateral and Default: Booms and Busts

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Lecture 1
Leverage, Default, and Forgiveness

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What Caused the 2007-9 Crisis and How I Think We Should Have Prevented It and Fixed It and What to Do Now

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Outline

• Leverage Cycle caused it
• Forgiveness would have fixed it
• Reform Fed Goals and Monetary Policy
  – End obsession with riskless interest rates

• Energize Office of Financial Research
• Infrastructure: stop Austerity
• Entitlement Reform
Definition of Asset Leverage vs Investor Leverage

• **Collateral** = Asset put up as guarantee of loan. Often a house. I will assume no-recourse loans, like housing.

• If can use $100 house to borrow $80, then margin or down-payment or haircut is 20%

• **LTV** is 80%, leverage is 5.

• Leverage on new loans is key: different from debt/equity on old loans. Reinhart-Rogoff talk about leverage going up for 2 years after big crisis, then de-leverage for 5-7 years. Using Old leverage.
Leverage Cycle

• My experience at Kidder Peabody in 1994
  – Collateral Equilibrium 1997
• My experience at Ellington in 1998
  – Leverage Cycle 2003
• My experience at Ellington in 2008
  – Forgiveness 2008
  – CDS 2010
Leverage Cycle Theory

• Long Period of Low Volatility and Financial Innovation Leads to Increased Leverage and Increased Activity
• That raises asset prices
• And makes economy more vulnerable.
• Lesson : Fed should regulate leverage
• Scary Bad news decreases leverage
• That lowers asset prices and activity but leaves debt.
• CDS suddenly appears, lowering prices more
• In acute stage of crisis, Fed must prop up leverage.
• If in aftermath, depressed asset prices stay too low relative to debts, debt must be forgiven
Crisis of 2007-09

• Before
  – Asset prices shot up
  – Investment and construction soared
  – Borrowing Ballooned
  – Defaults low

• After
  – collapsed
  – died
  – shrank
  – exploded

• Riskless Interest rates don’t explain the pattern
  – Low then high before crisis
  – Low after crisis
Leverage and Volatility Do

• Leverage rose steadily before the crisis, and collapsed after.
• Volatility was low during Great Moderation and Soared in the Crisis.
• (We will cover this in Lecture 3).
Shakespeare got this Right 400 years ago.

The Merchant of Venice

Who can remember the interest rate Shylock charged Antonio and Bassanio?

Bassanio is no fool.

Quality of Mercy
Leverage Cycle

• Seems like common sense.
• Yet major implications still not accepted, even if more attention paid to it:
  – Empower Fed to regulate leverage
  – Put endogenous leverage into large macro models used by policy makers
  – De-stigmatize Default and Forgiveness
What’s Missing from Macroeconomic Models

• Didn’t predict crisis. Overestimated effect of stimulus.
• All based on technology shocks or shocks to expectations of technology.
• Even fitting those models after the fact to the crisis, no connecting shocks in model to actual shocks.
• Shocks in model do not increase uncertainty/volatility.
• No default
• No changes in leverage or down-payment (or credit quality) demanded by lenders in those models as a result of changes in perceived likelihood of default.
• No analysis of optimal leverage policy.
• No allowance for underwater agents, or effect of indebted agents.
What’s Missing from Macroeconomic Models

• No calibration of heterogeneity (such as degree of differences in beliefs) and how that changes over cycle.

• No mention of financial innovation. Financial innovation has been huge. Yet they never appear in macroeconomics courses, as if they have no effect on the macro-economy.
  – Securitization: $10 trillion
  – CDS and other derivatives: $60 trillion
  – Credit cards: everybody in the world has one

• No money actually in the model, yet inflation and monetary policy is the whole point of the analysis.
Equilibrium Leverage

Standard Economic Theory:

Equilibrium (supply = demand) determines interest rate.

In my theory:

Equilibrium determines Leverage as well. (Lecture 2).

Surprising that one equation can determine two variables.

In standard theory either ignore default (hence need for Collateral) or fix leverage at some constant.
What Determines Leverage

• **Interest rates** determined by impatience.
• **Leverage** determined by uncertainty about and disagreement over future collateral prices because lenders worried about default. **Volatility/Down-Risk** is crucial.
  - In long run **financial innovation** increases leverage, e.g. by creating tranching and pyramiding
Precise in Binomial Models

• When there are just two possible future states, it is possible to make these claims completely rigorous, giving a general formula for equilibrium leverage that depends simply on down risk of asset payoffs (not quite volatility, but related).

• Assets with bigger down risk can be leveraged less.
Fear of Default

- Default emerged from the crisis as one of the central problems in macro economics, and a central problem in macro prudential policy.
- Before the crisis, default and its consequences were almost entirely missing from macro economics.
- The rational fear of default is often more important than the default.
Old Fashioned Default Models, if one could find them in macro

• Understood default as a change in the payoffs of a loan.
• Observed that loans with different anticipated payoffs would trade at different interest rates.
• Concluded that a riskier world would lead to bigger losses per dollar promised and higher interest rates.
Default and Collateral Equilibrium

• However, lenders worried about default do not simply raise interest rates. They change other terms of the contract.

• Collateral is most important.

• Credit is described not by a number but by a surface.
Credit Surface

Collateral not binding
Since no chance of default

1+r

1+r_j

LTV_j*

100%

LTV
Credit Terms and Credit Tightness

• As collateral gets huge relative to promise, the credit surface will become flat, and the required interest rate will approach the riskless rate.

• Two credit surfaces can have the same riskless interest rate, but reflect entirely different credit environments, if surfaces not flat.

• Credit tightness does not mean just a high (riskless) interest rate. Tightness might be measured by steepness of credit surface (not absolute height). Analogous to spreads.

• Like offer curve for credit.
More fear
Credit Surface Equilibrium

• Driven not just by impatience and productivity and growth, as is the case with credit models without uncertainty, but also by the perception of default losses.

• Greater fear of default implies a tighter credit market, not just higher interest rates.

• Key idea: Perception of greater losses does not move credit surface up in parallel, but tilts the credit surface to reduce the expected equilibrium defaults.

• Paradoxically, a safer world can create generate more equilibrium defaults.
Geanakoplos 1997. Assume borrower who defaults only loses the collateral. So in each state $s$ will deliver

- $\min(\text{promise}(s), \text{collateral}(s))$.
- Thus assume payment enforcement problems but not cash flow problems.
- Very different from Holmstrom-Tirole (1997) or Bernanke-Gertler (1989), where borrower might steal the money or not work hard. These models depend on asymmetric information about cash flows.
Modeling the Credit Surface

• Geanakoplos 1997.

• A contract or loan is defined by a pair
• \((A,C)\) where \(A\) is the promise and \(C\) is the collateral.

• Every pair trades in equilibrium at a price
\(\pi(A,C)\).

• \(\text{LTV}(A,C) = \pi(A,C)/p(C)\)
Non-contingent promises

• Think of loan $j$ promising as $j$ dollars in every state next period.
• Think of collateral as one unit of some asset.
• Each contract $j$ trades at its own price $\pi_j$.
• As $j$ increases, $LTV_j = \pi_j/p(C)$ increases
• Non-contingent promise defines interest
  • $1 + r_j = j/\pi_j$
• Which is increasing
Collateral not binding
Since no chance of default

1 + r_j

1 + r

LTV_j*

E
A

D
C
B

100%

LTV
Mapping Realized Credit or Flow of Funds

• Realized credit trades are points on the credit surface.
• Can count the volume or number of loans at each point on the credit surface to see credit picture of economy.
• Could also label it with type of borrower.
• This is flow of funds data, but that is not so easily accessible.
Multi-Dimensional Credit Surface
Tractable Binomial Model

• Introduced in Geanakoplos (1997), (2003)
• Simplest models in which can see effect of uncertainty on endogenous leverage.
• Binomial No Default and Leverage Theorem proved in Fostel-Geanakoplos (2013).
• Case of binomial trees with financial assets, but arbitrary utilities, many assets, commodities, time periods, etc, is thus completely tractable.
Binomial No Default Theorem: If binomial tree and agents get no utility from holding collateral, (like with REPO) then no default in equilibrium. Only non-contingent promise traded is \((d_D, d_D)\). Hence down volatility up (\(d_D/d_U\) goes down) implies leverage down.

(If utility from holding collateral, like housing, then can have default in equilibrium.)
In Binomial Economies with Financial Assets, all loans occur at Point A. So collateral equilibrium easy to compute. No default in equilibrium. But fear of default drives equilibrium.
Collateral Equilibrium and Volatility

• Source of default risk and fear in collateral equilibrium is downside volatility of asset values.

• Can see in collateral equilibrium that as volatility goes up, credit markets tighten.
Significance of Tight Credit

• Many people who would want to borrow more at the riskless interest rate even if default meant death, are unable to get bigger loans without putting up more collateral.

• Just because interest rates are close to zero and nobody is borrowing does not mean that people think there are no positive yielding riskless investments.
Why Leverage is important

• As every trader knows, if leverage is 5, and asset moves by 1%, your return moves by 5%. If house price is $101, sell it, return $80 and make $1 on $20 = 5%. If banks hadn’t been so leveraged, they wouldn’t have lost so much money and we wouldn’t have had bailout.

• No-recourse collateral gives borrower the “put option” to walk away from the house if its value falls below debt

• But real significance of leverage in my theory is that it allows just a few investors to buy so many assets, and so explains bubbles.
More Leverage → Higher Asset Prices
Low Leverage → Lower Asset Prices
Why?

• Higher leverage means people can borrow more.

• If constrained borrowers have higher marginal propensity to consume houses than lenders, then increasing leverage will increase the demand for housing and hence the price of housing.

• More lending gets us closer to “correct price of housing” that would prevail in Arrow Debreu world with no constraints?
Collateral Bubbles

• But price of collateral goods can go higher in collateral equilibrium than in Arrow Debreu equilibrium (where borrowing is perfectly unconstrained).

• Can get bubble in collateral equilibrium.

• Why?
Conventional View

• Borrowing limited by need to post collateral to guarantee delivery.
• Therefore valuable investments can’t be made.
• Commodities that are especially important to some people can’t be purchased.
• Collateral requirement depresses prices and activity.
Government intervention

• Government should intervene to boost (or at least not curtail) borrowing? Did so
  – For housing
  – For education

• Yet,

• Got a housing bubble and crash and Great Recession.

• Education tuition bubble which might also lead to crash.
Why? What’s wrong with conventional reasoning?

• Collateral goods have extra (artificial) value because they can be used to borrow. If only blue houses could be used as collateral, people would buy more blue houses. Called collateral value.

• Collateral can be used via leverage to bet, i.e. to synthetically create a desirable security that cannot be directly purchased. So more extra value from buying.
Space of debt contracts

Debt contract promise \( j > j^* \)

Debt contract delivery

Arrow U security

Asset Y Payoff

\( d_U \)

\( d_D \)
Collateral Bubbles

• In collateral equilibrium agents are constrained from borrowing as much as they would like.
• Good collateral trades at a premium because it enables extra borrowing: collateral value!
• Optimists can leverage, pessimists cannot.
• Leveraged purchase enables owners to demand up Arrow security.
• Does not allow people to buy down Arrow security.
• Does not allow people to sell up Arrow security.
• State prices biased to high implicit price of Up Arrow security.
Why does leverage raise asset prices?

• Extra Leverage relaxes borrowing constraints and gives buyers more power without countervailing increase in seller power.
• Nobody is lending constrained.
• Relies on no short sales.
Marginal Buyer Theory of Price

If no short selling. That’s why CDS became important.
Heterogeneous Agents

- **Natural Buyers** vs Public (assume some Natural Buyers are borrowing constrained)
- Differ in risk tolerance.
- Differ in ability to hedge.
- Differ in sophistication and knowledge.
- Might use assets for production.
- Might get higher utility for holding assets
  - Like houses
  - Leads to equilibrium leverage giving default
- Or just more optimistic (different priors)
  - Leads to equilibrium leverage without default, like Repo market.
II. Leverage Cycle in Theory
(Dynamic version of foregoing)

• 3 Phases of Leverage Cycle
  • Up
  • Crash
  • Aftermath
Leverage Cycle Up

• Long period of Low Volatility/Down Risk
• Leverage goes up because of low volatility and gradual innovation (of institutions supporting leverage and tranching).
• Optimists acquire more and more of assets
• Asset prices go up
• Debt goes up for two reasons. Higher percentage of a higher number.
• Economy more vulnerable. Sets stage for crash.
Leverage Cycle Crashes Always Have same three aspects

• **Bad news** makes everyone value assets less. But bad news is also **scary**, creating more uncertainty and more disagreement = **high volatility**

• **De-leveraging** because nervous lenders ask for more collateral

• **Leveraged buyers** (optimists) crushed, some go bankrupt, others insolvent and functioning poorly.

• **Feedback**
Leverage Cycle starts before scary news.
Leverage Cycle Crash

Price falls more than any agent thinks it ought to because marginal buyer changes

Even worse if CDS suddenly appears
Leverage Cycle Aftermath

• Agents underwater
• Down risk stays high and leverage low
• Underwater agents do not make socially positive investments if they think their collateral might be seized
  – Why spend $10,000 to prevent $50,000 damage if you will lose your house in the end anyway.
• Can be better for everyone to forgive debt.
Highs and Lows

• Leverage makes the asset price higher than it would have ever been without leverage.
• But the low is lower than it would have been without leverage.
• The gap between high and low is thus much bigger than it would have been.
• Thus the number of underwater businesses and homeowners can be huge
Multiple Leverage Cycles.

Co-existing Leverage cycles can generate Market phenomena like:

- Flight to Collateral
- Contagion

Related Work

• Minsky talked about leverage (“as the Achilles heal of capitalism” in Tobin’s description of his work).
• Minsky moment when lending stops
• No model/mathematics
• No collateral – mostly about corporations’ debt payments vs income streams
Credit Cycle big contribution

• Credit cycle literature (Bernanke, Gertler, Gilchrist, Kiyotaki Moore, Holmstrom-Tirole) emphasizes diminution in investment and prices because people are limited in how much they can borrow to spend on goods by need to post collateral, or put own skin in the game.

• Credit cycle emphasizes multiplier-accelerator: higher asset-collateral values means (at fixed LTV) higher loans which means more investment which means more activity and higher asset values.
Credit Cycle vs Leverage Cycle

• Credit cycle literature missed collateral value and bubbles and overproduction.
• Missed dramatic changes in leverage which create dramatic changes in asset prices, in both boom (over-leverage) and bust (de-leverage) phase.
III. Recurring Leverage Cycles

- Tulip bulb craze in 1637 in Holland.
- Land boom and crash in 1920s in Florida before Depression.
- 1998 emerging markets and mortgages, bankrupted Long Term Capital
- 2007-9 subprime mortgage crash
The current leverage cycle
Note: The chart represents the average margin required by dealers on a hypothetical portfolio of bonds subject to certain adjustments noted below. Observe that the Margin % axis has been reversed, since lower margins are correlated with higher prices.

The portfolio evolved over time, and changes in average margin reflect changes in composition as well as changes in margins of particular securities. In the period following Aug. 2008, a substantial part of the increase in margins is due to bonds that could no longer be used as collateral after being downgraded, or for other reasons, and hence count as 100% margin.
Note: The chart represents the average total repo loan as a percentage of asset value available from dealers on a hypothetical portfolio of CMOs originally rated AAA, subject to certain adjustments noted below. The price time series of imputed Alt-A floater prices is based on the Alt-A price drop vs. agency collateral time series available from Barclays.

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Observe that the Down Payment axis has been reversed, because lower down payment requirements are correlated with higher home prices.

Note: For every AltA or Subprime first loan originated from Q1 2000 to Q1 2008, down payment percentage was calculated as appraised value (or sale price if available) minus total mortgage debt, divided by appraised value. For each quarter, the down payment percentages were ranked from highest to lowest, and the average of the bottom half of the list is shown in the diagram. This number is an indicator of down payment required: clearly many homeowners put down more than they had to, and that is why the top half is dropped from the average. A 13% down payment in Q1 2000 corresponds to leverage of about 7.7, and 2.7% down payment in Q2 2006 corresponds to leverage of about 37.

Note Subprime/AltA Issuance Stopped in Q1 2008.
Figure 1
Household leverage ratios: Debt to disposable income

Leverage is debt to equity in this San Francisco Fed study

Figure 3
Household leverage and the run-up in house prices

% change in house prices, 1997-2007
% point change in household leverage, 1997-2007

Note: The plotted line depicts the best fit relationship in the data as generated by a simple least square statistical regression.
Figure 4
Household leverage and the decline in consumption

% change in consumption, 08Q2-09Q1

% point change in household leverage, 1997-2007

Note: The plotted line depicts the best fit relationship in the data as generated by a simple least square statistical regression.

Glick-Lansing FRBSF 2009
The Net Worth Shock

- Leverage by net worth and housing shock correlation

![Chart 1.1: Leverage Ratio for Homeowners By Net Worth Quintile](image)
The Net Worth Shock

- Net worth change in the cross-section of zip-codes
Net Worth Shock and Change in Consumption

Auto Sales Growth 2006-2009

Net Worth Shock

Mian-Sufi
How did crash start?

• Conventional view is that housing prices suddenly fell, and fell more than anyone imagined, so banks lost huge money, and that rippled through economy.
• My view: Housing prices had been going up because of increasing leverage, but LTV can’t go above 100, so increase bound to stop as LTV approached 100.
• Scary bad news of delinquencies + credit default swaps creation in mortgages at top of cycle led to dramatic fall in BBB prices before big fall in housing prices.
• Led to tightening of collateral on houses. That led to dramatic fall in housing prices. Then government did not intervene properly in housing market, and prices fell further.
Housing Leverage Cycle
Margins Offered (Down Payments Required) and Housing Prices

Observe that the Down Payment axis has been reversed, because lower down payment requirements are correlated with higher home prices.

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Note Subprime/AltA Issuance Stopped in Q1 2008.

Housing Peak at Q2 2006
Slightly down Q4 2006
CDS created on subprime late 2005
ABX securities index collapses Jan 2007
Then housing prices start to free fall
BBB prices crash before big drop in housing
Scary
Bad News

DQ / Orig

OT S Delinquent 90+ / Orig

CWL 2003-1
CWL 2004-1
CWL 2005-1
CWL 2006-1
CWL 2007-1
Leverage Cycle Idea

- Volatility ↔ Leverage ↔ Asset Prices

- Volatility/down risk is a proxy for fear of default.
- In models it is downside risk of collateral price.

- Low volatility/down risk implies high leverage which implies high asset prices. Fear of default implies low leverage implies low asset prices.
IV. 2007-9 Worst Leverage Cycle

because

• Leverage got higher than ever before.
  – Prolonged low volatility
  – Securitization innovation
  – Government implicit guarantees e.g. to Fannie and Freddie and to Too Big to Fail banks allows them all to borrow more cheaply, and therefore to leverage more.
  – Banks lied about how leveraged they were.
  – Low rates (global imbalances) encouraged search for yield via leverage.

• Double leverage cycle, in housing and securities.
  – Feedback between the two

• CDS appeared for first time at peak of cycle
  – Allowed pessimists to leverage and helped cause crash.
  – Since optimists selling insurance instead of buying it, CDS added to losses for optimists when asset prices fell

• Houses and banks further underwater making for bigger foreclosure deadweight costs
Fostel-Geanakoplos (2012, 2014) propose the possibility that the mortgage boom and bust crisis of 2007-2009 might have been greatly exacerbated by financial innovation.

**Timing** of financial innovation:

Leverage and Securitization came first, raising asset prices, then

**CDS** followed much later, crushing their prices.

(we will cover this in Lecture 4)
Tranching

- A more sophisticated kind of leverage, with even greater effect on price.
Leverage Cycle and CDS

• CDS market not standardized for mortgages until 2005.
• CDS allow pessimists to leverage their opinion that market is too high instead of sitting on sidelines.
• That was another shock at top of bubble.
• Market might never have gotten so high if CDS traded from beginning.
Big growth, but after Growth in securitization

Source: IBS OTC Derivatives Market Statistics
Unexpected Introduction of Tranching at $t=2$

Unexpected Introduction of CDS at $t=3$

Unexpected introduction of Leverage at $t=1$

Non-Leverage Economy at $t=0$

Fostel-Geanakoplos (2012)
V. What’s so bad about so much leverage?

• Leverage changes asset prices.
• Most important savings vehicle for households is their home. Leverage makes that riskier.
• Most important asset for banks are mortgages. Leverage makes those riskier.
• Households and banks can’t hedge these risks.
• Nobody takes into account that if they all respond more by leveraging, they will collectively change asset prices.
Welfare: Why can there be too much Leverage in a world of rational agents?

• More leverage raises asset prices at first by enabling natural buyers to purchase more, but reduces them later because natural buyers are so far in debt.

• Constraining leverage thus changes prices and can redistribute wealth to provide more insurance.

• Underwater borrowers do not fix their houses; limiting leverage will raise prices in crisis and reduce number of underwater homeowners.
More precisely (1) risk bearing

- Suppose borrowers have higher marginal propensity to consume houses.
- Suppose at future up state U the homeowners are richer and buying more houses, while at D they are poorer and selling houses.
- Pro cyclical increase in leverage at U raises house price and hurts home buyers.
- Decrease in leverage at D lowers house prices and again hurts home sellers.
More precisely (1) risk bearing

• Even if leverage remained the same at U and D, by curtailing leverage at 0, that would make borrowers owe less at U and D, so housing prices would be higher at U and D.

• Loss for buyers because of higher house prices at U matters less (because they are rich there) than gain for same people selling at higher prices at D where they are poor.
More precisely (2) Debt Overhang

• Underwater homeowners and business owners do not make efficient repairs – why spend $10,000 on repairs to save $50,000 of damages if you are going to lose your house anyway?

• Lenders foresee this problem when making loans.

• But they do not realize that by curtailing general leverage, house prices would not fall as far at D, and fewer underwater.
More precisely,
(3) Volatile Prices affect public

• Prices have real effects on economic activity. Tobin Q.
• At top lots of activity and investment.
• At bottom people cannot sell new loan at $100 to buy car when a comparable old auto loan sells at $65. Too little investment.
• Unfair to subject risk averse public to so much volatility in income.
• Fortunes of natural buyers rise and fall through cycle. Changing inequality over cycle.
VI. What Should We Have Done?

- Boom began in 90s and continued all the way to crisis of 2007. Fed should have reined that in.
- Fed reacted brilliantly after it understood crisis had begun (almost 2 years after it did begin).
- But Fed and ECB have not been strong enough in aftermath.
Reforming the Federal Reserve

• Federal Reserve currently charged with managing inflation and unemployment.
• Main policy instrument is interest rates. Formerly used mostly short rate. Lately (with quantitative easing) has moved to manage long rates.
• Should be responsible for managing systemic financial risk.
• Needs another policy tool.
Fed Should Manage the Credit Surface as well as Interest Rates

• From Irving Fisher in 1907 and before it has been commonly supposed that the interest rate is the most important variable in the economy.
• When economy slows, public clamors for lower rates, and Fed obliges.
• Fed has been pumping out billions of dollars in bank loans. Fed lowered fed funds rate in December 2008 to zero, without much effect.
• But collateral rates or leverage more important in times of crisis, and also more important to prudential regulation. Tell banks cannot make mortgage loan at LTV > 90%.
Monetary Policy in the Aftermath of the 2007-9 Crisis: Too Little Too Late.

• Ben Bernanke is a good man who dearly wants to
  – put Americans back to work
  – And to stabilize the economy
  – And to keep inflation in check

• You can’t do all that with one policy tool: lowering interest rate(s)

• Need more policy tools. Also help from Congress and Treasury.
a) Managing the Credit Surface

• The credit surface is the most important representation of credit conditions in the economy.
• Yet it is very difficult to find more than bits and pieces of it.
• The central banks of the world should be mapping it out and publishing it periodically.
• And they should be forecasting it, and forecasting the effect of their riskless interest interventions on the whole credit surface.
• And I think they should be managing all of it, not just riskless interest rates!
What Should We Have Done?

• Crisis began in January 2007 in subprime mortgages more than eight years ago.
• Nothing substantial was been done to deal with massive foreclosure problem.
• Never confronted problem of debt overhang for homeowners, small businesses, and government.
• Only saved our banks.
• b) Should have forgiven subprime debt
Foreclosure Disaster

• 4 million homes already lost to foreclosure
• Of the 50 mm outstanding loans that are current:
  – 8.5 million underwater
    • 5.6 million Prime
    • 2.1 million Alt-A
    • 800 thousand Subprime
  – These loans are at high risk of defaulting as long as they remain underwater
  – If current default rates continue at same rate with unchanged housing prices, 3 million more will default in next few years
Principal should be written down

• Losses from foreclosure are horrible. Get on average 23% back on loan from foreclosing a subprime loan.
• Takes 18 months to 3 years nowadays to throw somebody out of his house.
• Mortgage not paid, taxes not paid, house not fixed, house often vandalized, realtor expenses etc.
• If write down principal on subprime loans, get more for lender and borrower!
• Example: $160,000 loan, $100,000 house. Could write down to $80,000 or $90,000.
Foreclosure Policy Mistakes

• Thought that temporarily writing down interest would make a big difference
• Thought could give small incentives to Servicers and Banks and they would make modifications
Warned 7 Years Ago


- NY Times Op-ed March 2009 “Principal Matters” advocated writing down principal as only solution.
Subprime Cumulative Recidivism by Coupon and Months Since Mod

Cumulative Recidivism

Months Since Mod
Community Bankers

• Government could hire community bankers in each area.
• Loan information would be sent to them.
• Their job would be to modify loans to make as much money as possible for lender.
Default, Punishment, Forgiveness

• Idea that defaulting is morally reprehensible.
• Or that forgiving loans would create moral hazard and encourage future default.
• And prevent lenders from lending.
• All wrong.
Net Monthly Flow (Excluding Mods) from <60 days to >=60 days DQ
6 Month Average as of Jan 09

06-2 Indices

- ABX (Subprime)
- Option ARM
- Alt-A ARM
- Alt-A Fixed
- Prime ARM
- Prime Fixed

CCLTV < 60
CCLTV 60-80
CCLTV 80-90
CCLTV 90-100
CCLTV 100-110
CCLTV 110-120
CCLTV 120-140
CCLTV 140-160
CCLTV > 160
European Leverage Cycle

• Household borrowing problem in many countries
• Banks overleveraged.
• But also sovereigns overleveraged. (Because of implicit guarantees being in Euro).
• Need forgiveness.
Greek Problem

• Reduced primary deficit from 10% to 0%.
• Crushing austerity. 25% unemployment
• Keep pressure on for reforms.
• Greeks must be told in advance forgiveness will come if reforms met.
Progress from interest rate cuts?

• Short interest rate cut in U.S. to 0 in 2008.
• Massive (3-4 $trillion) buying of long bonds to lower long rates started in 2009.
• Yet,
• Many borrowers still can’t get loans.
• Crisis started in housing and mortgages. Not fixed.
Most Asset Prices Have Appreciated But Home Prices Were Left Behind
Total Mortgage Originations (Thousands) by FICO Score 2006 vs 2012

<table>
<thead>
<tr>
<th>FICO Score</th>
<th>2006 Originations (‘000)</th>
<th>2012 Originations Annualized (‘000)</th>
<th>% Change</th>
</tr>
</thead>
<tbody>
<tr>
<td>&lt;600</td>
<td>1135.3</td>
<td>47.5</td>
<td>-95.8%</td>
</tr>
<tr>
<td>600-700</td>
<td>4434.5</td>
<td>1238.3</td>
<td>-72.1%</td>
</tr>
<tr>
<td>700-750</td>
<td>2712.3</td>
<td>1346.3</td>
<td>-50.4%</td>
</tr>
<tr>
<td>750-800</td>
<td>2372.6</td>
<td>2559.6</td>
<td>7.9%</td>
</tr>
<tr>
<td>800+</td>
<td>408.2</td>
<td>961.0</td>
<td>135.4%</td>
</tr>
<tr>
<td>Total</td>
<td>11062.9</td>
<td>6152.6</td>
<td>-44.4%</td>
</tr>
</tbody>
</table>
Drawbacks of Interest Rate only Policy

- Fed can push asset prices up, but that does not necessarily spur production.
- Significant activity financed by loans, and people or businesses that don’t have collateral or high credit rating can’t get loans even when interest rate goes down.
- So lowering interest rates can be ineffectual.
- Might increase spending as people feel richer. But looks like trickle down!
Dangers of Quantitative Easing - Long Interest Rate Cuts

- Increasing all asset prices except housing.
- May cause a bubble in some unintended sector like high yield, and then a crash there that will disrupt markets.
- Did Fed anticipate that interventions in mortgage market (buying mortgages) would shift credit surface so much for high yield bonds?
END
Marginal buyer = .87.

Crash really bad; news not.

Top 13% of buyers go bankrupt.

Leverage at 0 = .95/.26 = 3.6; Leverage at D = .69/.49 = 1.4

Interest rates = 0.