

# Managing The Leverage Cycle

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# Fed Should Manage Leverage as well as Interest Rates

- From Irving Fisher in 1890s 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**.
- But **collateral rates** or **leverage** more important in times of crisis.



SHAKESPEARE

Shakespeare got this  
Right 400 years ago.

The Merchant of Venice

# Negotiation

- Over interest rate (many pages)
- And over collateral.

# Which did Shakespeare think more important: Interest or Collateral?

- What interest did Shylock charge? Nobody remembers.
- Everybody remembers collateral of **pound of flesh.**

# Judgment: Wrong Collateral level!

- **P:** “Wait a moment. There is something else. This bond
- Does not give you one drop of blood. The words
- Expressly are “a pound of flesh”. So take your
- Bond. Take your pound of flesh. But if, in cutting it, you shed
- One drop of Christian blood, your lands and goods, under the
- Laws of Venice, will be confiscated to the sate of Venice.”

**Pound of flesh but not a drop of blood.**

# Leverage Cycle Papers

- Geanakoplos 1997 “Promises Promises”
- Geanakoplos 2003 “Liquidity, Default, and Crashes: Endogenous Contracts in General Equilibrium”. Invited address World Econometric Society Congress 2000.
- Fostel-Geanakoplos 2008 “Leverage Cycles and the Anxious Economy”. AER.
- Geanakoplos (2009) “The Leverage Cycle”

# Collateral papers

- Bernanke-Gertler-Gilchrist 1996, 1999
  - Kiyotaki-Moore 1997
  - Geanakoplos-Zame 1997, 2002, 2005, 2009
  - Araujo-Pescoa 2005 and many others
  - Kubler et al many
- 
- Collateral, but not looking at endogenous leverage.



# Definitions

- **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 **downpayment** is 20%, **LTV** is 80%, **collateral rate** is 125% and **leverage** is 5.
- Cannot borrow without collateral.

# Equilibrium Leverage

## Standard Economic Theory:

Equilibrium (supply = demand) determines interest rate.

## In my theory:

Equilibrium determines Leverage as well.

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. **Volatility** is crucial.

# Leverage Important because

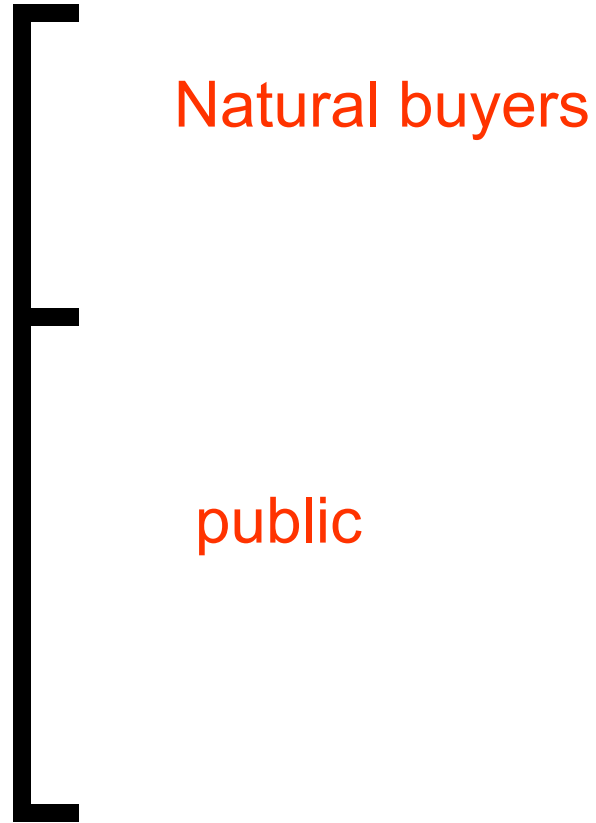
- It allows a small group of people to buy a huge amount of assets, on borrowed money
- Borrowers returns multiplied, for good or bad: 1% change in house value implies a 5% change in capital of borrower in previous example.
- Gives borrower “put option” to walk away.

More Leverage →  
Higher Asset Prices

Low Leverage →  
Lower Asset Prices

- Leverage gives optimists more buying power.
- Relies on no short sales.

# Natural Buyers Theory of Price



# Heterogeneous Agents

- **Natural Buyers** vs Public
- Differ in **risk tolerance**.
- Or just more **optimistic**.
  - Leads to equilibrium leverage without default, like Repo market.
- Might get **higher utility** for holding assets
  - Like houses
  - Leads to equilibrium leverage giving default
- Differ in ability to hedge.
- Differ in sophistication and knowledge.
- Might use assets for production.

# Standard Theory

- Asset Price = Fundamental Value.
- Heterogeneity is missing.



# Leverage Cycle

- Too **much** equilibrium **leverage** in normal times
- Too **high asset prices** in normal times
  
- Too **little leverage** in crisis
- Too **low asset prices** in crisis
  
- Recurring cyclical problem.

# Leverage Cycle Crashes Always Have same three aspects

- **Scary Bad news** creating more uncertainty and more disagreement = **high volatility**
  - FORECLOSURES
- **De-leveraging** because nervous lenders ask for more collateral
- **Leveraged buyers** (optimists) crushed, some go **bankrupt**, others insolvent and functioning poorly

# Recurring Leverage Cycles

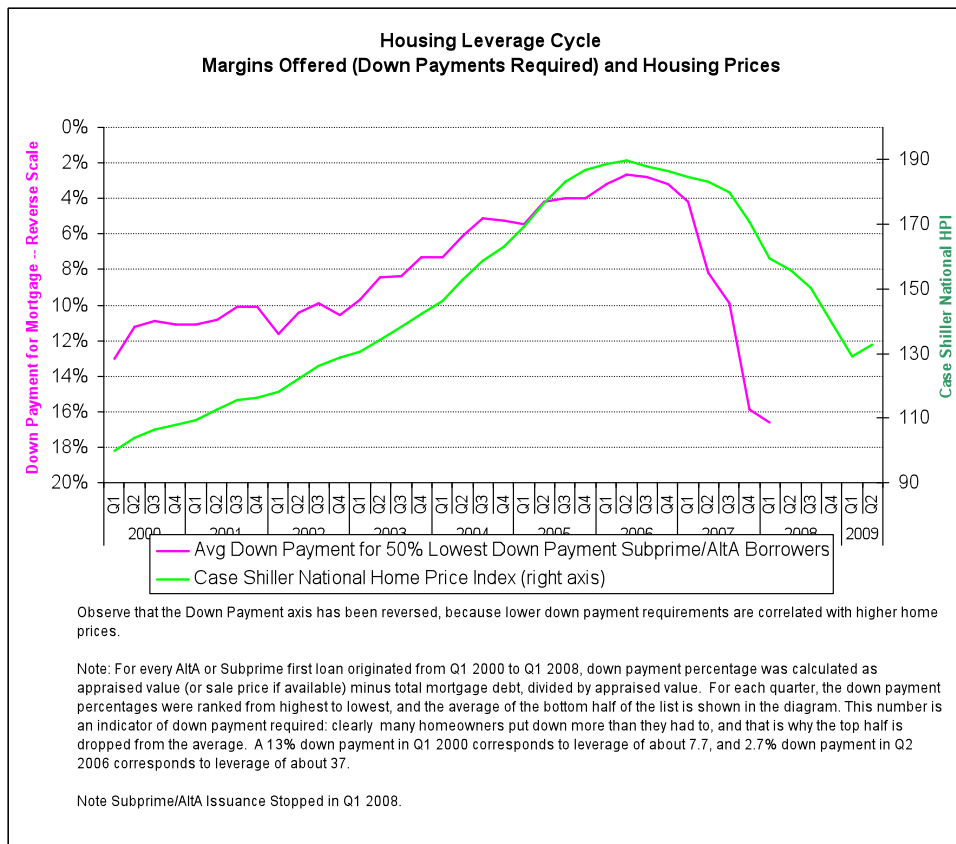
- 1994 derivatives crisis, bankrupted Orange County
- 1998 emerging markets and mortgages, bankrupted Long Term Capital
- 2007-8 mortgage crash

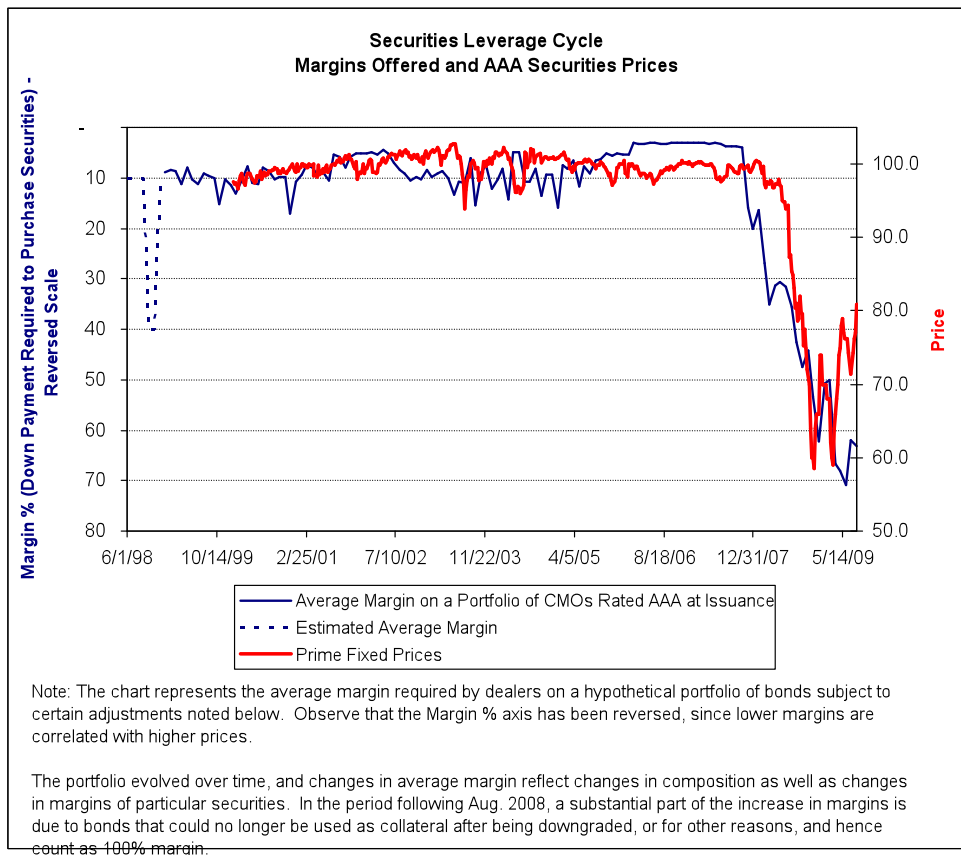
# Leverage dramatically increased from 1999-2006

- A **bank** that wanted to buy a AAA mortgage **security** could borrow **98.4%** of purchase price, paying down only **1.6%** cash. That's over **60 to 1** leverage.
- Average leverage in 2006 across all **\$2.5** trillion of **toxic mortgage securities** was **16 to 1**.
- So buyers only had to pay **\$150** billion cash, and borrow **\$2.35** trillion!
- **Home** buyers could get mortgage with 3% down in 2006, for leverage **33 to 1**.

Then leverage drastically curtailed  
by nervous lenders wanting more  
collateral

- Toxic mortgage securities leverage fell to average less than 1.2 to 1.
- Homes leveraged 3 to 1 unless can get government guaranteed loan, and still less if private loan.
- Now leverage of toxic assets rising again via government stimulus.





# 2007-9 Worst Leverage Cycle because

- Leverage got higher than ever before.
- Double leverage cycle, in housing and securities.
  - Feedback between the two
- Houses and banks further underwater making for bigger foreclosure costs and debt overhang.
- Implicit government guarantees, e.g. to Fannie Mae and Freddie Mac and on banks issuing CDS, that let them leverage so much at low rates.
- CDS appeared for first time at peak of cycle
  - Made losses for optimists bigger than losses of asset value
  - Allowed pessimists to leverage and helped cause crash.
  - Not enough collateral put up by issuers of insurance.



Why is leverage cycle bad?

# What's so bad about so much leverage? (Even without default)

- At top so few buyers have such a big effect on prices. What if they are crazy?
- Construct many projects which look ridiculous in retrospect when cycle turns down. Costly if irreversible investment.
- Fortunes of natural buyers rise and fall through cycle. Changing inequality over cycle.
- Has real effects on economic activity, and welfare of risk averse third parties. Unfair to subject public to so much volatility. Tobin Q.
- What if optimists indispensable to economy: too big to fail

# What's so bad about leverage (with default)

- **Debt overhang**: When underwater will not choose  $PV > 0$  projects because old investors get the money
- **Cost of confiscation of collateral** – homes today fetch  $\frac{1}{4}$  of subprime loan amount when sold, after vandalism etc.
- Restricting leverage can **change relative prices**, often in ways that improve risk allocation.

# What to Do About Leverage Cycle?

- Collect leverage data and make it public.
- Regulate leverage in normal times.
- Put CDS on an exchange.
- In the crisis, reverse the three symptoms:
  - Stop foreclosures in order to avoid deadweight losses, and to stabilize uncertainty and margins: **write down principal**.
  - **Resolve** potential bankruptcy situations quickly.
  - **Releverage** the system by going around banks to lend with less collateral
  - **Spend** govt money to replace natural buyers.

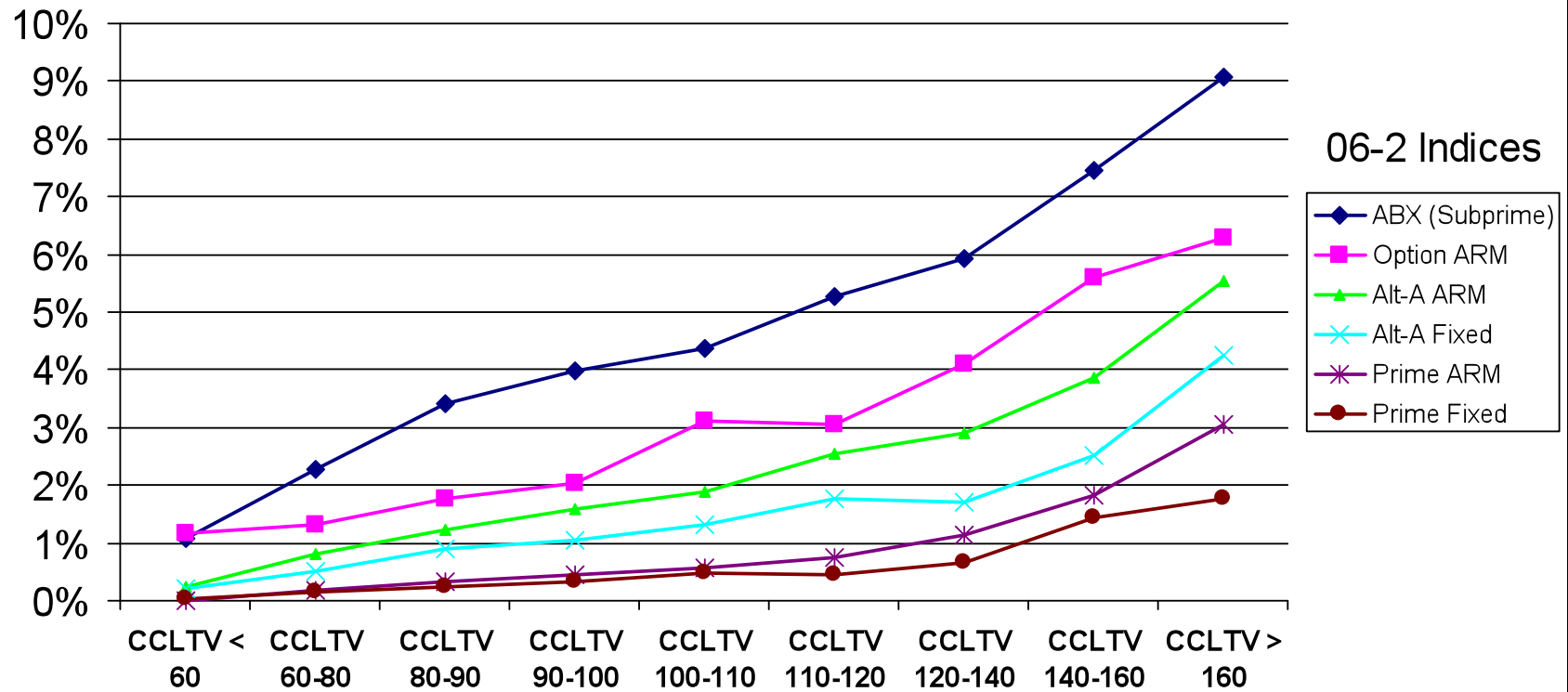
# Housing Foreclosure Disaster

- 2 million homeowners already thrown out. 3.2 million more seriously delinquent. Another 3 million more will be.
- Recoveries on subprime foreclosures are 25% of loan amount.
- If loan is \$160,000 and house is worth \$100,000, will probably get \$40,000 after expenses. Why?
- Takes 18 months to throw homeowner out of house, during which he doesn't pay mortgage, or taxes, or fix house, then house vandalized, then realtor costs etc.
- Writing down principal to \$80,000 is a WIN-WIN for homeowner and lender. Probably homeowner pays the \$80m (which is more than \$40m lender would get in foreclosure), otherwise homeowner fixes house and sells it for profit, and again lender gets \$80m.

# Foreclosure Disaster

- People default primarily because their houses are underwater. See how sensitive defaults are to LTV.

**Net Monthly Flow (Excluding Mods) from <60 days to >=60 days DQ**  
**6 Month Average as of Jan 09**



# Why Servicers won't write down principal

- The agents least willing to write down principal are the servicers. The renegotiation problem cannot be left to them.
- Yet that is what Obama plan has done.



# Why Servicers won't write down principal

- Their fees are .5% of principal. If principal written down, less fees.
- If principal written down, homeowner might sell and then fees lost altogether.
- Requires lots of manpower to visit homes and figure out how far to write down principal to make money for lender. Servicers don't have the staff, and don't want to spend the money.
- Servicers owned by big banks who own second loans. If write down first loans, people might expect second loan to be written down, which would be very costly for servicers.