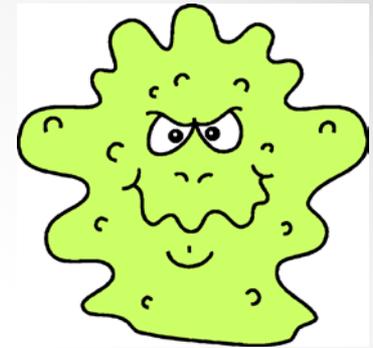# The Subprime Virus
Agarwal, Ambrose, and Yildirim

Discussion by Shane M. Sherlund

The comments contained herein are mine alone and do not necessarily reflect the views of the Board of Governors of the Federal Reserve System, its members, or its staff.
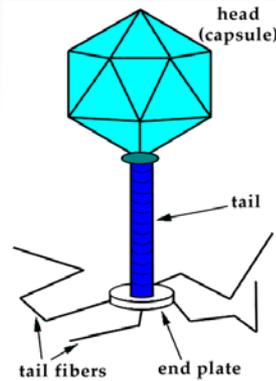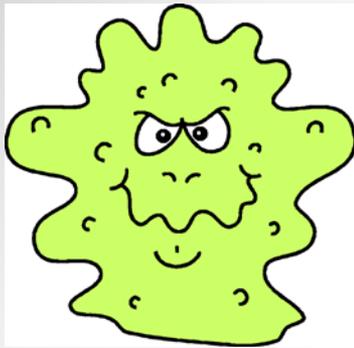
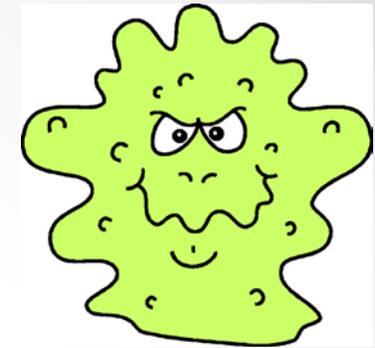12/5/2013 ● 1

The Subprime Virus
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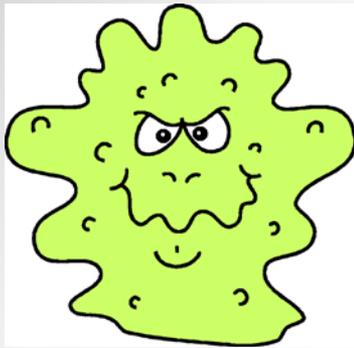
12/5/2013

The Subprime Virus
Agarwal, Ambrose, and Yildirim

Atlanta 2008:Q4

Chicago 20008:Q4

Discussion by Shane M. Sherlund

12/5/2013

Summary

- Very nice paper!!!

- Describes how subprime mortgages might have imposed negative externalities on more prudently underwritten prime mortgages.
    - Subprime originations
    - Foreclosure externalities

- Model simulation; empirical evidence.

- Subprime originations and subprime defaults **<u>DO</u>** appear to be linked with prime defaults.

Model Simulation

- House price paths depend on local house prices, house price volatility, and default.

- When a borrower defaults, that house sells for a 20% discount; all other house prices update. Any borrower with negative equity defaults. Repeat.

- More prime defaults when:
  - More subprime originations.
    - Subprime originations begin with less equity so exposed to HP declines.
  - Higher house price volatility.

Things to Think About…

- Quite a bit of evidence that foreclosure externalities can be extremely local.
  - Foreclosure discounts can be fairly large.
  - Effects on surrounding homes limited to as little as 1/10th of a mile.
    - Campbell et al. (2011)
    - Harding et al. (2009)
    - Immergluck & Smith (2006)
    - Anenberg & Kung (2012) – effect of foreclosure listing!!!
  - Can one specify these types of declining effects in the house price equations?

- Merton model of default.
  - Bhutta, Dokko, and Shan (2010) show that borrowers have pretty high thresholds for negative equity before exercising their default option.

Data

- LPS data, 2003-2008.

- Sample splitting:
  - Non-qualified ZIP codes (always subprime)
  - Qualified ZIP codes
    - Non-prime ZIP codes (prime turned subprime)
    - Prime ZIP codes (always prime)

- Non-qualified ZIP codes do NOT look like qualified ZIP codes.

- Non-prime ZIP codes do NOT look like prime ZIP codes.

Empirical Model

- Relate ZIP-code prime default rates to:
  - Cumulative ZIP-code subprime originations share
  - Change in MSA unemployment rate
  - Change in MSA house prices
  - MSA house price volatility
  - ZIP-code subprime default rate
  - ZIP-code mortgage refinancing rate
  - ZIP-code demographics; time and MSA fixed effects

- Three empirical strategies: Baseline, cumulative change in prime default rates, two-stage least squares.

- Most interested in effect of subprime originations and subprime defaults on prime defaults.

Empirical Evidence

- Prime defaults are higher when:
  - House prices decline
  - House price volatility increases
  - Unemployment rates increase
  - Credit scores decline
  - SUBPRIME ORIGINATIONS INCREASE
  - SUBPRIME DEFAULTS INCREASE

- Fairly consistent across implementations.

Things to Think About…

- LPS undersampling of subprime; data cliffs.

- Alt-A mortgages.

- ZIP-code credit scores.

- Measure of subprime originations.

Subprime Undersampling

- The LPS data undersamples subprime originations.

- Suppose $y_i = \beta x_i + \varepsilon_i$.

  Assume that $\breve{x}_i = \gamma x_i$, where $\gamma < 1$.

  Then $y_i = \beta \frac{1}{\gamma} x_i + \varepsilon_i = \beta^* x_i + \varepsilon_i$.

  Because $\frac{1}{\gamma} > 1$, $\beta^* > \beta$.

- So its possible that the results might overstate the true underlying relationship between cumulative subprime originations and prime default rates.
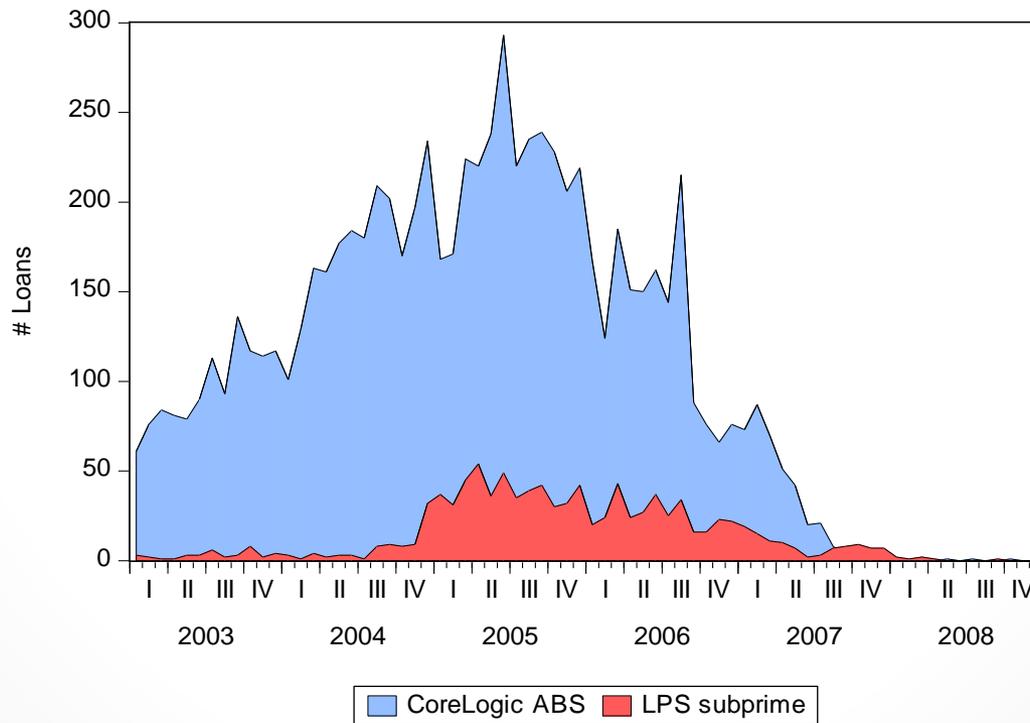
Subprime Undersampling

Subprime Originations
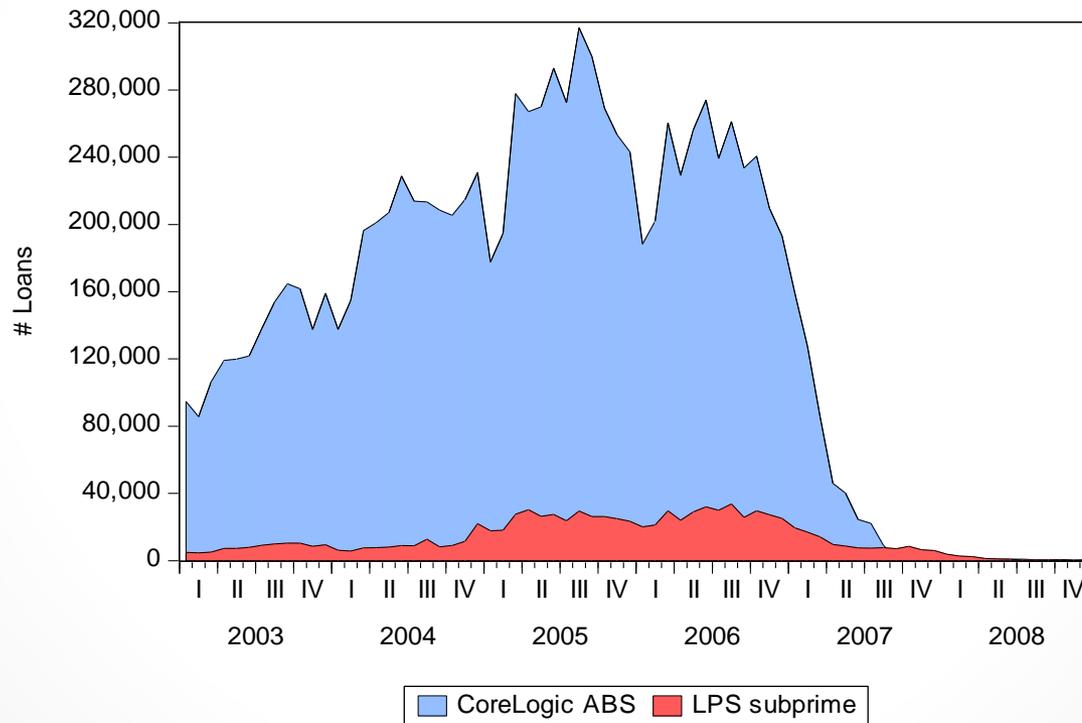
Subprime Undersampling

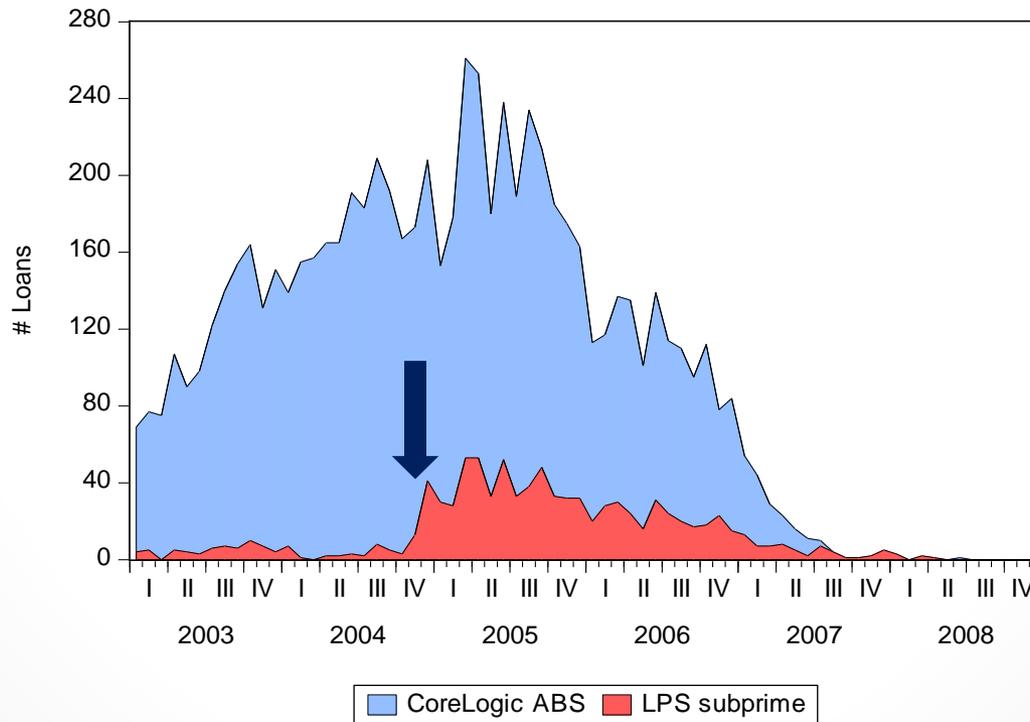

Subprime Originations (60629 ZIP)

Data Cliffs

- The LPS data adds servicers and loans over time.

- The paper addresses problems associated with back filling of data.

- But the addition of a new servicer might also increase the data's exposure to new originations.

Data Cliffs

Subprime Originations (95206 ZIP)
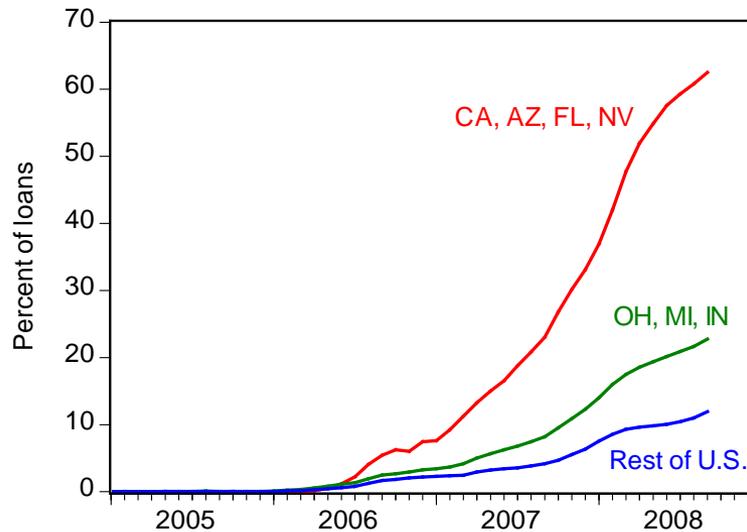
Alt-A Mortgages

- LPS definition of subprime up to each individual servicer.
  - Subprime definitions can very greatly (Mayer & Pence (2008)).

- Many alt-A mortgages end up on the prime mortgage book.
  - LPS does not include an alt-A designation.
  - 87 percent of 2003-2008 option-ARMs classified as prime in LPS

- Alt-A mortgages behaved much like subprime mortgages heading into and during the crisis.

- Inclusion of alt-A, particularly option ARMs, in "prime" default rates might be misleading.
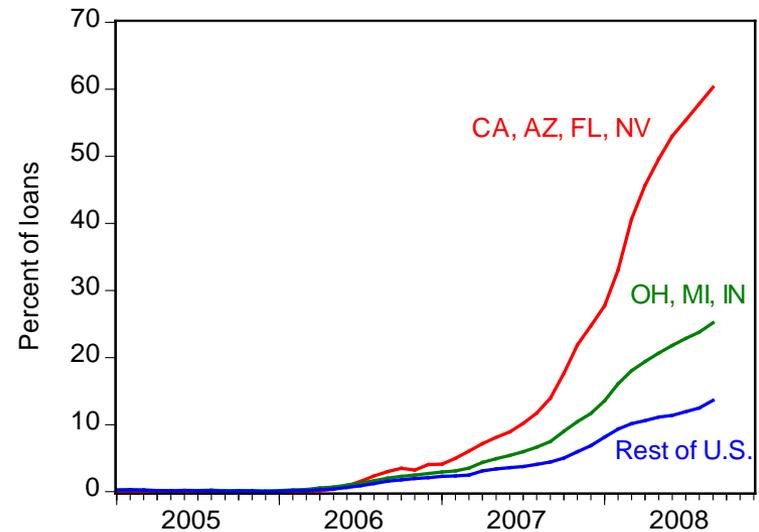
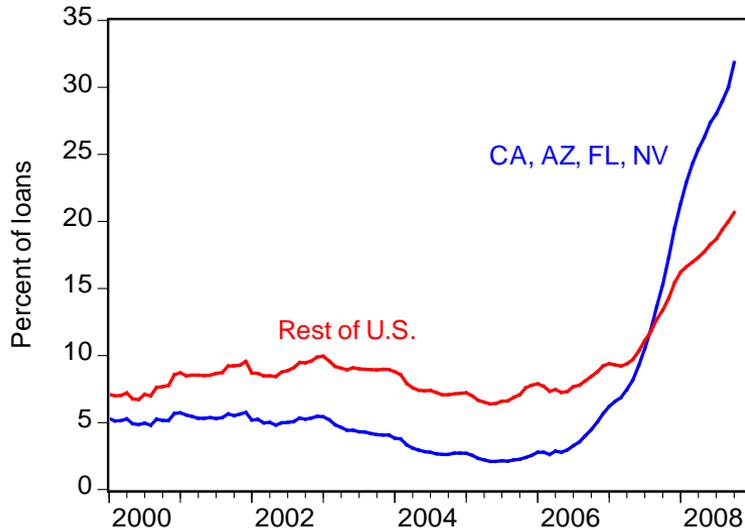# Alt-A Mortgages

Underwater Mortgages
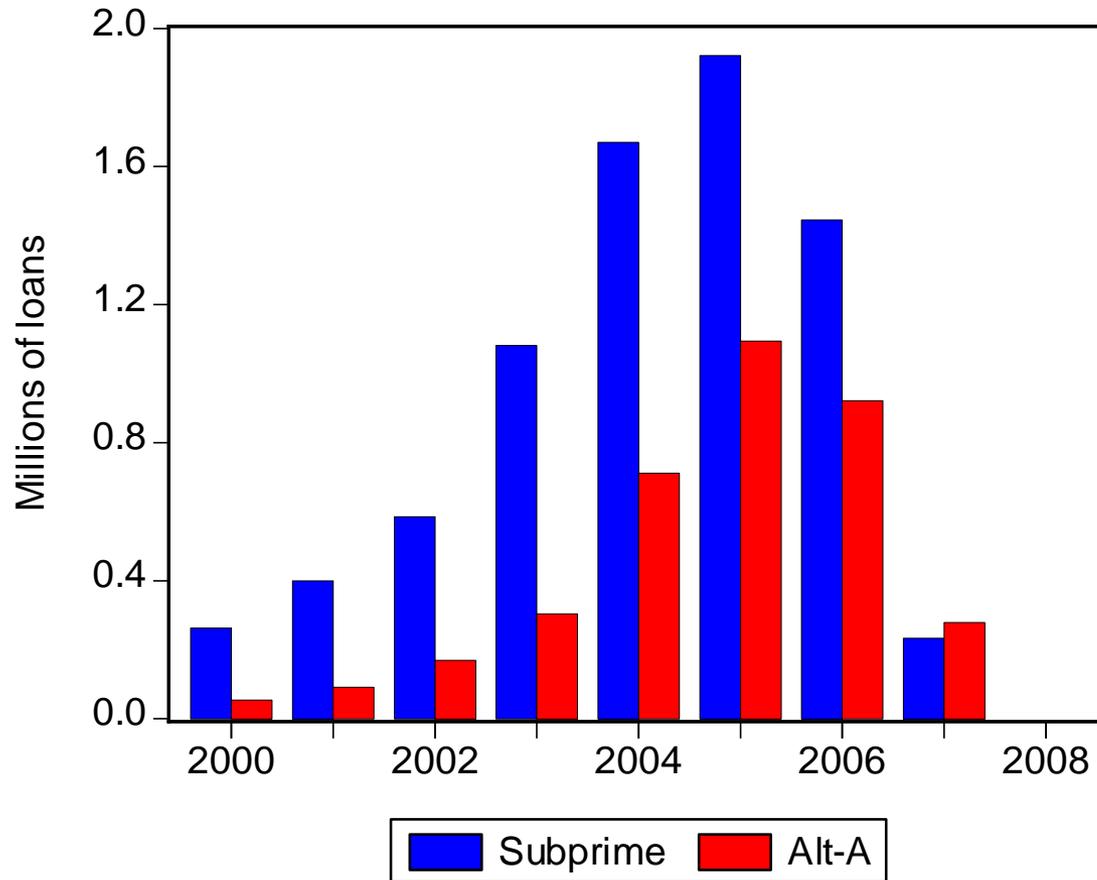
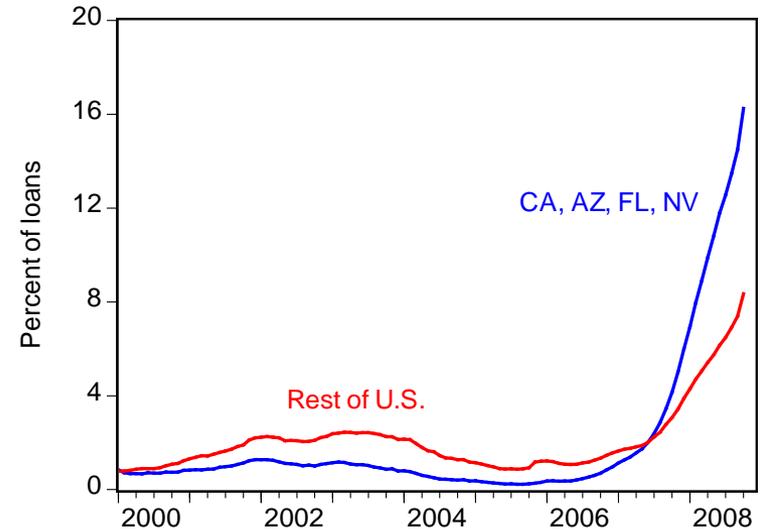Source: Calculations from CoreLogic ABS and CoreLogic HPI data.

Ser. Delinq. Mortgages

Subprime

Alt-A

ZIP-code Credit Scores

- Paper controls for ZIP-code credit scores in its results.

- How are these defined?

- Optimally, average of new prime originations for each quarter for each ZIP code???

- Condition on prime LTVs? (Percent with $LTV \geq 80$)

- Condition on no/low doc? (Keys et al. 2010)

Subprime Originations

- Subprime mortgages refinanced A LOT.
    - o Does the cumulative measure of subprime originations double (or triple +) count actual subprime concentration in an area?

- The paper uses a cumulative proportion measure of subprime originations.
    - o Use time-varying STOCK shares as a measure of subprime concentration?

Conclusion

- Very nice paper!!!

- Subprime mortgages imposed negative externalities on more prudently underwritten prime mortgages.
  - Subprime originations
  - Foreclosure externalities

- Model simulation; empirical evidence.

- Subprime originations and subprime defaults **<u>DO</u>** appear to be linked with prime defaults.