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14.03/003 Microeconomic Theory & Public Policy Fall 2025

Lecture slides 20. Adverse selection and subprime lending

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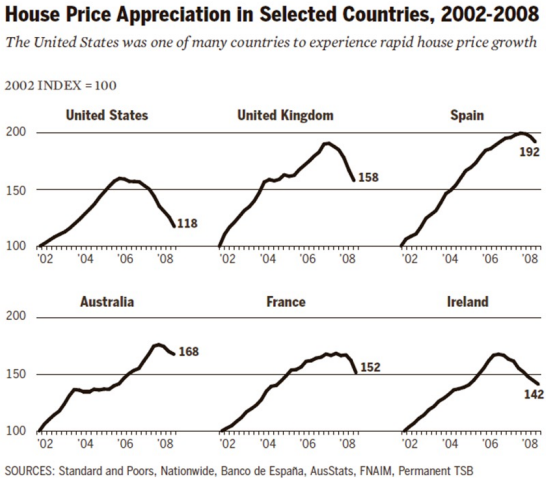
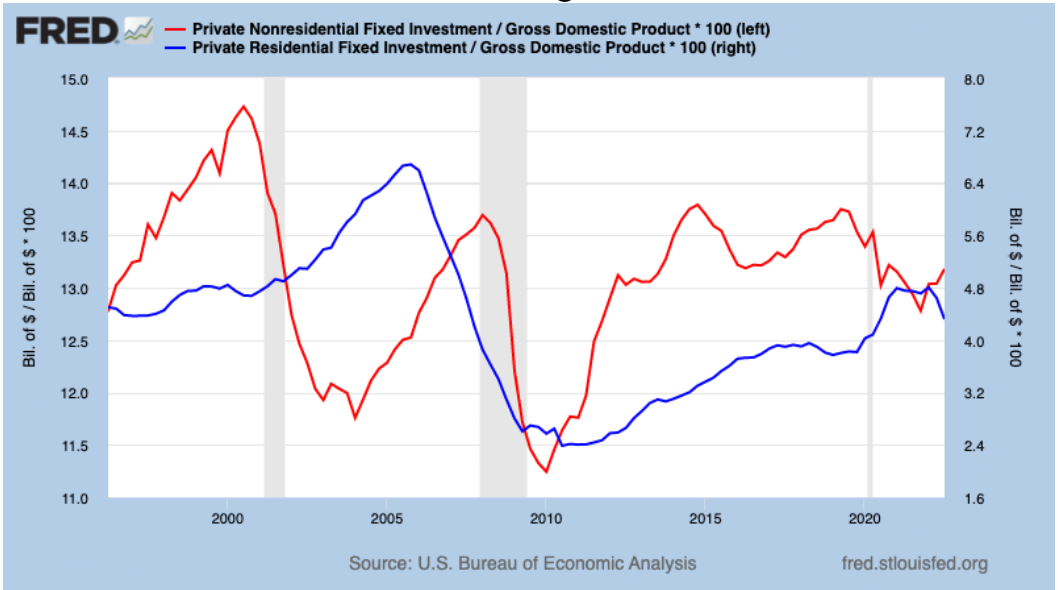
Worldwide Real Estate Bubbles, 2002 – 2008

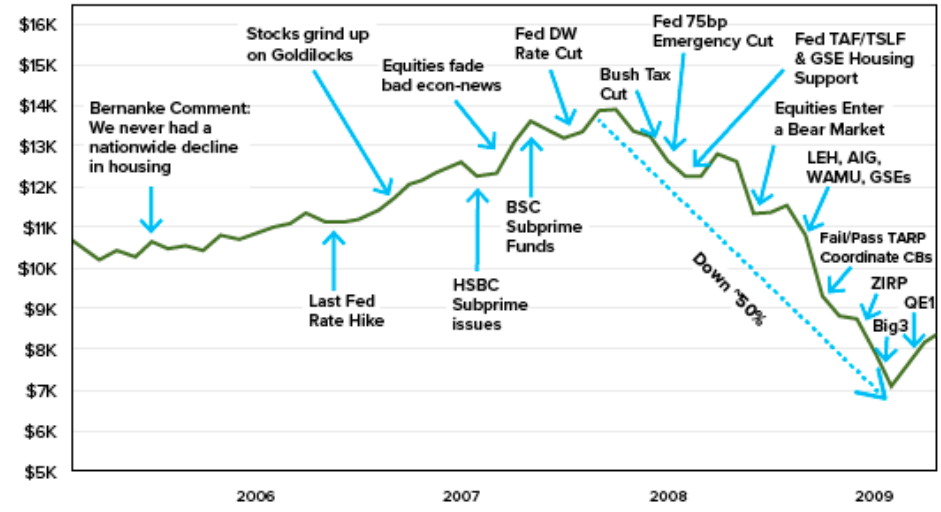


By Financial Crisis Inquiry Commission - http://fcic.law.stanford.edu/report/conclusions, Public Domain, https://commons.wikimedia.org/w/index.php?curid=47853455

U.S. Residential Investment Surged Between 2002 and 2007

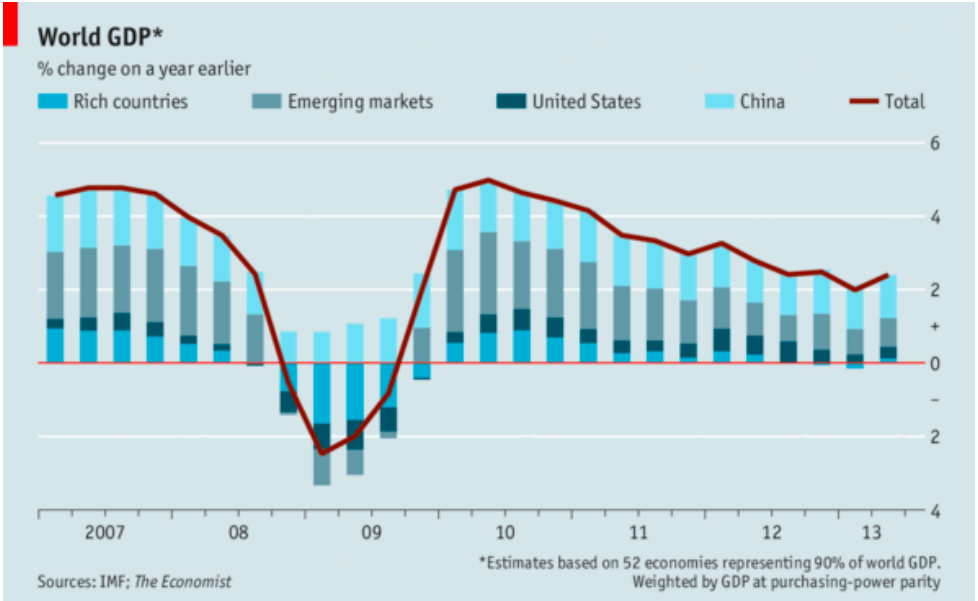


DJIA Index (Monthly Data) Pre/Post GFC 2005-2010



Source: Money Morning Staff Research

MONEY MORNING


World GDP*
% change on a year earlier
Rich countries
Emerging markets
United States
China
Total
6
4
2
+
0
–
2
4
2007
08
09
10
11
12
13
*Estimates based on 52 economies representing 90% of world GDP.
Weighted by GDP at purchasing-power parity
Sources: IMF; The Economist

Did securitization lead to lax screening? Evidence from subprime loans Keys et al. (2010)

Background: Securitization

Definition: A mortgage-backed security (MBS) is a type of asset-backed security which is secured by a mortgage or collection of mortgages. (*Wikipedia*)

- One asset is "backed" by many borrowers (risk pooling)
- Works essentially like a bond where the buyer of the asset receives a stream of interest payments
- The idea behind MBS was to spread risk over many asset holders
- Holder of asset faces the risk that borrowers default
- During the financial crisis this default risk became an aggregate risk

Freddie Mac Guidelines for Prime vs. Subprime Lending

While not the only ingredient in market estimates of credit quality, FICO scores (credit scores developed by Fair Isaac and Company) provide a useful measure for quantifying default risk. In general, first-trust mortgage borrowers with FICO scores above 660 are considered to have a good credit reputation.

Borrowers with FICO scores between 660 and 620 are somewhat riskier borrowers, for whom underwriters should perform a more extensive review. Borrowers with scores below 620 should be subjected to a thorough, cautious review.

— Calmoris and Mason, 1999

Distribution of Fair-Isaac (FICO) credit scores in the US in 2004

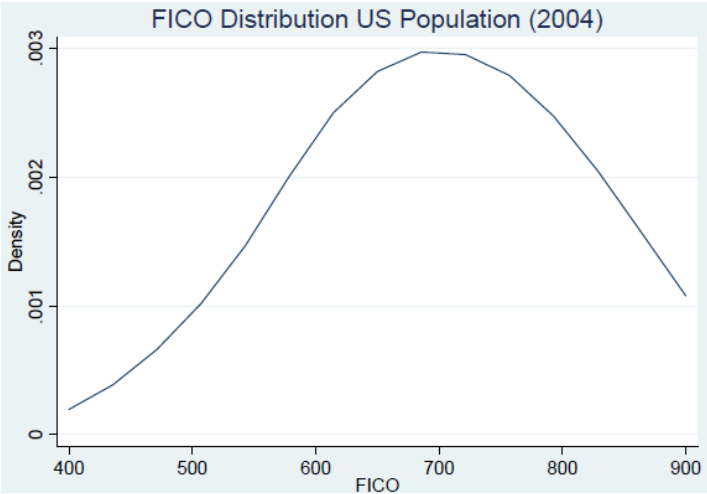


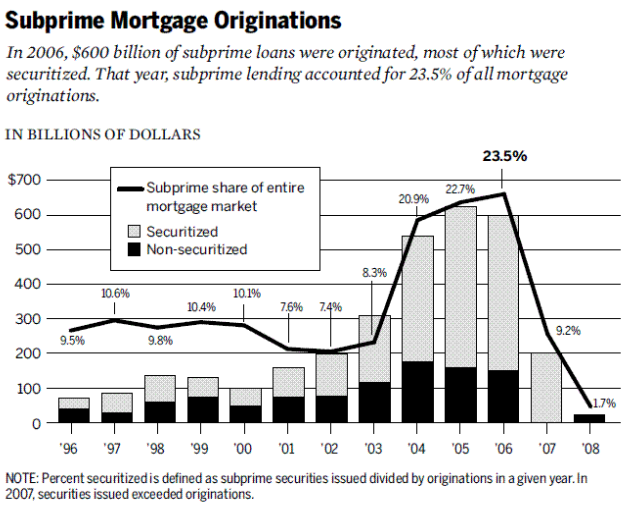
Figure 1: FICO Distribution (US Population)

Figure 1 presents the FICO distribution in the U.S. population for 2004. This data is from an anonymous credit bureau which assures us that the data exhibits similar patterns during the other years of our sample. The FICO distribution across the population is smooth, so the number of prospective borrowers in the local vicinity of a given credit score is similar.

Key Idea

- **Mortgage lending**: Mortgage issuers gather both **hard** and **soft** information on borrowers. An industry rule of thumb "allowed" loans above a FICO score of 620 to be securitized.
  - Loans above 620 can get securitized, loans below 620 are harder to securitize and sell
  - If the additional risk is not properly priced, banks have an incentive to screen less thoroughly above 620
- **Types of loans**
  - **Full documentation:** An exhaustive financial inventory of income, debt, credit, payment history
  - **Low documentation – AKA 'liar loans'**: "Designed for self-employed borrowers who cannot provide tax returns as evidence of their income. They still require some form of supporting evidence of the borrowers income, although some lenders will accept an accountant's declaration or bank statements" (Wikipedia)

Subprime Mortgage Originations, 1992 – 2008



By National Commission on the Causes of the Financial and Economic Crisis in the United States - Final Report of the National Commission on the Causes of the Financial and Economic Crisis in the United States, p.70 figure 5.2, Public Domain

Number of Loans by FICO Score: Low-Documentation Loans

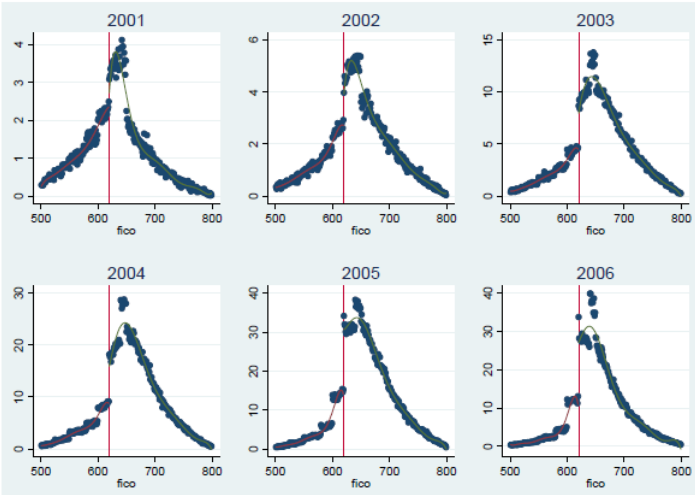


Figure 2: Number of Loans (Low Documentation)

Figure 2 presents the data for number of low documentation loans (in '00s). We plot the average number of loans at each FICO score between 500 and 800. As can be seen from the graphs, there is a large increase in the number of loans around the 620 credit threshold (i.e., more loans at 620^{+} as compared to 620^{-}) from 2001 onwards. Data is for the period 2001 to 2006.

Surge in *Low-documentation* loans starting in 2003

TABLE I
SUMMARY STATISTICS

Panel A: Summary statistics by year

	Low documentation			Full documentation		
	Number of loans	Mean loan-to-value	Mean FICO	Number of loans	Mean loan-to-value	Mean FICO
2001	35,427	81.4	630	101,056	85.7	604
2002	53,275	83.9	646	109,226	86.4	613
2003	124,039	85.2	657	194,827	88.1	624
2004	249,298	86.0	658	361,455	87.0	626
2005	344,308	85.5	659	449,417	86.9	623
2006	270,751	86.3	655	344,069	87.5	621

Interest Rates: Low-Documentation Loans

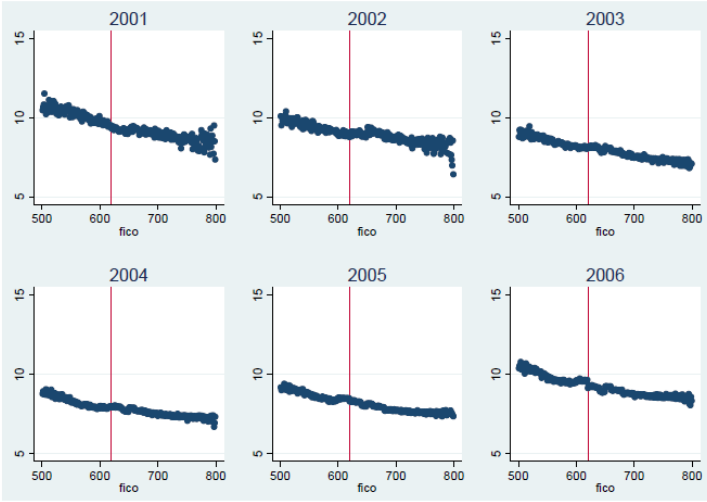


Figure 3: Interest Rates (Low Documentation)

Figure 3 presents the data for interest rate (in %) on low documentation loans. We plot average interest rates on loans at each FICO score between 500 and 800. As can be seen from the graphs, there is no change in interest rates around the 620 credit threshold (i.e., more loans at 620^{+} as compared to 620^{-}) from 2001 onwards. Data is for the period 2001 to 2006.

Median Household Income: Low-Doc Loans

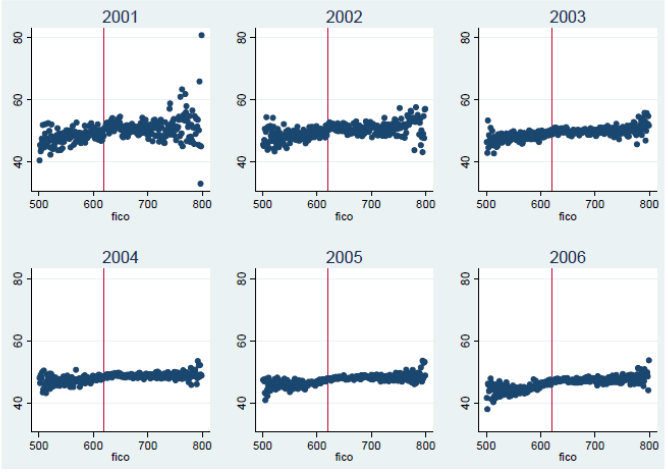


Figure 5: Median Household Income (Low Documentation)

Figure 5 presents median household income (in '000s) of zip codes in which loans are made at each FICO score between 500 and 800. As can be seen from the graphs, there is no change in median household income around the 620 credit threshold (i.e., more loans at 620^{+} as compared to 620^{-}) from 2001 onwards. We plotted similar distributions for average percent minorities taking loans, and average house size and find no differences around the credit thresholds. Data is for the period 2001 to 2006.

Loan-to-Value Ratio: Low-Documentation Loans

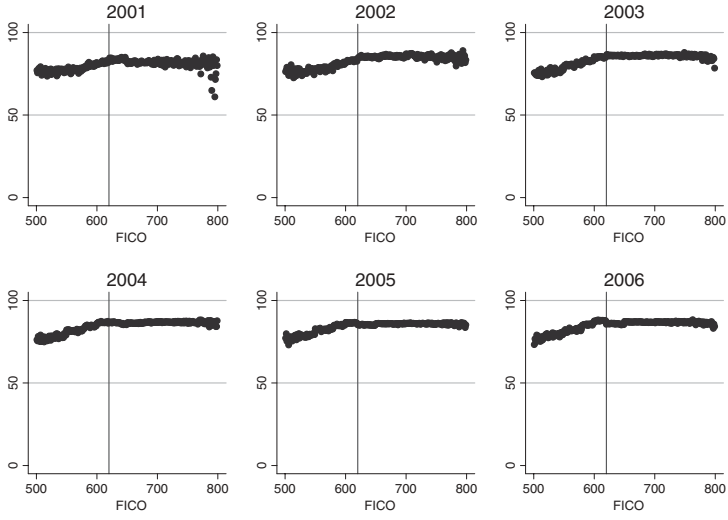


FIGURE IV
Loan-to-Value Ratio (Low-Documentation)

Annual Delinquencies in 2001: Low-Doc Loans

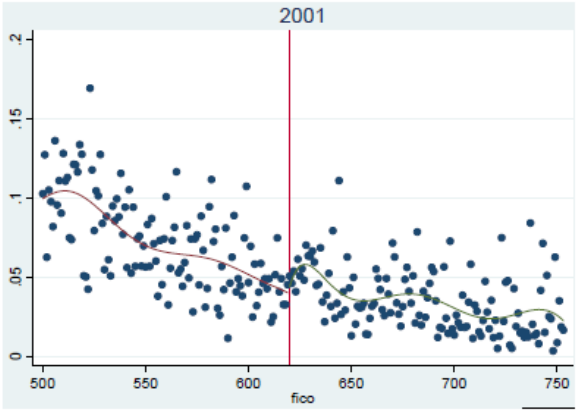


Figure 6A: Annual Delinquencies for Low Documentation Loans in 2001

Figure 6A presents the percent of low documentation loans that became delinquent in 2001. We plot the dollar weighted fraction of the pool that becomes delinquent for one-point FICO bins between score of 500 and 750. The vertical line denotes the 620 cutoff, and a seventh order polynomial is fit to the data on either side of the threshold. Delinquencies are reported between 10-15 months for loans originated in the year.

Annual Delinquencies in 2002: Low-Doc Loans

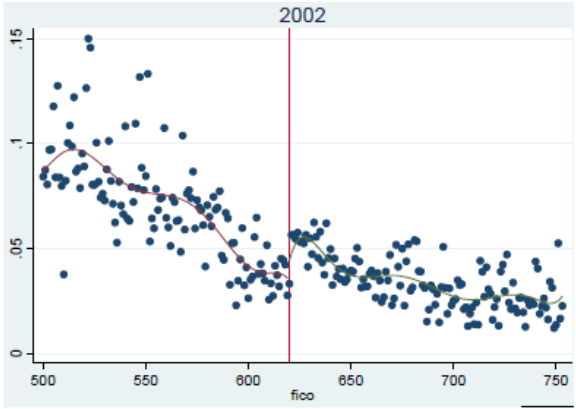


Figure 6B: Annual Delinquencies for Low Documentation Loans in 2002

Figure 6B presents the percent of low documentation loans that became delinquent in 2002. We plot the dollar weighted fraction of the pool that becomes delinquent for one-point FICO bins between score of 500 and 750. The vertical line denotes the 620 cutoff, and a seventh order polynomial is fit to the data on either side of the threshold. Delinquencies are reported between 10-15 months for loans originated in the year.

Annual Delinquencies in 2003: Low-Doc Loans

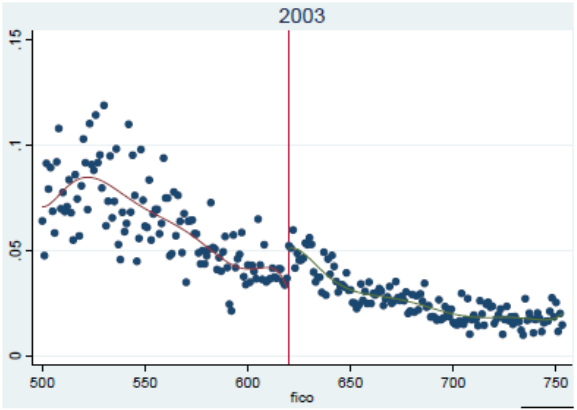


Figure 6C: Annual Delinquencies for Low Documentation Loans in 2003

Figure 6C presents the percent of low documentation loans that became delinquent in 2003. We plot the dollar weighted fraction of the pool that becomes delinquent for one-point FICO bins between score of 500 and 750. The vertical line denotes the 620 cutoff, and a seventh order polynomial is fit to the data on either side of the threshold. Delinquencies are reported between 10-15 months for loans originated in the year.

Annual Delinquencies in 2006: Low-Doc Loans

Figure 6F: Annual Delinquencies for Low Documentation Loans in 2006

Figure 6F presents the percent of low documentation loans that became delinquent in 2006. We plot the dollar weighted fraction of the pool that becomes delinquent for one-point FICO bins between score of 500 and 750. The vertical line denotes the 620 cutoff, and a seventh order polynomial is fit to the data on either side of the threshold. Delinquencies are reported between 10-15 months for loans originated in the year.

Annual Delinquencies: *Full-Documentation Loans*

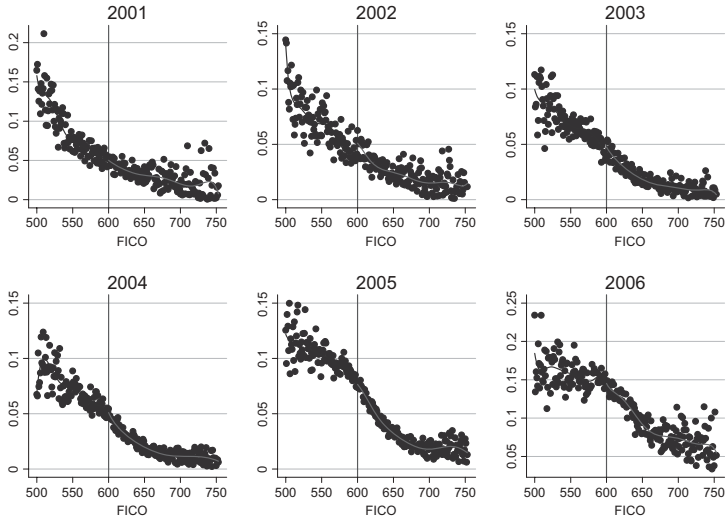


FIGURE XII
Annual Delinquencies for Full-Documentation Loans

Cumulative Delinquencies 2001 – '06: Full-Doc Loans

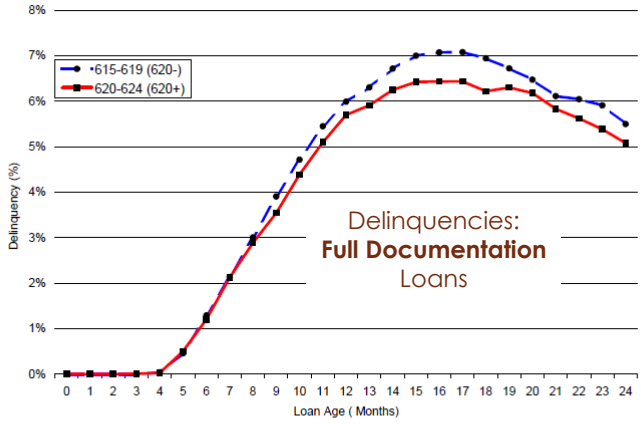


Figure 10: Falsification Test - Delinquencies for Full Documentation Loans Around FICO of 620

Figure 10 presents the falsification test by examining the percent of full documentation loans (dollar weighted) that became delinquent for 2001 to 2006. We track loans in two FICO buckets – 615-619 (620^-) in dotted blue and 620-624 (620^+) in red – from their origination date and plot the average loans that become delinquent each month after the origination date. As can be seen, the higher credit score bucket defaults *less* than the lower credit score bucket for post 2000 period. For brevity, we do not report plots separately for each year. The effects shown here in the pooled 2001-2006 plot show up for every year.

Cumulative Delinquencies 2001 – '06: Low-Doc Loans

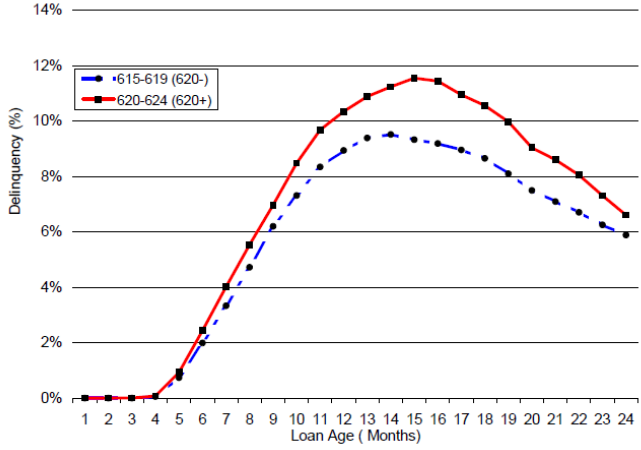


Figure 7: Delinquencies for Low Documentation Loans (2001-2006)

Figure 7 presents the percent of low documentation loans (dollar weighted) that became delinquent for 2001 to 2006. We track loans in two FICO buckets – 615-619 (620^-) in dotted blue and 620-624 (620^+) in red – from their origination date and plot the average loans that become delinquent each month after the origination date. As can be seen, the higher credit score bucket defaults *more* than the lower credit score bucket for post 2000 period. For brevity, we do not report plots separately for each year. The effects shown here in the pooled 2001-2006 plot are apparent in every year.

Highly recommended podcast:
"Inside Job" *This American Life*, April 2010

https://www.thisamericanlife.org/405/inside-job