

# **Macro-Prudential Regulation and Real Estate**

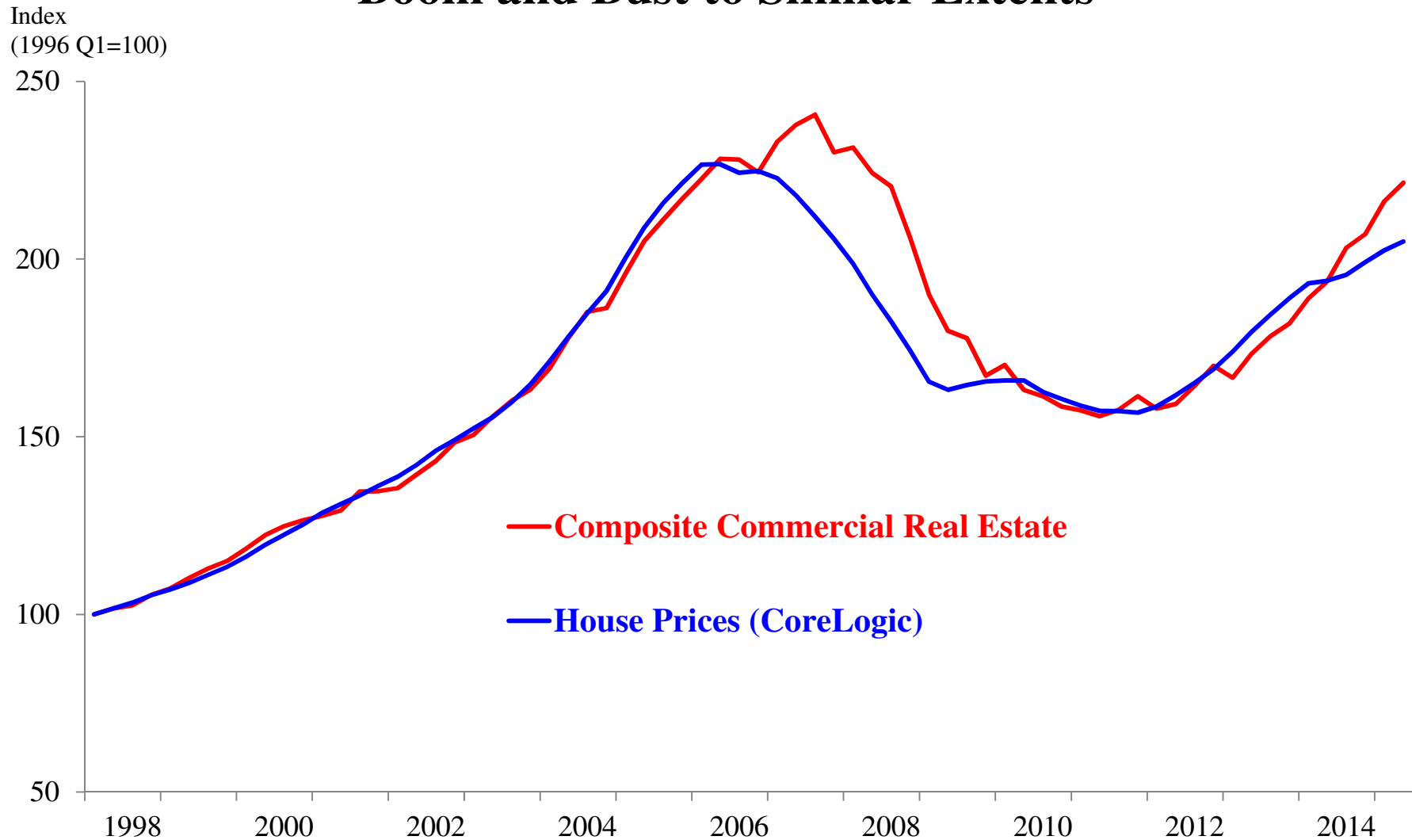
## **Fonds Conrad-Leblanc Seminar**

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Federal Reserve Bank of Dallas  
and Southern Methodist University

\* This presentation is based, in large part, on a paper co-authored with Susan Wachter, “Macro-Prudential Policy Responses to the Great Crisis: Lessons, Progress, and Remaining Challenges,” unpublished manuscript, in process. It also draws heavily on co-authored research with several of my other co-authors, most prominently Pat Hendershott, David Ling, John Muellbauer, and Anthony Murphy. The views expressed are those of the author, and are not necessarily those of the Federal Reserve Bank of Dallas or of the Federal Reserve System. Any errors are my own.

# U.S. House and Commercial Real Estate Prices Boom and Bust to Similar Extents



Sources: CoStar equal (sales unit) weighted repeat sales prices, CoreLogic (equal sales unit-weighted) repeat sales, and authors' calculations.

# Organization of Presentation

- Shifts in U.S. consensus on macro-prudential risks and policies
- What makes real estate vulnerable to booms and busts?
  - Focus on example of U.S. housing
- What drove the twin US real estate bubbles of the mid-2000s?
  - Owner-occupied housing
  - Commercial real estate (CRE)
- Major U.S. tools for addressing macro-prudential risks
  - Some reasons why Canada avoided the U.S. experience of 2000-12
- Concluding Comments

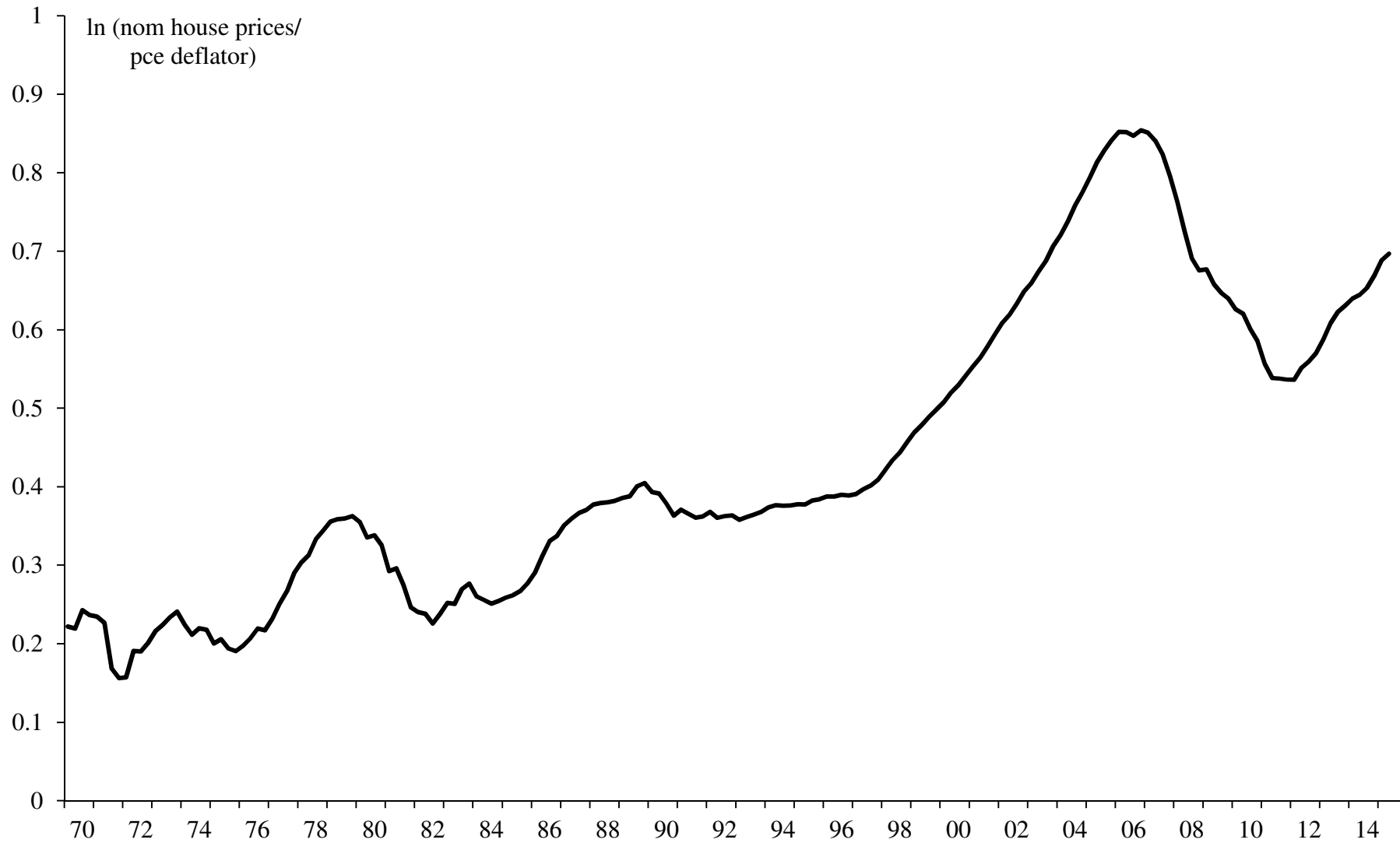
# Organization of Presentation

- Shifts in U.S. consensus on macro-prudential risks and policies

# **The Pre-Great Recession U.S. Consensus on Macro-Prudential Policy and Risks**

- Regulation focused on micro-prudential risk, Basel thought to provide enough protection against macro-prudential risks.
- If inflation low and near target, the financial system is resilient enough to survive shocks, with macro policy providing the time and conditions for cleaning up financial excesses.
- Under-appreciation of housing and mortgage imbalances.

# Real House Prices Soar, Plunge, Then Partly Recover

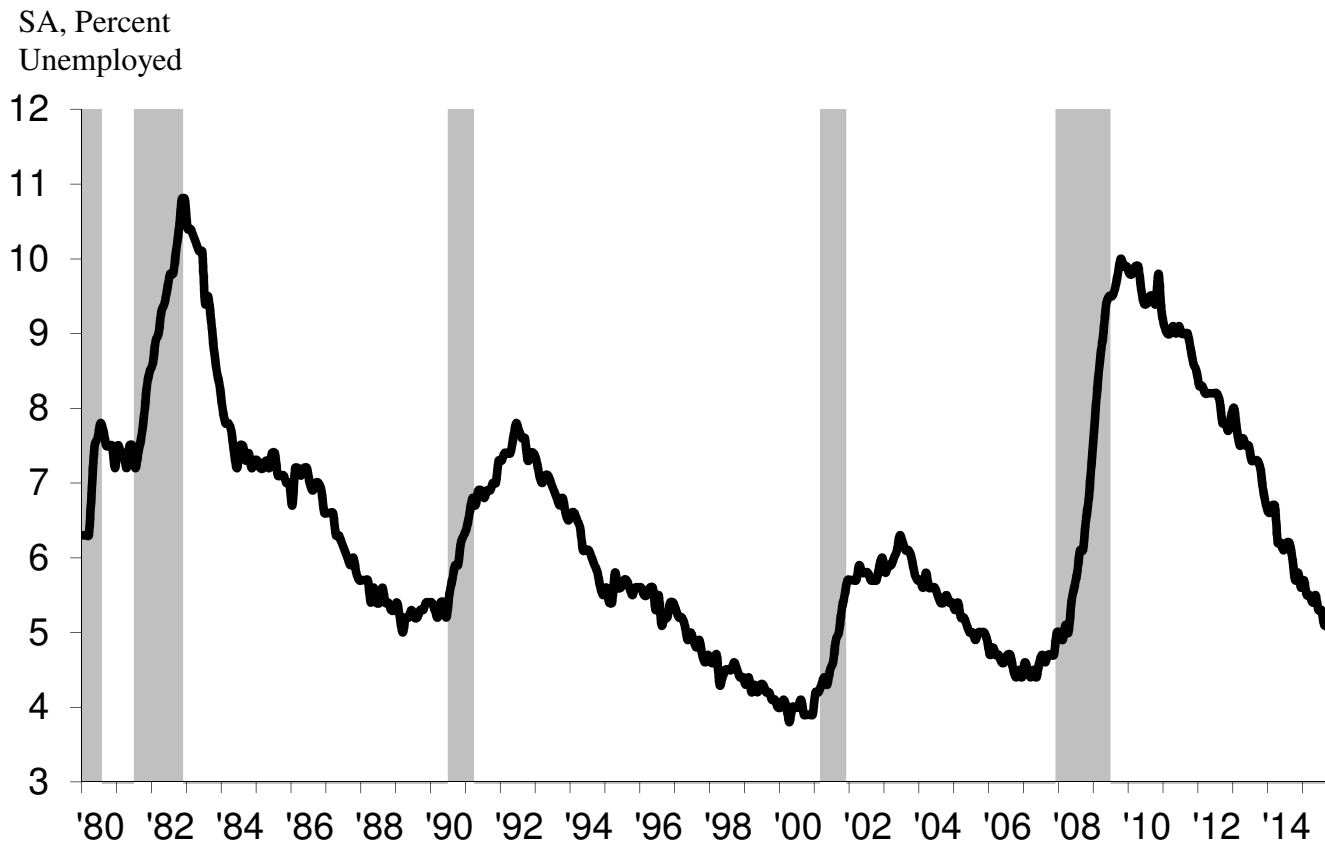


Sources: FHFA, Freddie Mac, BEA, Federal Reserve Board, and authors' calculations.

# Pre-Great Recession U.S. Consensus on Macro-Prudential Policy and Risks

- If inflation low and near target, financial system resilient enough to survive shocks, with macro policy providing the time and conditions for cleaning up financial excesses.
- Regulation focused on micro-prudential risk, Basel thought to provide enough protection against macro-prudential risks.
- Under-appreciation of housing and mortgage imbalances.
- Also, an under-appreciation of correlated risks:
  - Vast bulk of financial system impaired.
    - Old dichotomy of safety net protected banks and liquid securities markets providing a “spare tire” failed. Both direct and indirect (intermediated) finance collapsed.
  - Financial shocks triggered a correction in house prices threatened the financial system, led to a severe recession

# Unemployment Rose Greatly During the Great Recession And Took a Long Time to Recover

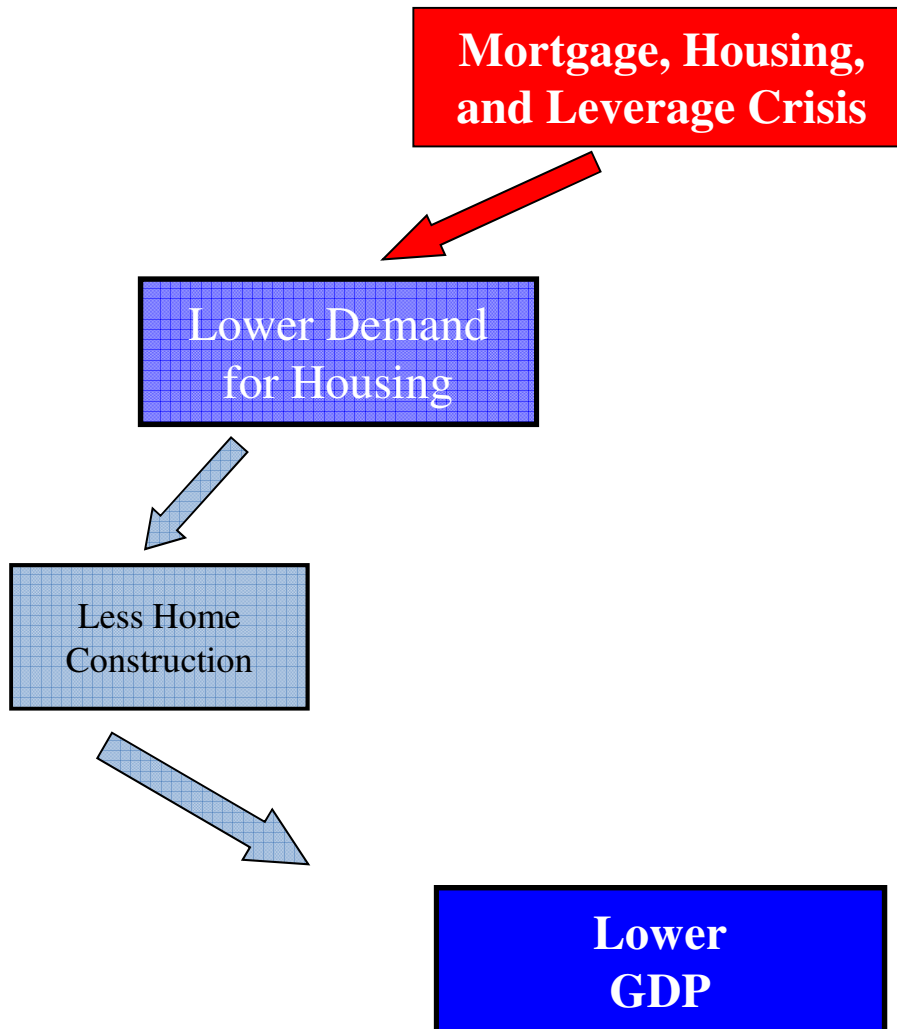


Source: Bureau of Labor Statistics.

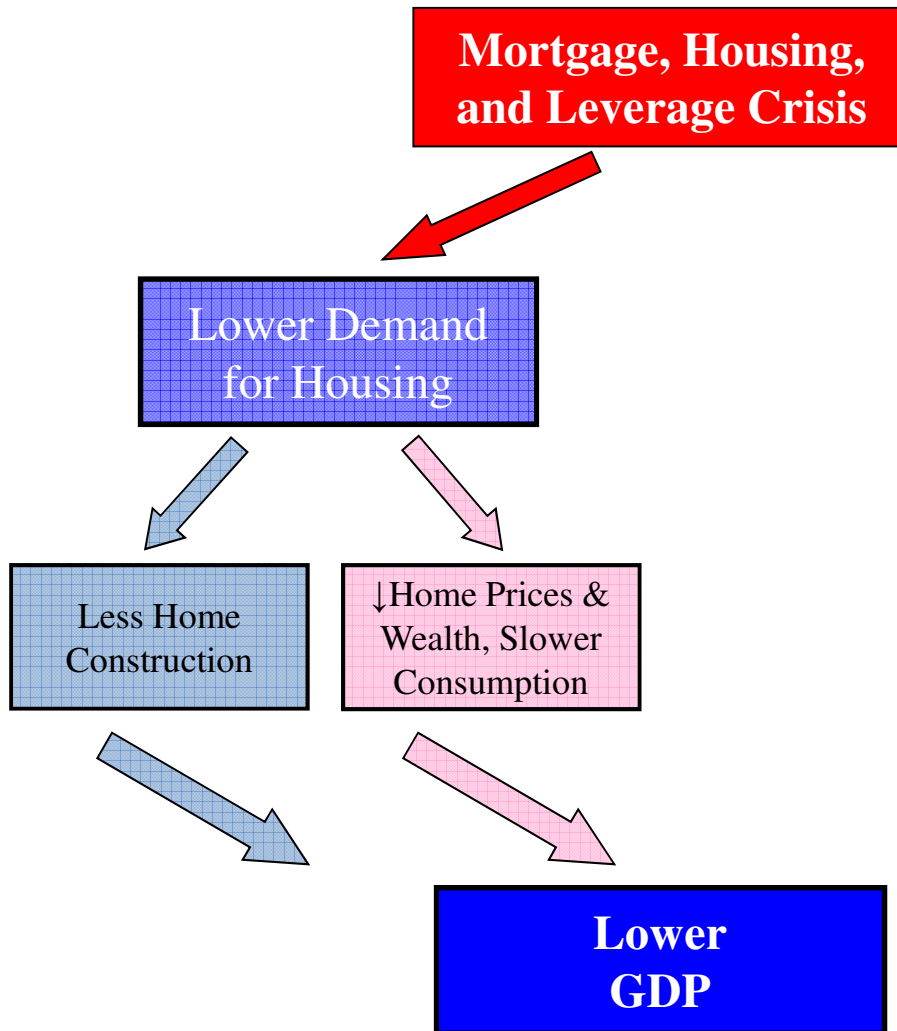


# Emerging Post-Crisis U.S. Consensus View

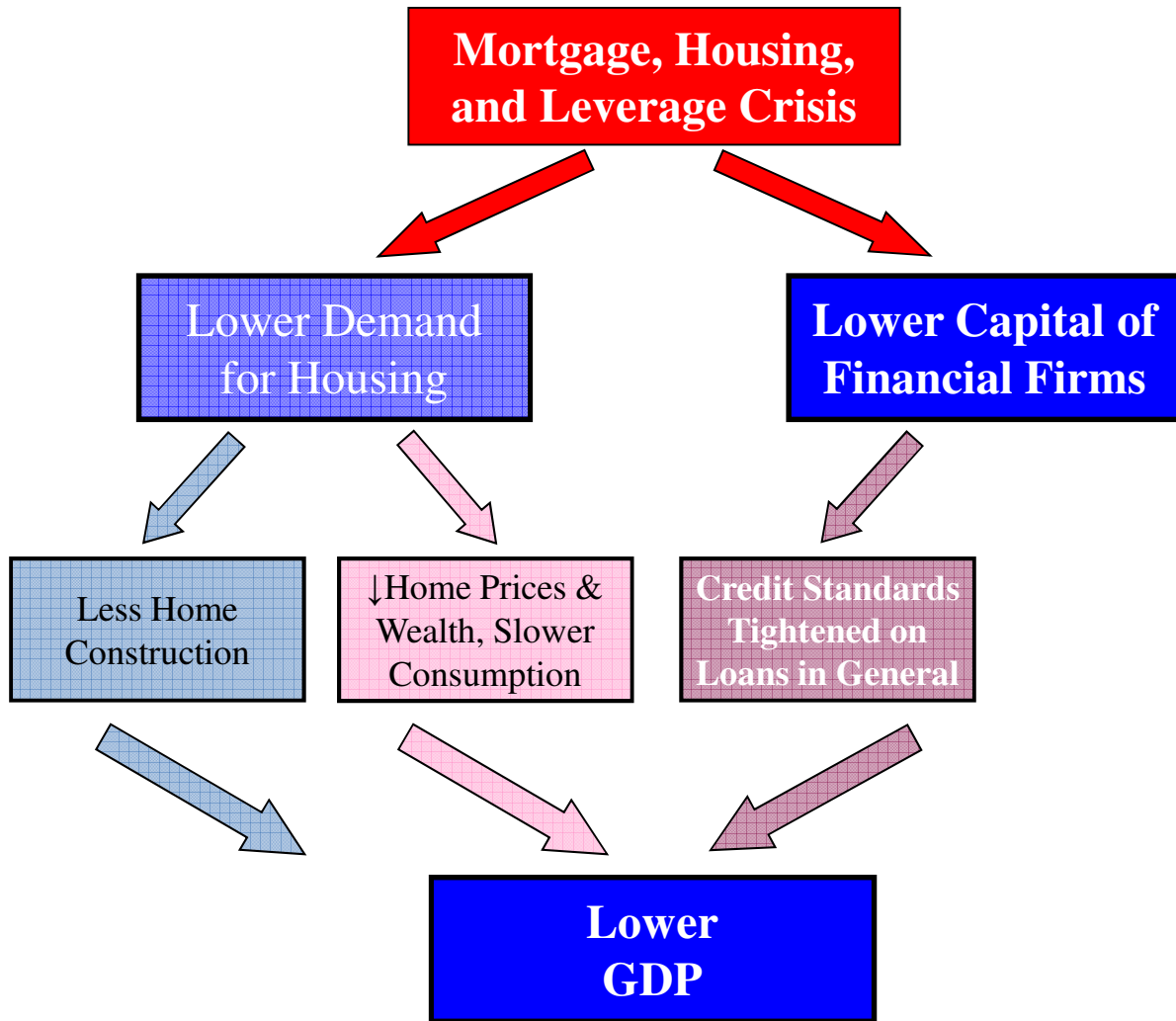
- Without macro-prudential regulation to restrain systemic risks, the financial system is not resilient enough for post crisis policies to quickly offset/clean up financial and macroeconomic damage.
- Real estate problems seem associated with prolonged and deep downturns across countries and since the 1920s in the U.S.
- Credit booms spawn real estate bubbles that ultimately give rise to:
  - Loan losses that threaten the financial system's stability
  - Debt overhangs that prolong the recovery from downturns
  - Correlated risks that can hurt economy in multiple major ways



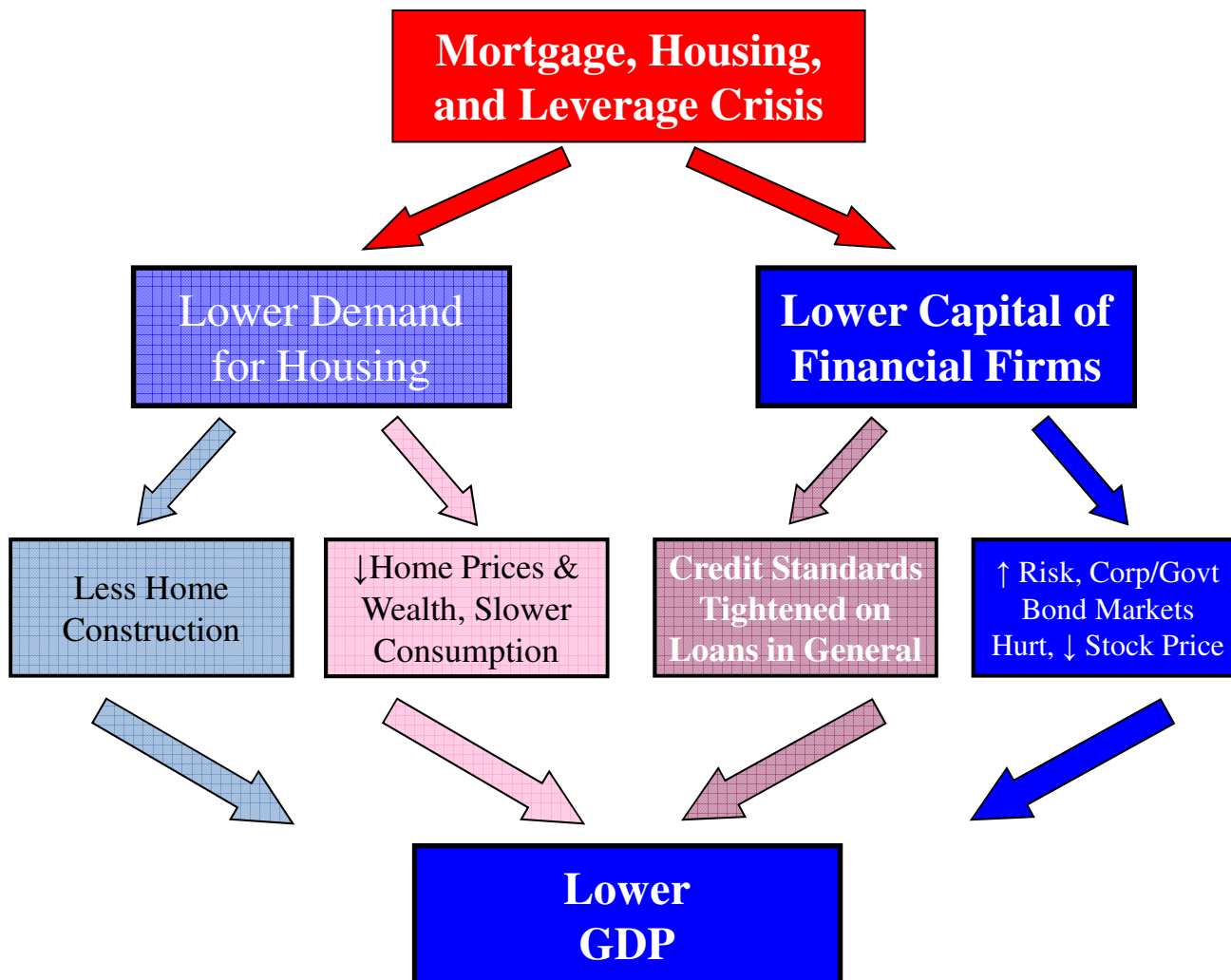
Source: J. Duca and J. Muellbauer, 2014, "Tobin LIVES: Credit market architecture and the US household flow of funds."



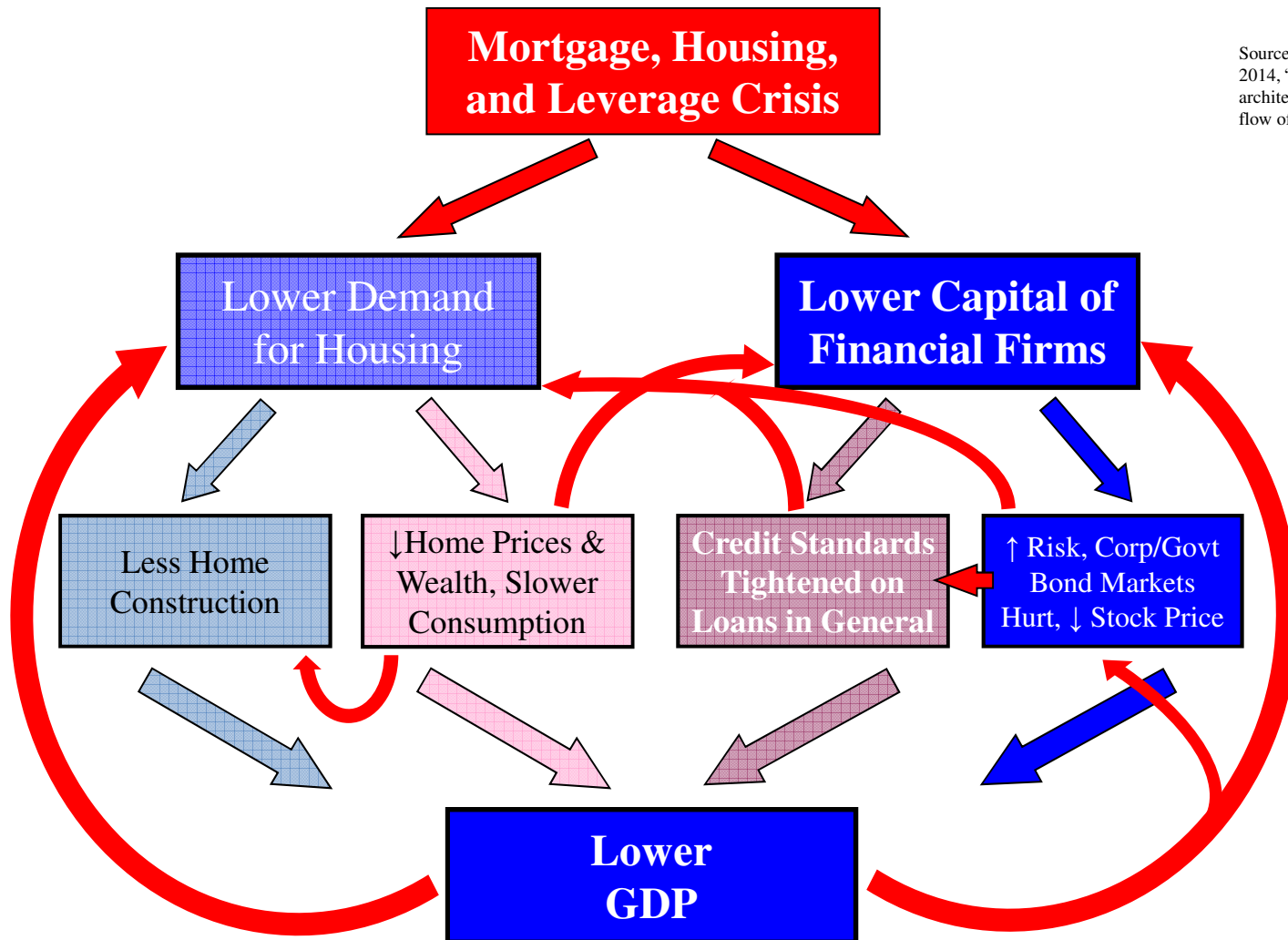
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- Credit booms spawn real estate bubbles that ultimately give rise to:
  - Loan losses that threaten the financial system's stability
  - Debt overhangs that prolong the recovery from downturns
  - Correlated risks that can hurt economy in multiple major ways
- Need macroprudential policy to address externalities\* (social costs) that lenders do not bear that encourage excess lending that can:
  - Cause build-ups of imbalances before crises occur
  - Amplify the impact of negative shocks on the real and financial sectors
  - Create widespread macro damage from creating correlated risks

\* See Adair Turner's (2015) book.

# Organization of Presentation

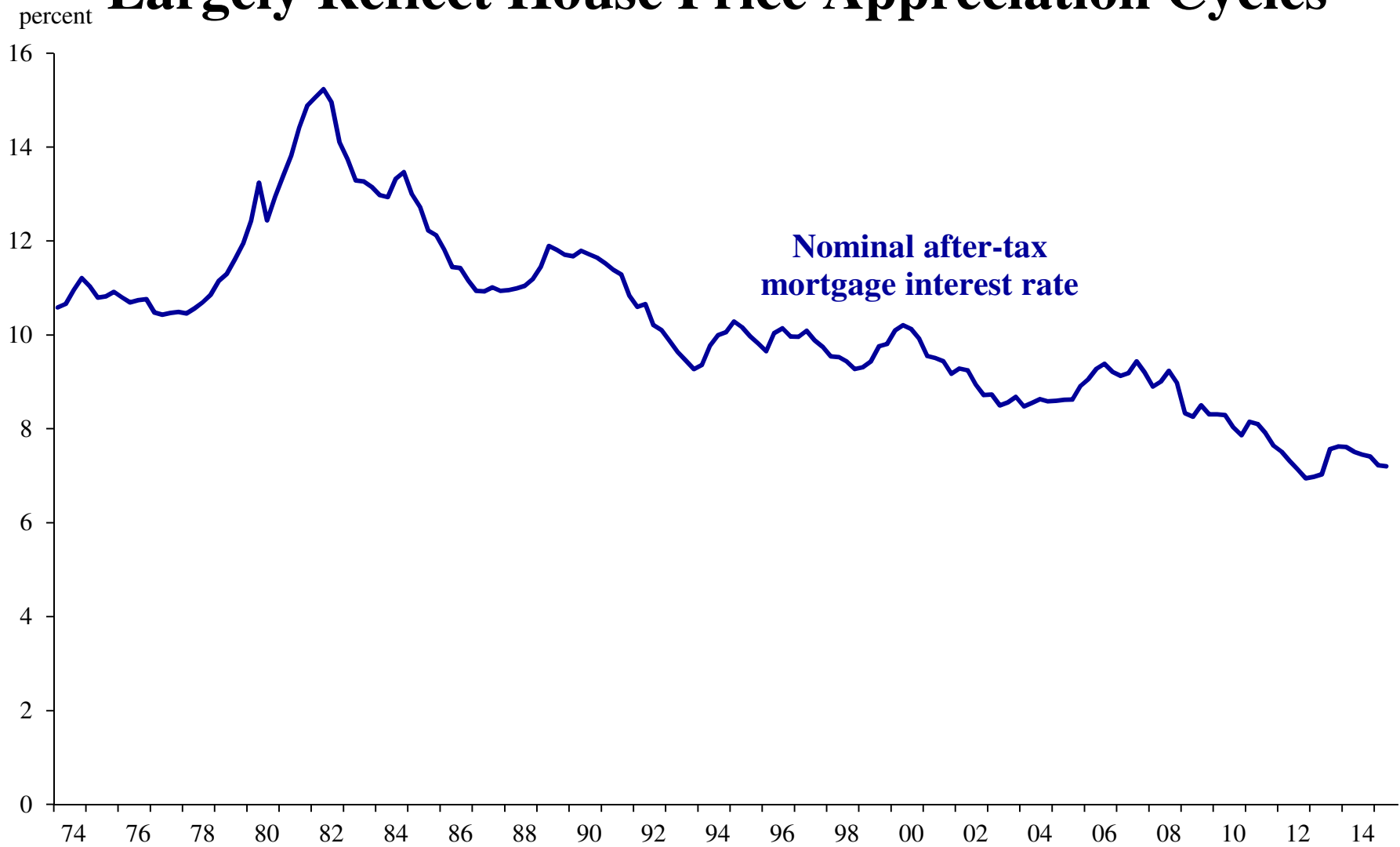
- Shifts in U.S. consensus on macro-prudential risks and policies
- **What makes real estate vulnerable to booms and busts?**
  - **Focus on example of U.S. housing**



# The U.S. Subprime Housing Boom-Bust: What Makes Residential Real Estate Vulnerable?

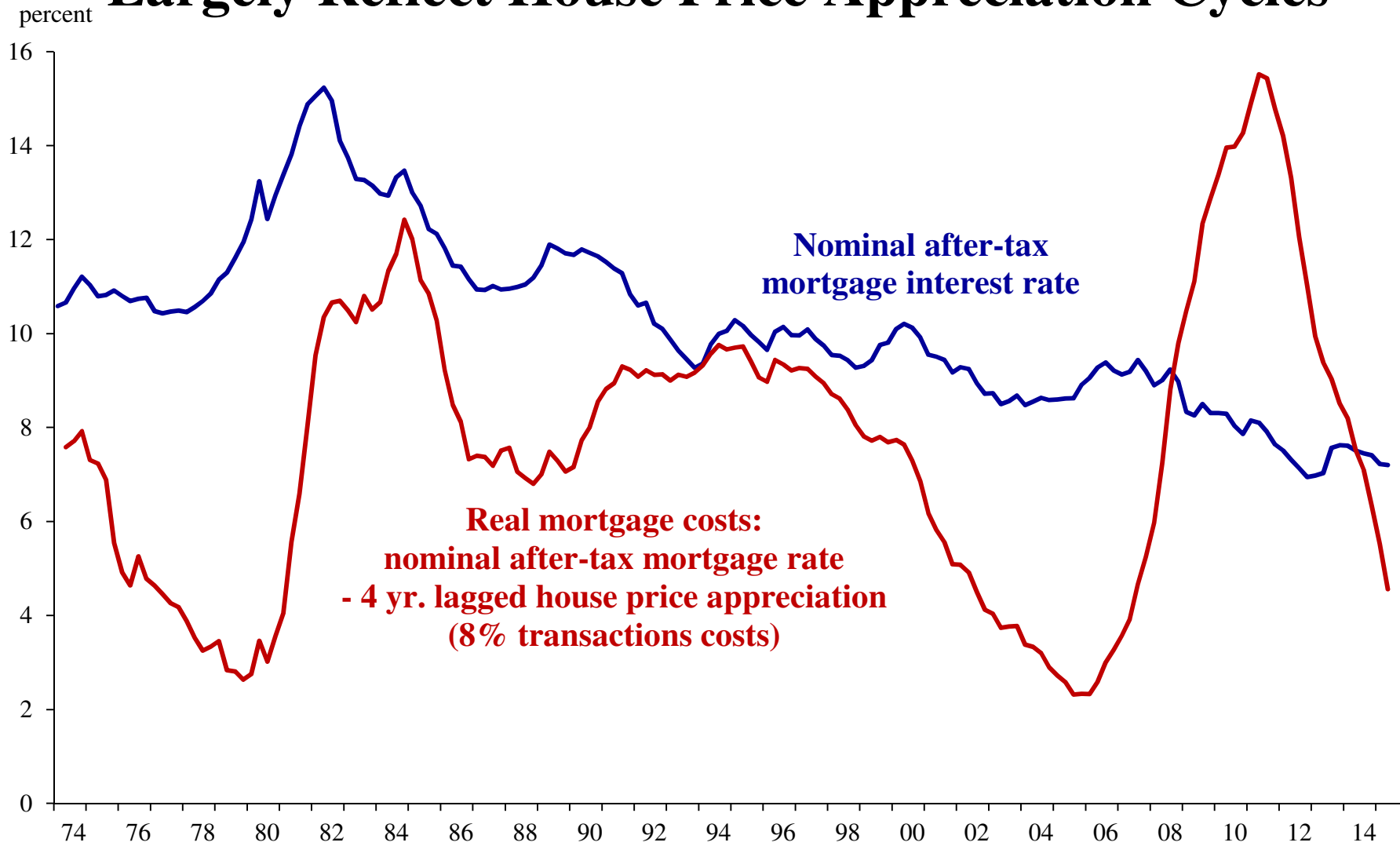
- Four key drivers of the effective demand for housing:
  - **Income** (permanent)
  - **interest rates** (price of credit) adjusted for taxes
  - **expected house price appreciation** (lowers the real mortgage interest rate)
  - **credit standards** (downpayment, payment-to-income ratio, credit history)
- Housing thinly traded (5% normal annual turnover), so transactions prices very sensitive to imbalances in the flow demand and supply of housing.
- High transactions costs, infrequent buying by home-buyers with tax incentives to own, and long-times to buy/build houses create serial correlation in excess returns.
- Induces formation of extrapolative (backward-looking) expectations of appreciation, amplifying swings in real mortgage interest rates:  
Real mortgage rate = [(1-tax rate) x mort. rate] – expected price appreciation

# Real After-Tax Mortgage Interest Rates Largely Reflect House Price Appreciation Cycles



Sources: FHFA, Freddie Mac, BEA, Federal Reserve Board, and authors' calculations.

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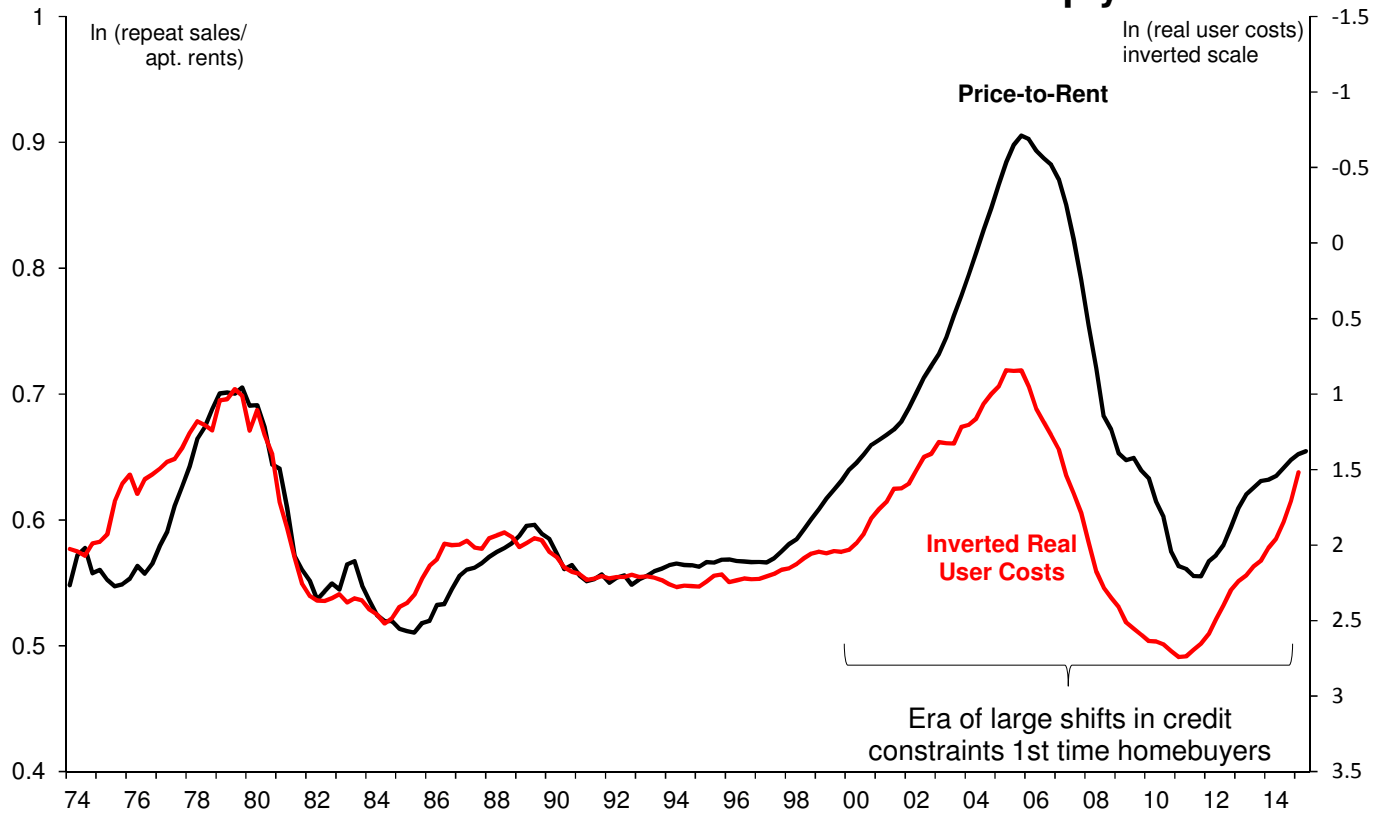


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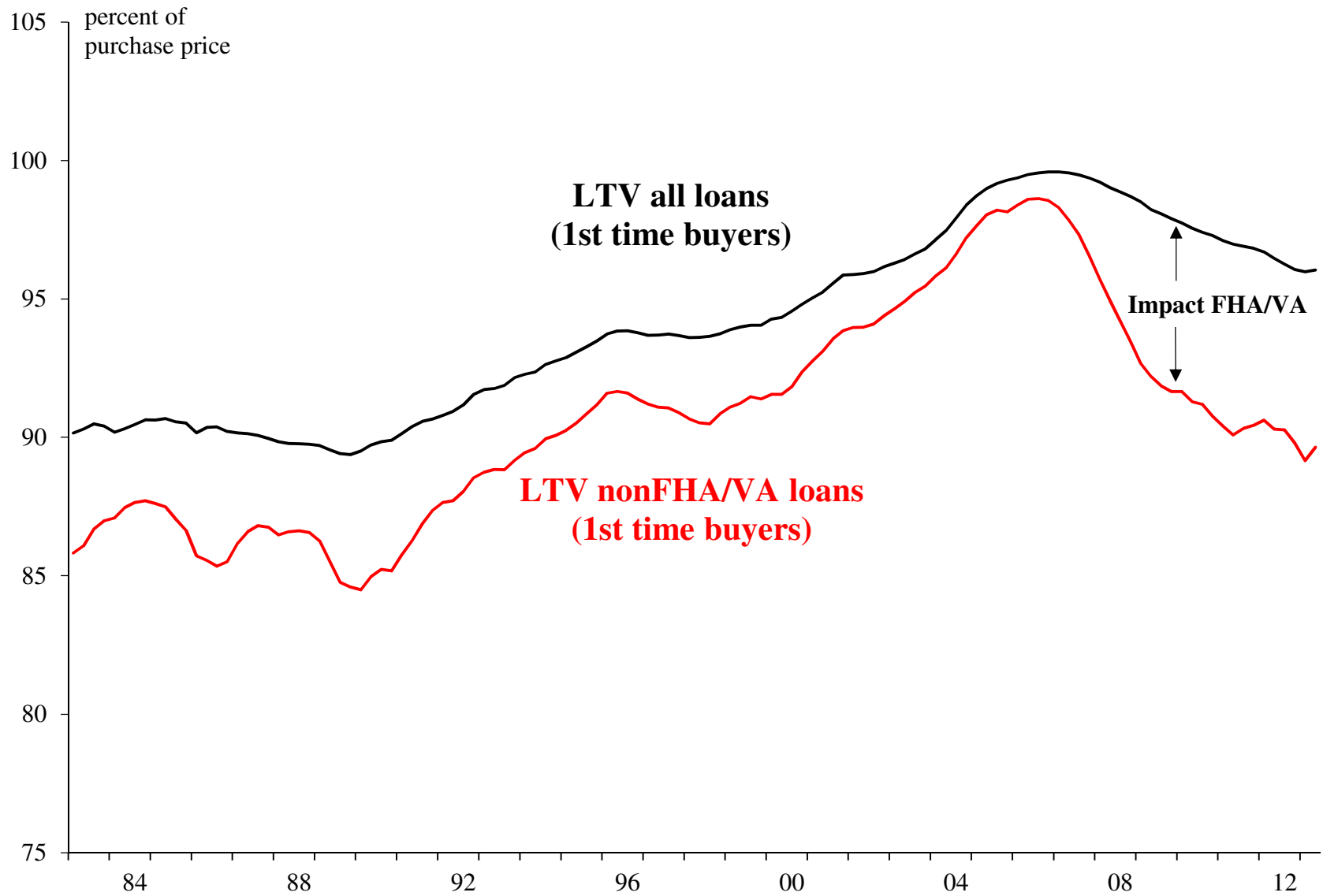
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$$\text{Real mortgage rate} = [(1 - \text{tax rate}) \times \text{mort. rate}] - \text{expected price appreciation}$$
- If price appreciation persists construction jumps, overbuilding risk.
- Residential real estate swings contained under Taylor-Rule monetary policy when credit standards stable. Commercial real estate bust early-1990s from tax changes.
- Mid-2000s U.S. housing boom reflected more than low interest rates. Weaker credit standards boosted housing demand, amplified by price expectations. (see Duca, Muellbauer, and Murphy (2010, 2011, 2012, 2016)).

## In Subprime Boom-Bust, House Price-to-Rent Ratios Move More than Real User Costs Alone Imply



Sources: FHFA, Freddie Mac, BLS, BEA, Federal Reserve Board, and authors' calculations.

# LTVs on Mortgages to First-Time Homebuyers



# Organization of Presentation

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  - Owner-occupied housing
  - Commercial real estate (CRE)

# Interpreting the Great Recession: A Kindleberger-view of Macro-Financial Booms and Busts

- The Great Recession triggered by the collapse of an unsustainable easing of mortgage credit standards made possible by structured finance. Four elements:
- New innovation introduced in good times, not stress tested: Subprime/Alt A
- If financial leverage available, massive excess risk taking in a new product
  - SIVs, higher leverage at comm. & invest. banks, global capital, lower capital requirements on investment-grade PMBS; non-prime 40% of new mortgages
- If credit funds illiquid market, thinly traded prices mislead: prices usually based on 5% annual housing turnover, these prices guide appraisals and mortgage equity withdrawal
- If financial imbalances fund real sector imbalances, fin. crises can morph into recessions
  - Housing an important contributor to the business cycle (Leamer, 2007; Bordo/Haubrich)
  - Amplified by funding of consumption with housing equity (Duca, Muellbauer, Murphy, 2012)
  - Amplified if the funding of these imbalances is levered and unstable (Adrian and Shin (2009, 2010), Brunnermeier and Sannikov (2013), Gorton and Metrick (2012), Geanakoplos (2012)
  - Nonprime assets less suitable for securitization; intermediaries use too much unsecured debt
  - Large capital losses at banks and shadow banks induce credit crunch in securities & loan mkts.



## **How Underpriced Risks Were Critical to Generating the Twin U.S. Real Estate Bubbles of the mid-2000s\***

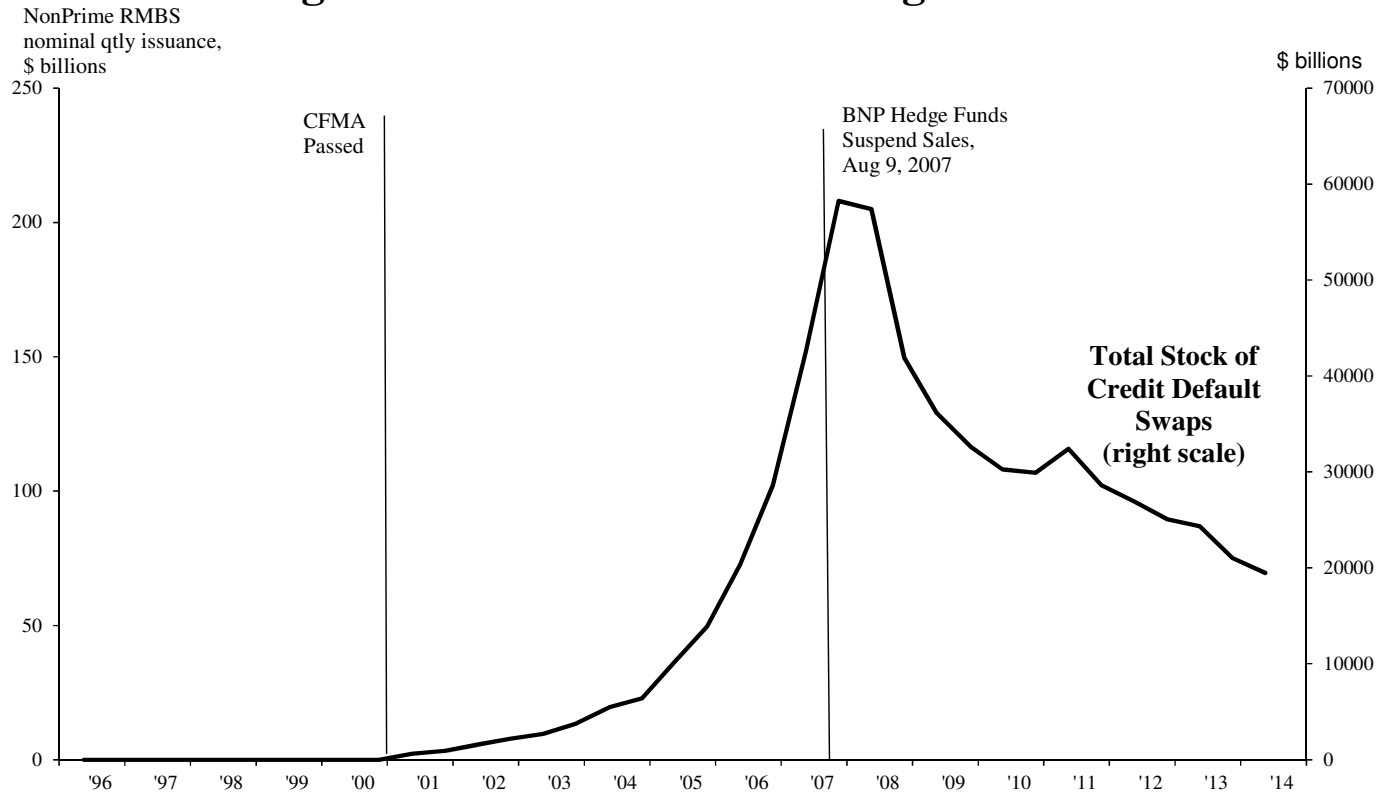
- Private sector and regulators underestimated risks
- Capital requirements on securitized nonprime home mortgages and CRE mortgages were lowered, fueled a mortgage boom
- As did underpricing of real estate risks by private sector via:
  - CDO structuring of securitized nonprime home mortgages
  - CMBS risk priced off corporate bonds not CRE assets

\* See Duca and Wachter (2016)

# The Rise of U.S. Structured Finance, An Untested Innovation Enabling Subprime & CMBS to Grow

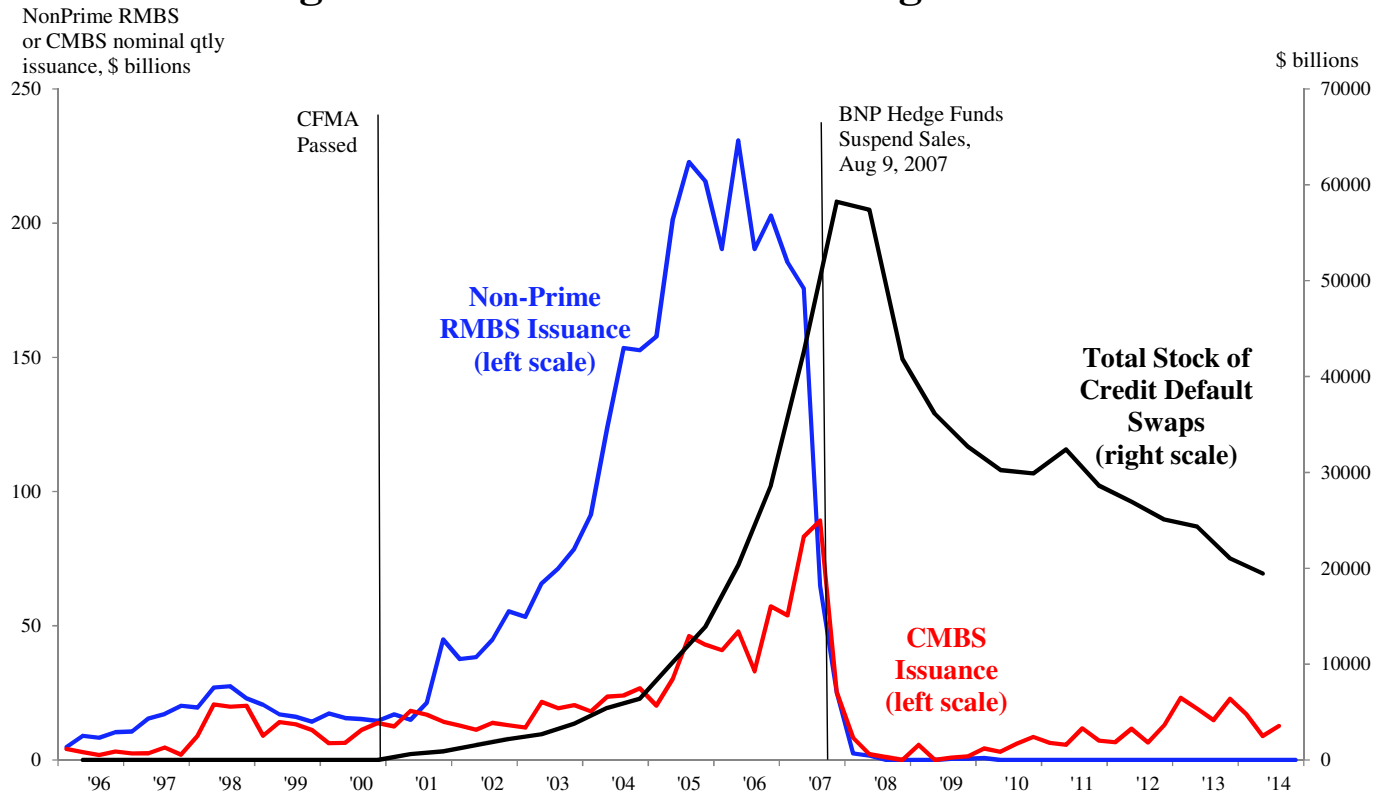
- Before 2000, limited subprime lending. 2 general types of mortgages:
  - Conventional mortgages: max. debt payments-to-income 36 percent, min. 20% downpayment (or 5-10% down, any shortage below 20% covered by private mortgage insurance from well-capitalized firms)
  - FHA/VA mortgages: gov't insured limited size mortgages, low down-payment requirements but limits on debt-payments-to-income ratios (usually 38%), starter home for young or basic home for less well-off.
- CFMA (Commodity Futures Modernization Act of 2000) gives pre-bankruptcy priority to a company's derivative obligations, gross CDS volume surges from 0 to \$60 Trillion by 2008

## CMBS and NonPrime RMBS Issuance, with CDS Outstanding, Surge in the Mid-2000s and Plunge in 2007/08



Sources: *Inside Mortgage Finance*, SIFMA, BIS, ISDA, and authors' calculations.

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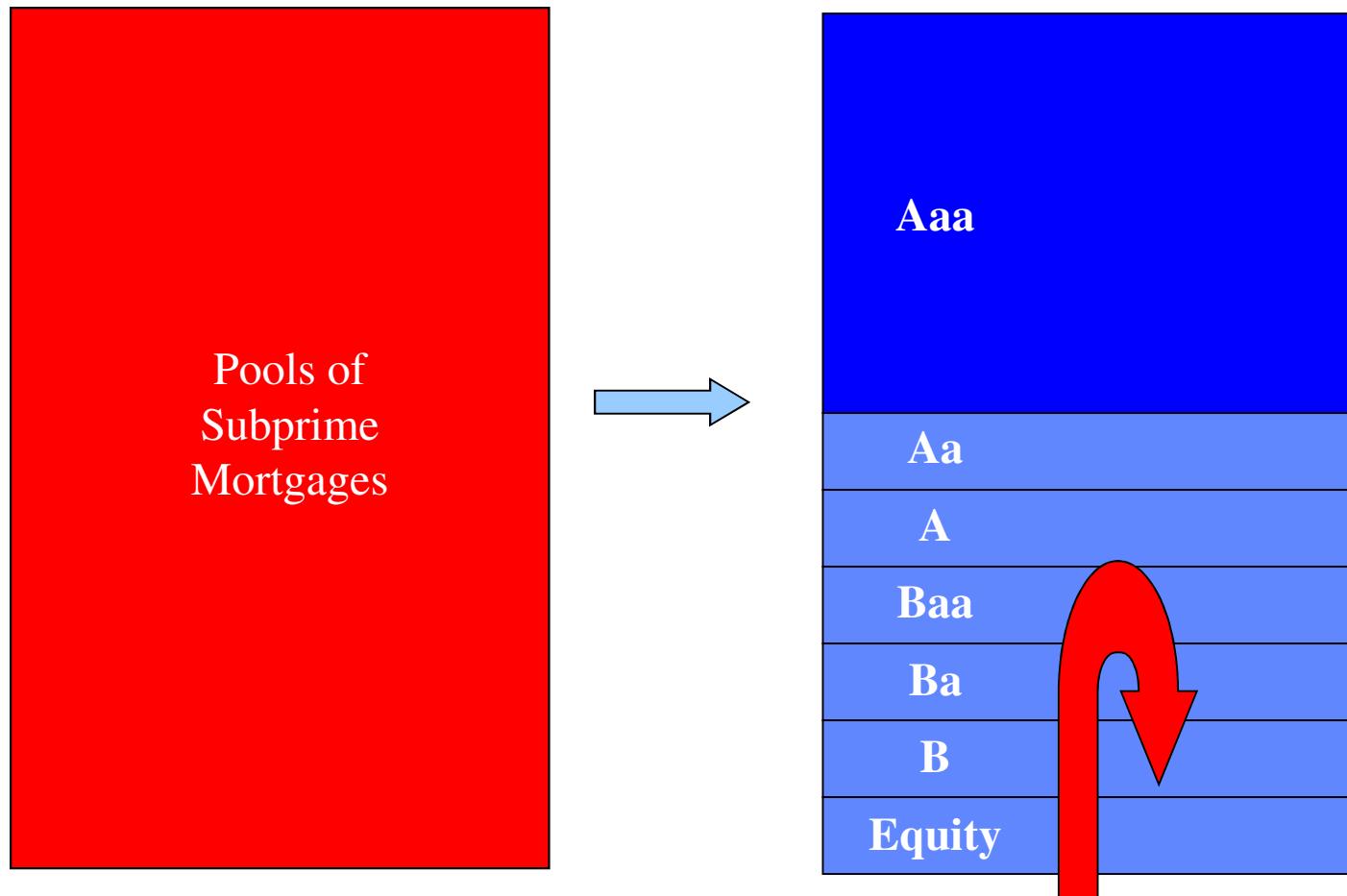


Sources: *Inside Mortgage Finance*, SIFMA, , BIS, ISDA, and authors' calculations.

# **The Rise of U.S. Structured Finance and How Excesses Built Up in the Subprime Boom (cont'd)**

- Structured finance understated default risk of subprime/Alt A:
  - Bulk of subprime/Alt A funded by private-label mortgage-backed securities (PMBS)
  - Default risk apportioned to different tranches of CDO holdings
  - Credit ratings underestimate risks to tranches from a liberalization (easing) of credit standards (“house prices never drop” vs. late with false sense of protection against tail risk (no clearing house))

# Low rated tranches to protect high rated CDOs from default losses



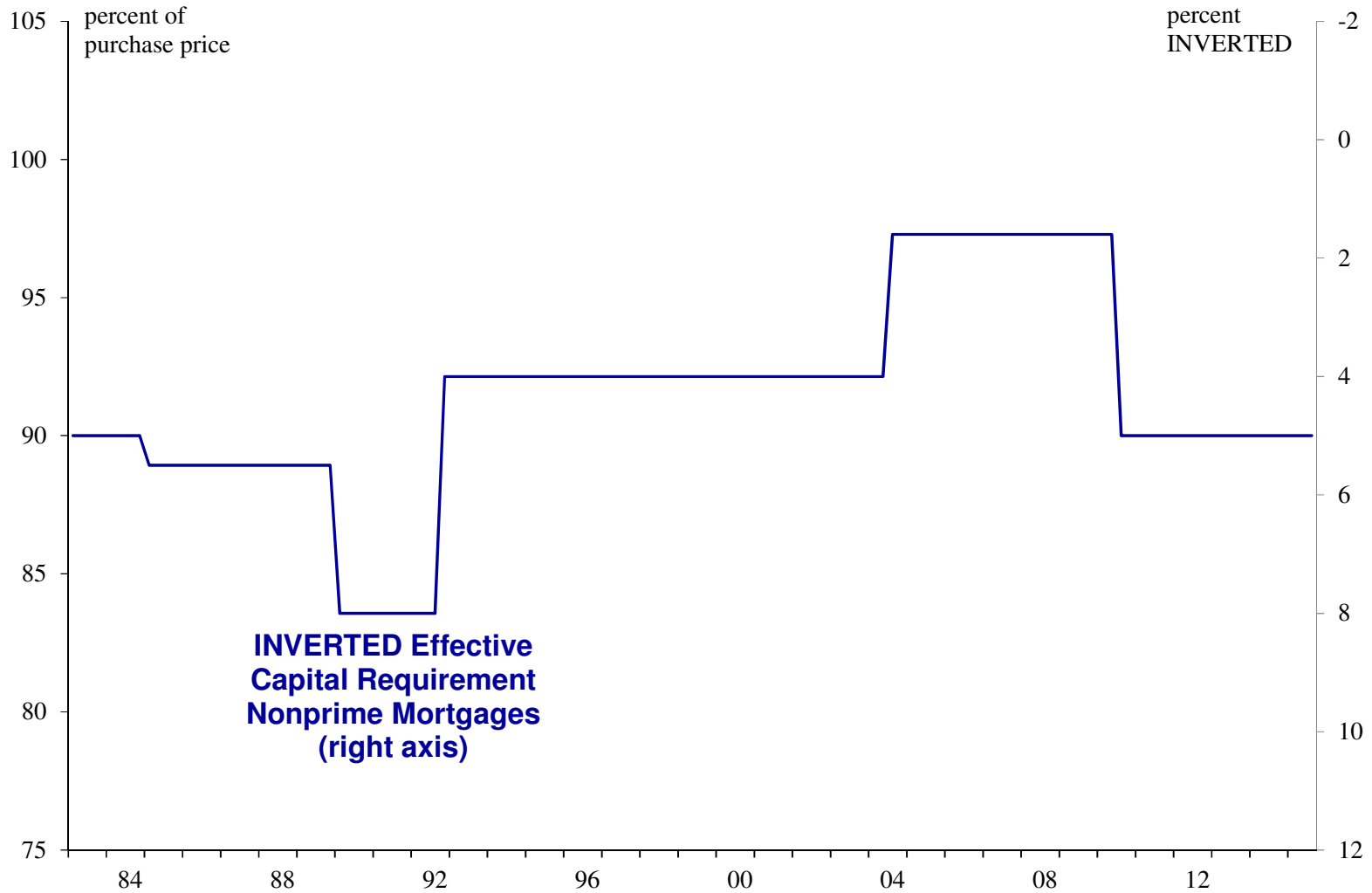
Pre-2006 forecasts subprime defaults

*Source: Author modified from Commercial Mortgage Securities Association*

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  - Some rise in PMBS and CMBS issuance between 2001 and early 2004 when 8% capital for PMBS/CMBS at commercial banks; 6.7% at investment bank brokerages
- 2000 to mid-2004 subprime & Alt A rise to 15% of home purchase loans
- June 2004: Capital requirement on investment-grade PMBS cut from 8 to 1.6 % at commercial banks and capital requirements weakened at investment banks (4 of big 5 investment banks doubled leverage)
- Subprime/Alt A rises from 15% to 40% of home purchase loans and the homeownership rate rises from 65% to 69%

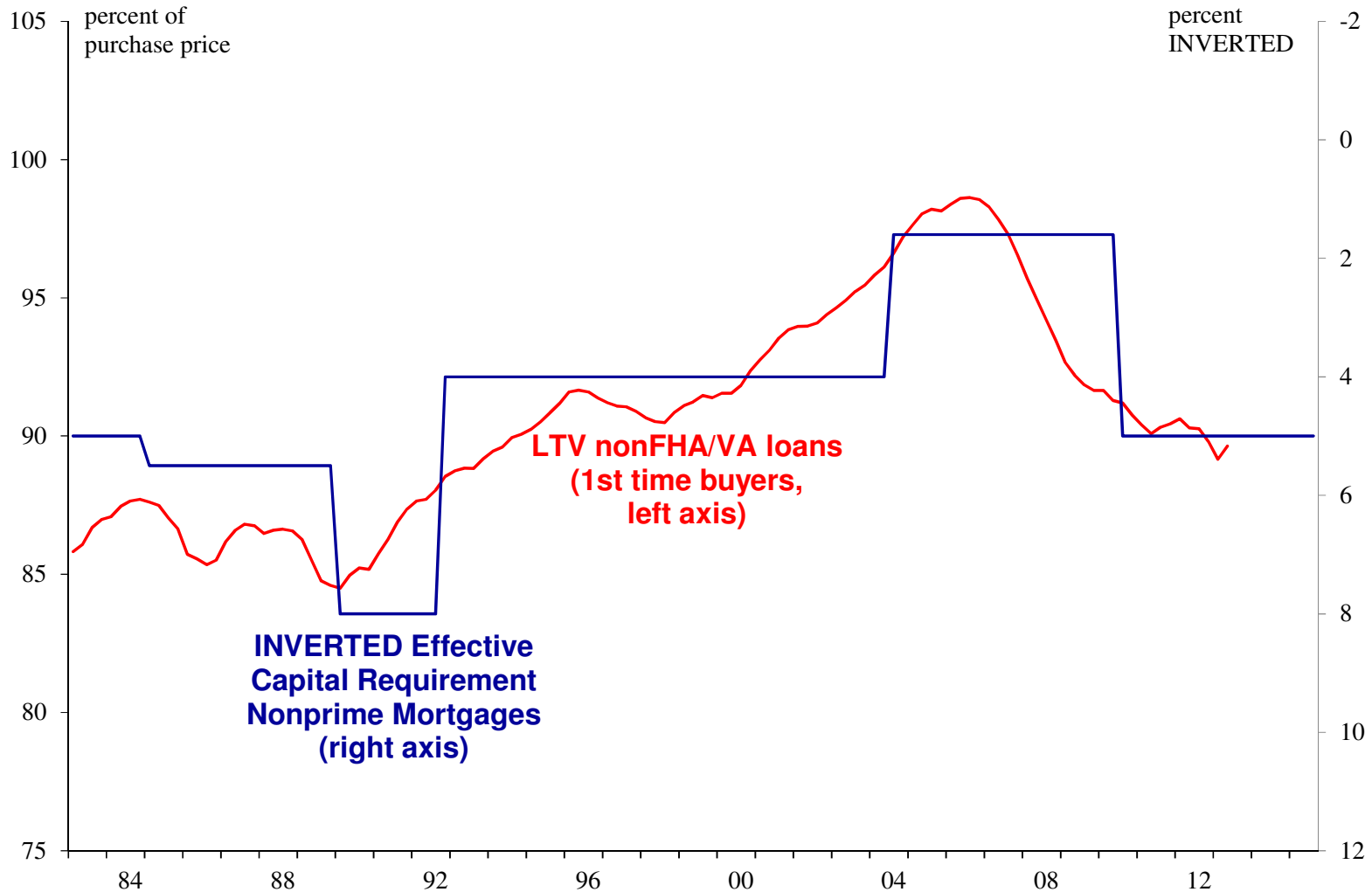
# Effective Capital Requirement on Nonprime Mortgages and LTVs on Mortgages to First-Time Homebuyers



Sources: American Housing Survey and calculations from John V. Duca, John Muellbauer, and Anthony Murphy (forthcoming), "How Mortgage Finance Reform Could Affect Housing," *American Economic Review*.

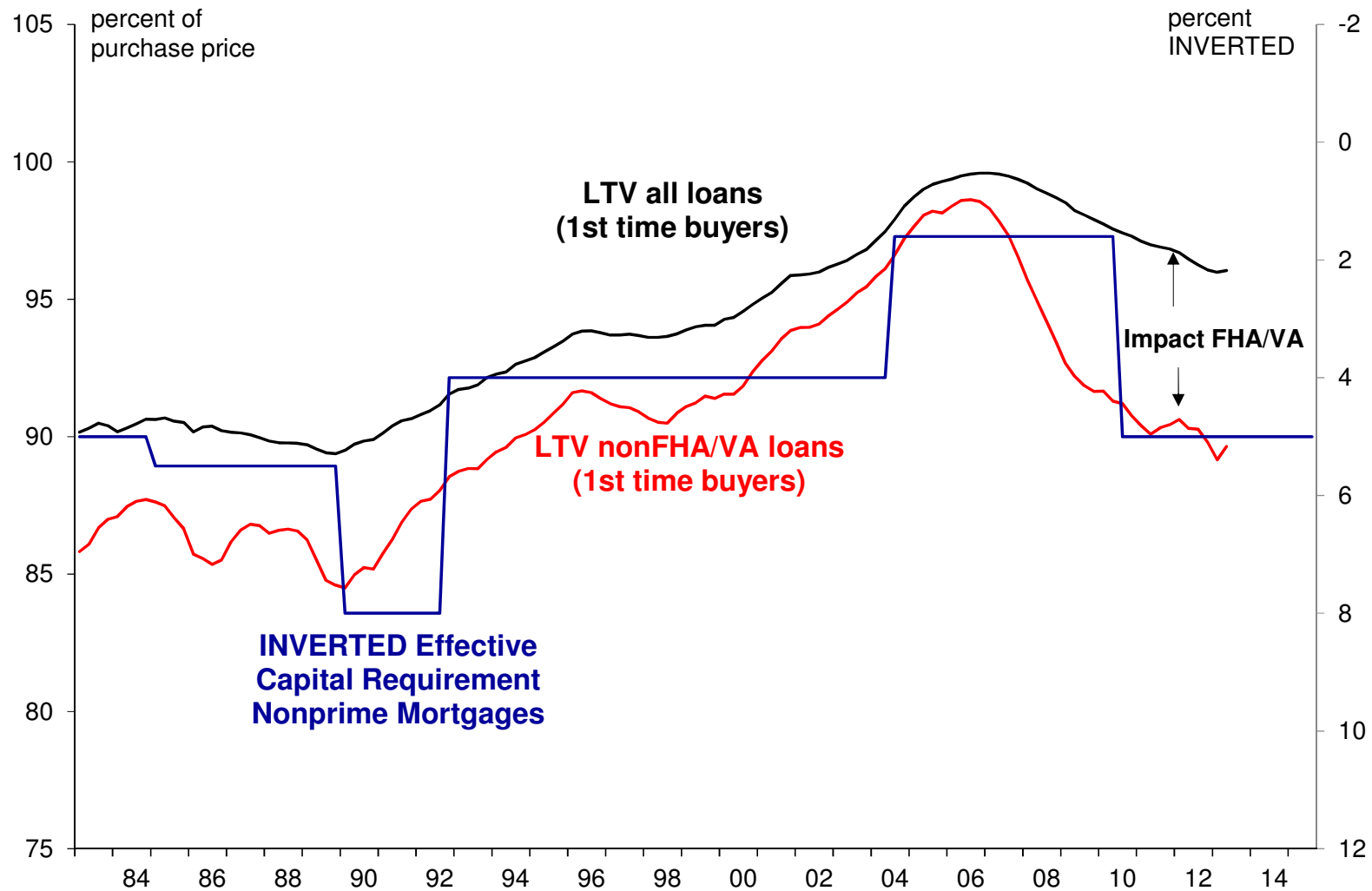


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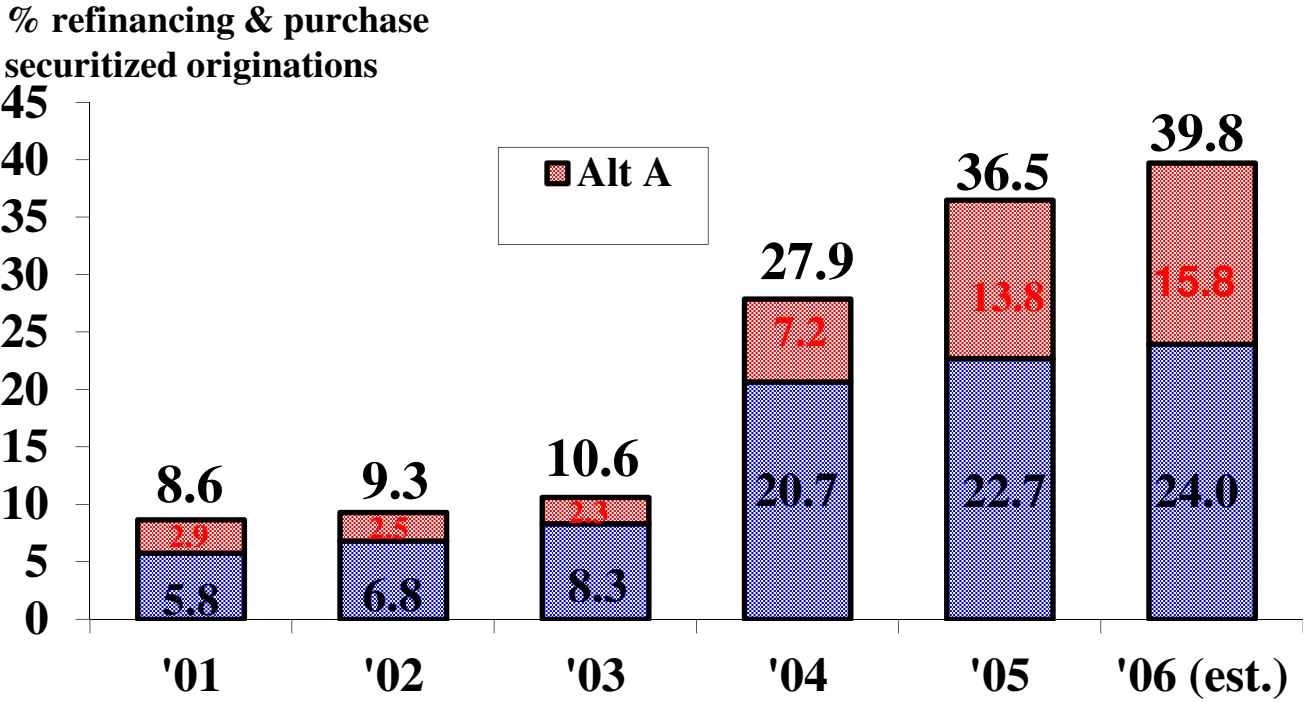
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# Subprime & “Alt A” share of mortgage originations jump (Goldman Sachs)

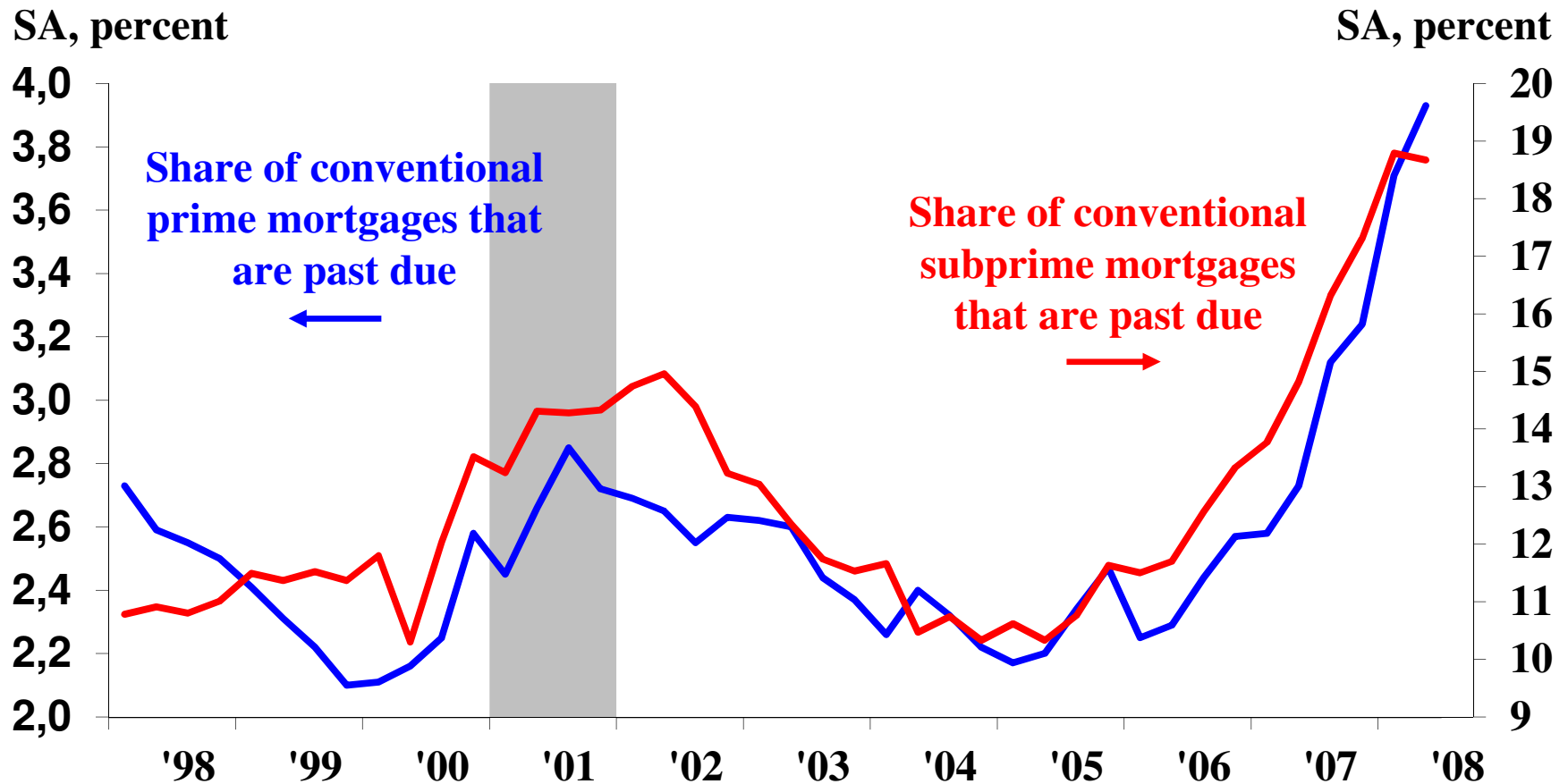


Source: Goldman Sachs, *US Economics Analyst*, Feb. 23, 2007, Andrew Tilton.

# The Deep and Prolonged U.S. Housing Bust

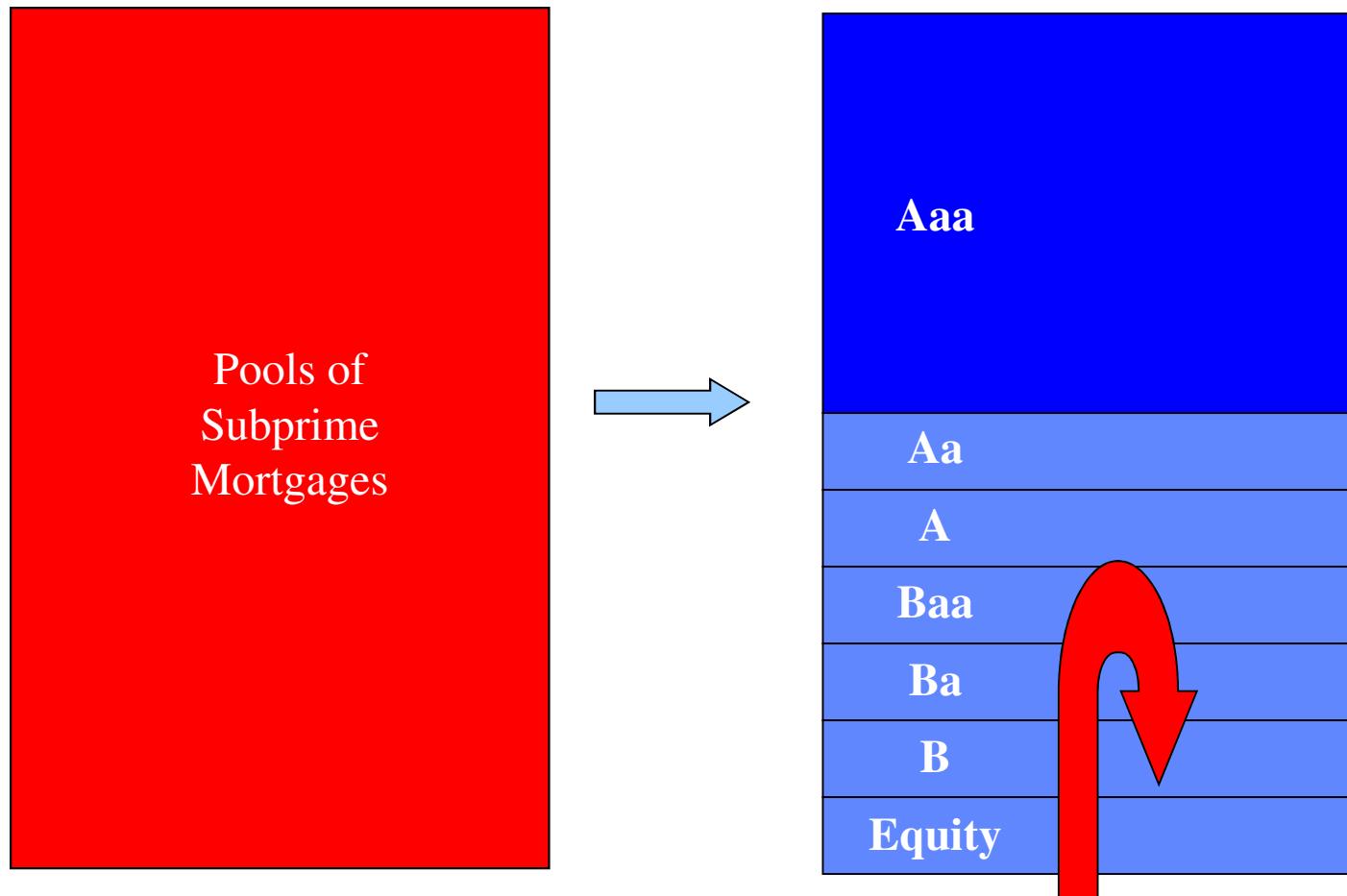
- Rising house prices enabled a troubled borrower to:
  - Sell house at a capital gain and pay off mortgage so no mortgage losses
  - Or refi to pay off old mortgage or home equity loan to pay 1<sup>st</sup> lien loan
- Delinquencies jump when house prices stop rising, losses mount on PMBS/CMBS, credit standards tightened, lowers effective demand and prices for real estate.
- Securities price declines amplified by how PMBS and CMBS were funded:
  - Large commercial banks used short-term non-government insured debt to fund PMBS and CMBS held in portfolio or in off-balance sheet SIVs and SPVs
  - Large investment banks also use short-term debt to fund PMBS, CMBS, ....
  - Short-term debt dried up, forcing fire sales of PMBS and CMBS
  - Doubts about whether CDS guarantees would pay out also induce fire sales
- PMBS servicers not legally able to or lacked resources to work-out loans, refinance subprime borrowers. Home supply boosted by foreclosed & short-sale homes.
- Construction surges with a lag, creates big supply of houses just as downturn starts.
- Losses at lenders & investors impair mortgage supply, credit crunch deepens

# Late Mortgages Unexpectedly Became More Prevalent, Reaching New Records



Source: Mortgage Bankers Association.

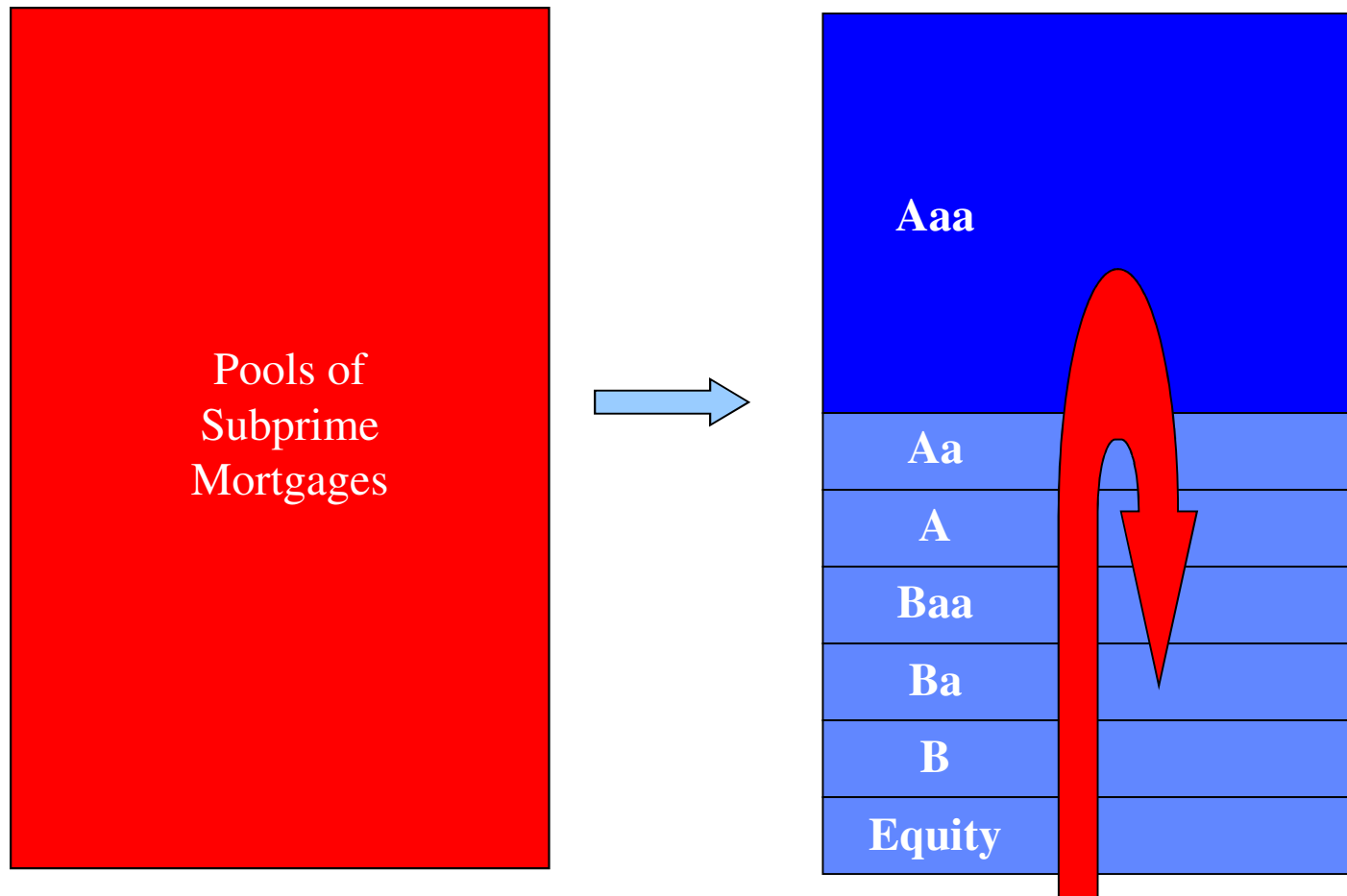
# Low Rated Tranches Supposed to Protect High-Rated CDOs from Default Losses



Pre-2006 forecasts subprime defaults

*Source: Author modified from Commercial Mortgage Securities Association*

# Unexpected Subprime Losses Pose Risk to “High-rated” CDO Tranches



Much larger actual subprime defaults

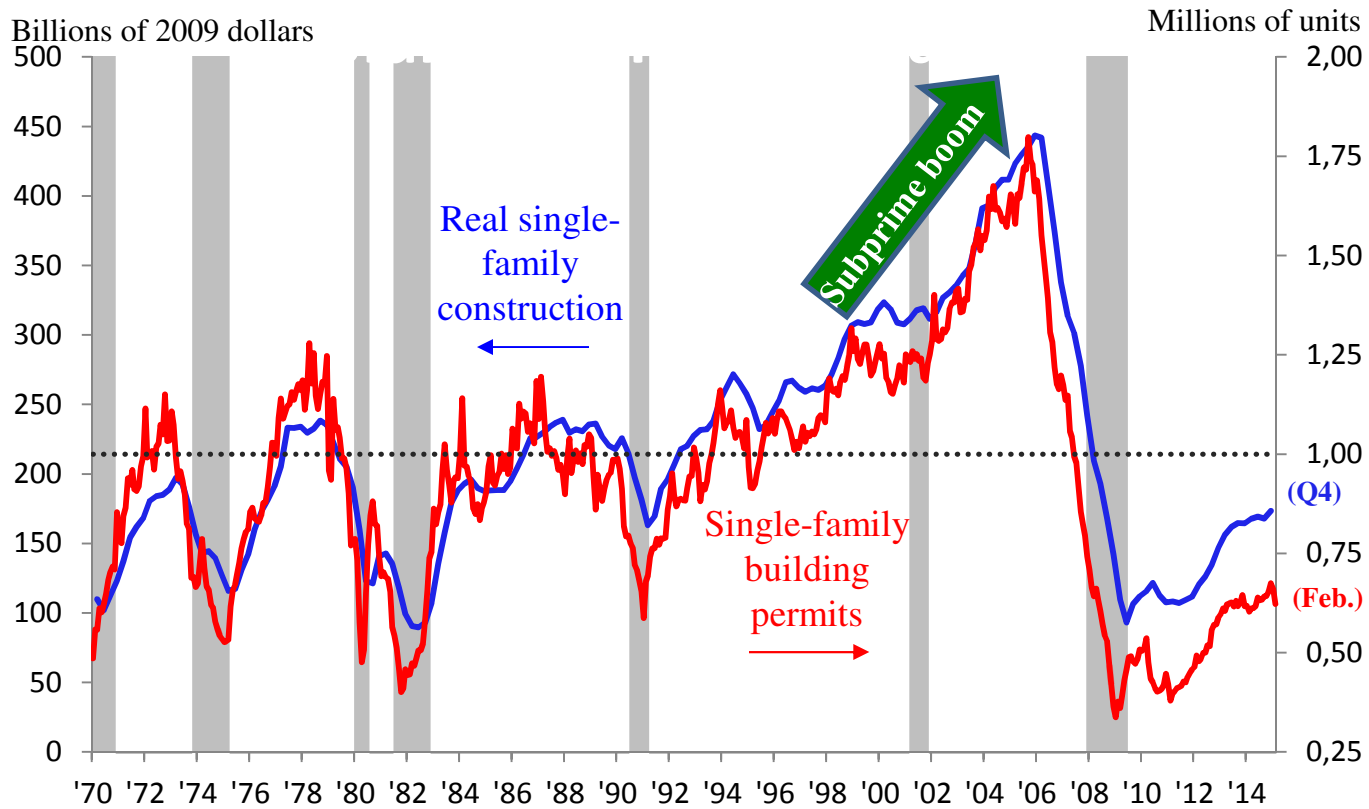
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- Construction surges with a lag, creates big supply of houses just as downturn starts.
- Losses at lenders & investors impair mortgage supply, credit crunch deepens.
- Supply-demand imbalance lowers prices, amplified by extrapolative expectations. Bust worsened by deep recession & income losses induced by housing.

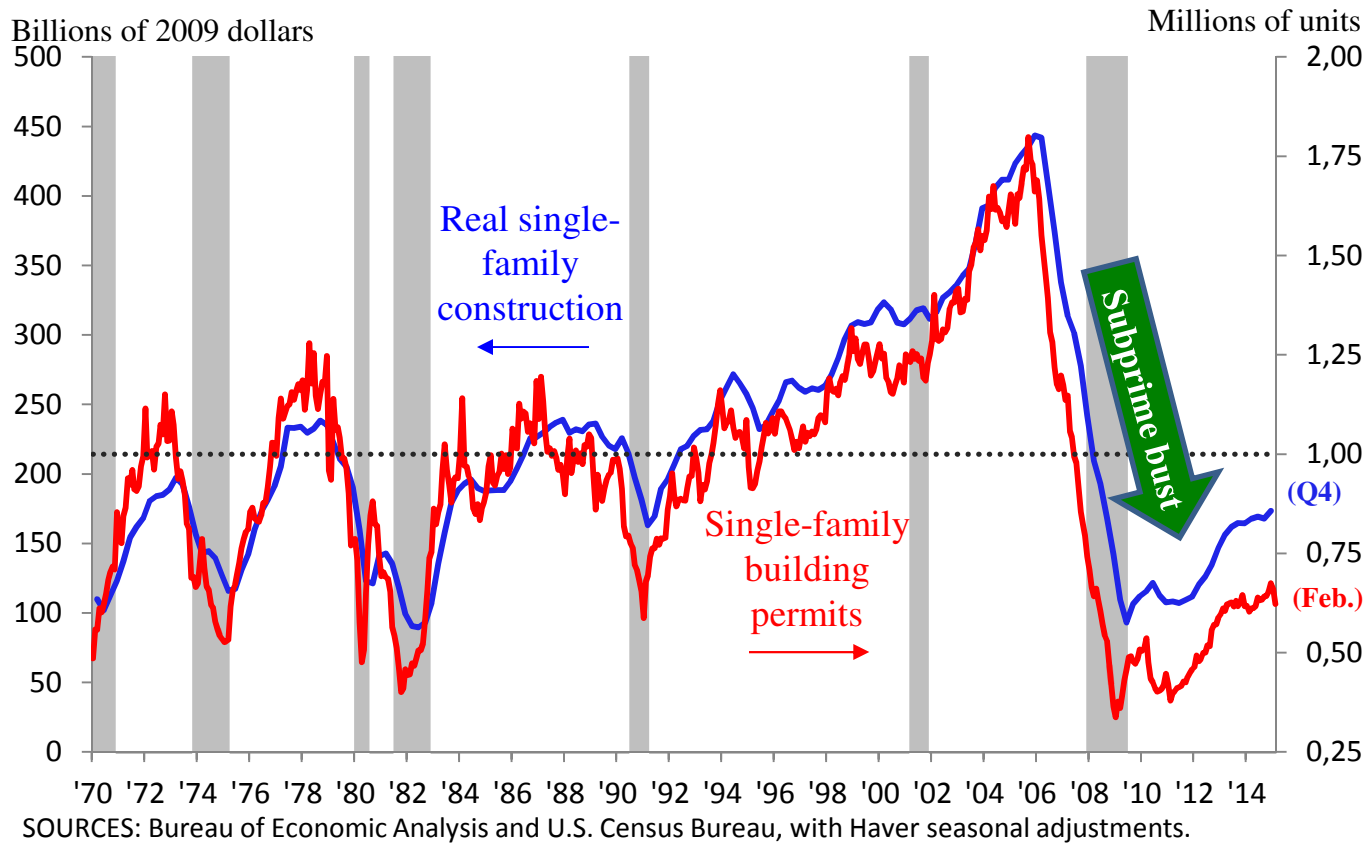


# Single-Family Home Construction Peaks,

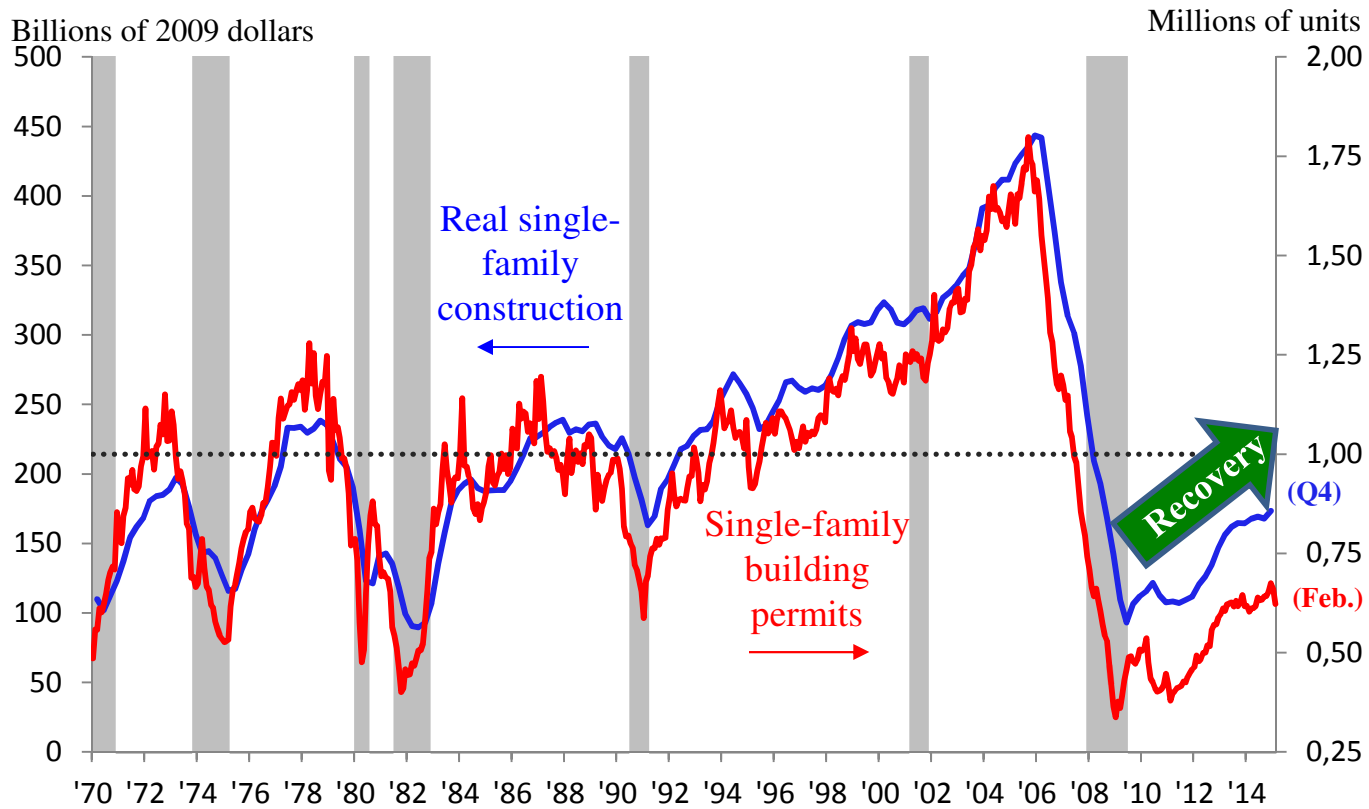


SOURCES: Bureau of Economic Analysis and U.S. Census Bureau, with Haver seasonal adjustments.

# Single-Family Home Construction Peaks, Plunges,



# Single-Family Home Construction Peaks, Plunges, Slowly Recovers



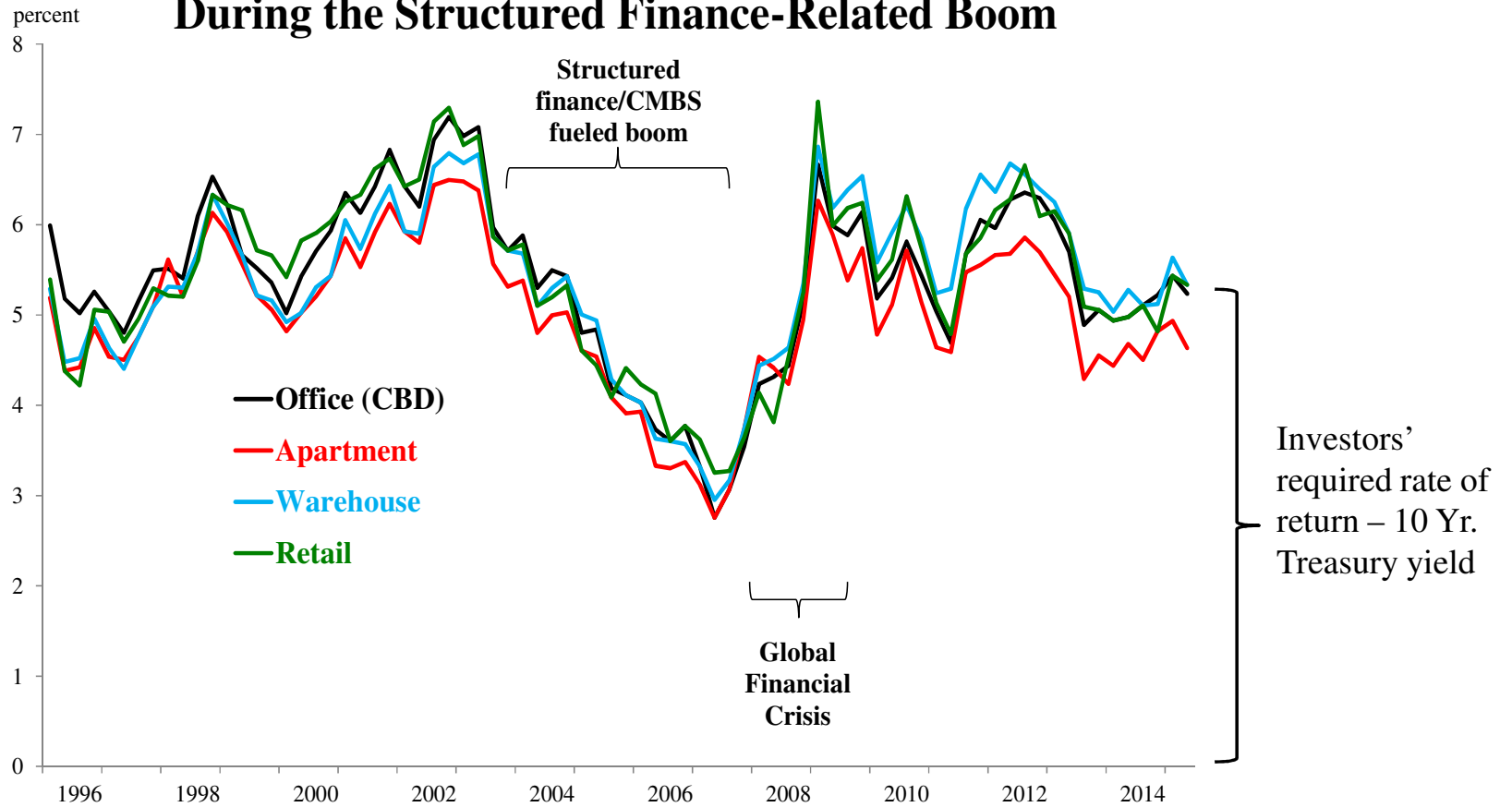
SOURCES: Bureau of Economic Analysis and U.S. Census Bureau, with Haver seasonal adjustments.

## **How Underpriced Risks Fueled the Commercial Real Estate Bubble the mid-2000s\***

- Lower risk premiums mainly drove down investors' required rates of return for investing in CRE, pushed up prices
- Lower risk premiums of mid-2000s driven by two factors:
  - CMBS risk priced off corporate bonds not CRE assets. Low Baa risk premia helped fuel CMBS boom, then busted
  - Regulators cut capital requirement on high-rated CMBS from 8 percent to 1.6 percent in 2004

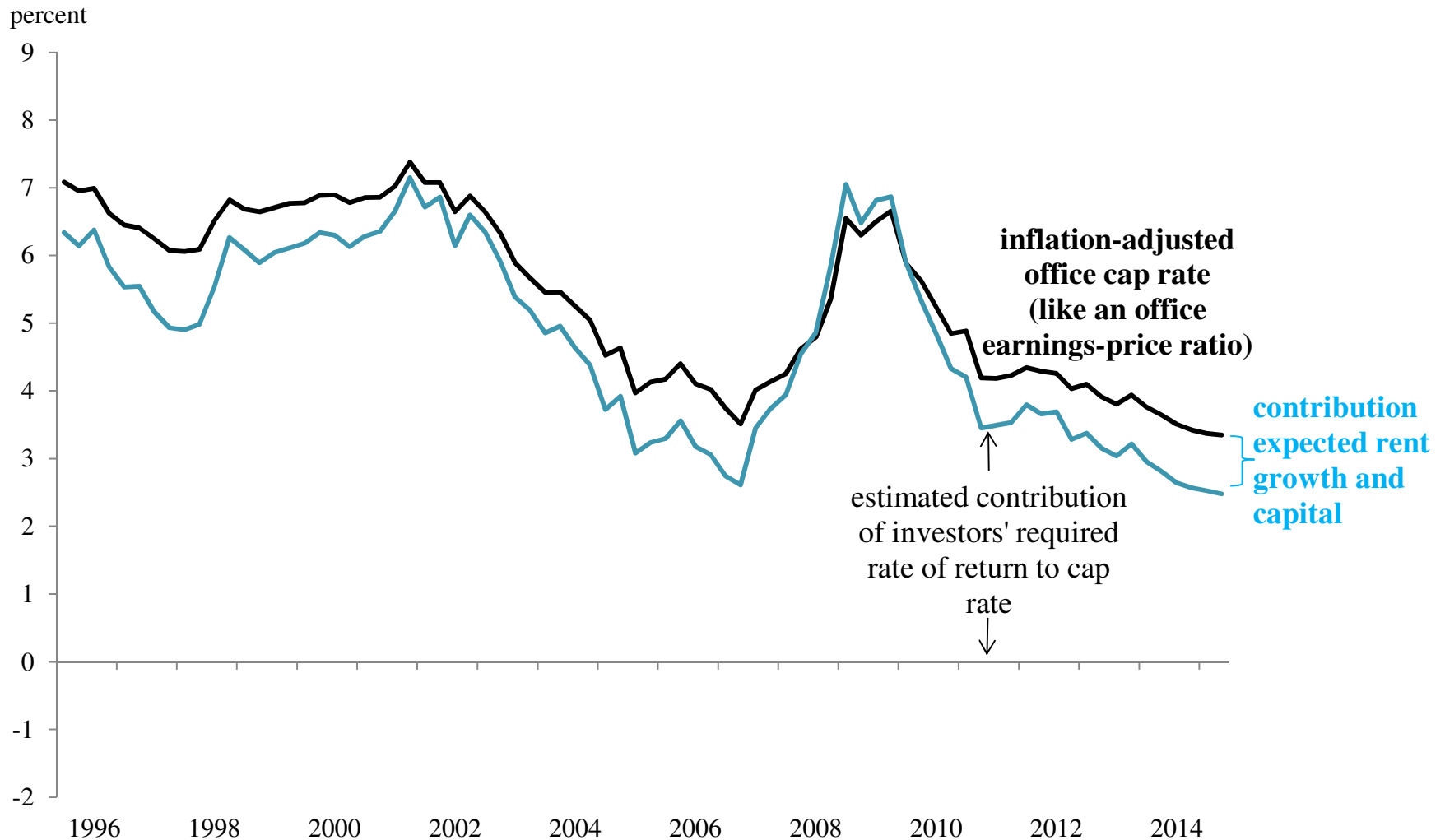
\* See Pavlov and Wachter (2006, 2009, 2011) and Duca and Ling (2016)

**Figure 9: Risk Premia on Commercial Real Estate Collapse  
During the Structured Finance-Related Boom**



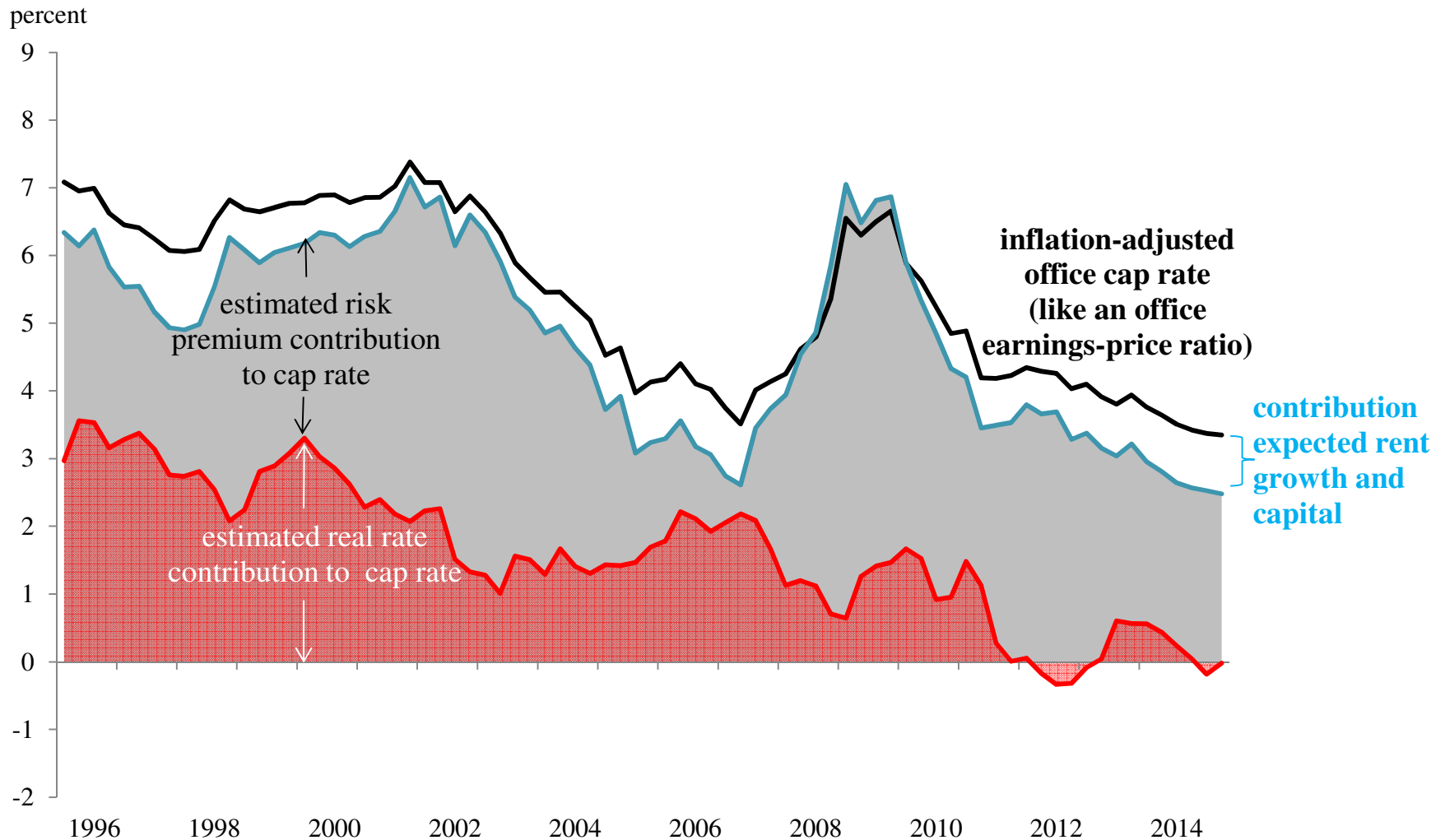
Sources: RERC value-weighted cap rates, Federal Reserve, and authors' calculations.

# Real Office Cap Rate Driven Down in Mid-2000s by Falling Risk Premiums, recently by Low Real Long-term Interest Rates



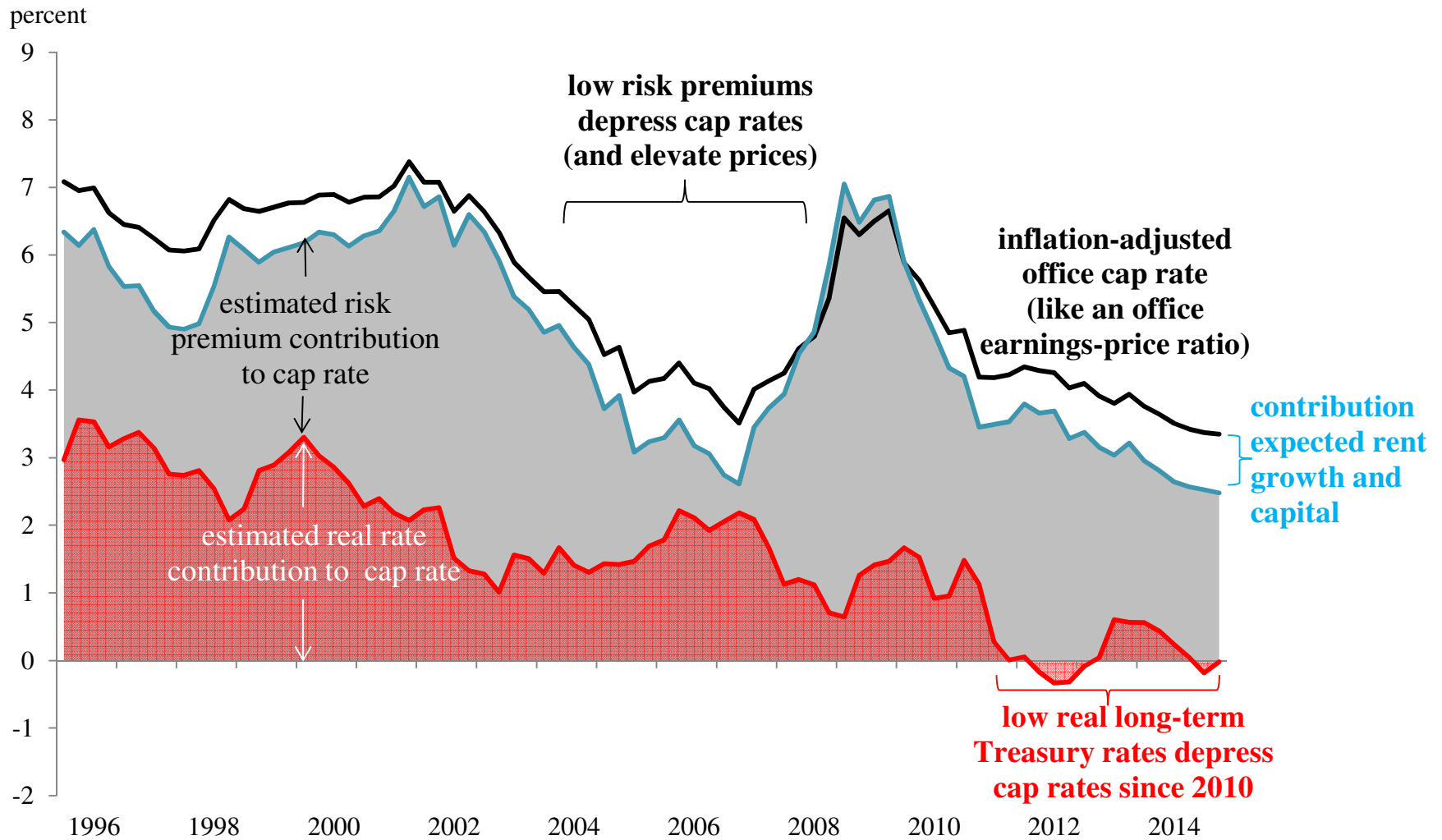
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- Major U.S. tools for addressing macro-prudential risks

# Overview of Macro-Prudential Tools

- Tools designed to improve financial resiliency to crises
- Tools focused on preventing crises
- Some tools common to both tasks
- Address correlated risks, interconnectedness relating to both

# Major Macro-Prudential Tools to Improve Financial Resiliency to and Recovery From Crises

- **Stronger noncyclical AND countercyclical buffers**
  - Safety net era of the 2000s, capital ratios flat at large U.S. banks. Pre-safety net era 1920s: large US banks built up capital as financial risks mounted, but still needed support in 1930s (Koch, Richardson, VanHorn, forthcoming)
  - Spanish banks built up cyclical capital buffers in good times, but not enough
- **Stress tests aimed at reducing regulatory avoidance in form of banks**
  - Picking riskier loans within a category
  - Delaying writing off loans—capital ratios misleadingly high
  - Taking forward-looking, tail, correlated, or new (from innovations) risks.
- **Cover systemically important shadow banks**
  - Addresses regulatory arbitrage at systemically important banks
  - Require them to raise capital or shrink; apply stress tests, case of Lehman
- **Have systems to work-out borrower loans (subprime servicers unable)**
- **Liquidity requirements**
  - Risky loans funded by uninsured, short-term debt (investors try limiting exposure by limiting duration of their funding)
  - Duration mismatch fuels risky lending—impose Liquidity Coverage Ratio
  - Alter regulation to limit risks of runs: floating NAVs for institutional MMMFs

# Major Macro-Prudential Tools to Limit Financial Excess and Prevent Crises

- **Stronger capital buffers & stress tests on commercial banks and SIFIs**
  - Increased “skin-in-the-game” lowers incentive for TBTF & moral hazard
  - Stress tests cut adverse selection incentives of banks to make risky investments
  - Limited if weaker regulations on nonbank lenders
  - Counter cyclical capital buffer – controversy over linking to credit ratios
- **Risk retention (skin-in-the-game) rules for securitization**
  - Reduce regulatory arbitrage incentives for securitizing risky loans
- **Some limits on riskiness of mortgages**
  - Limits on interest rate adjustments, points, fees, and debt service burdens.
    - Qualified rate mortgages – eligible for securitization
    - Qualified mortgages – mortgages limiting legal exposure of lenders
    - Limit size of FHA mortgages having low down-payment requirements

# **Major Macro-Prudential Tools to Limit Financial Excess and Prevent Crises** (continued)

- **Explicit caps on LTVs (not done) and debt-service burdens (partially)**
  - Some success elsewhere, addresses limited success w/ higher capital requirements
  - Pros: limits risky loans possible intermediation by non-SIFI shadow lenders
  - Cons: limits homeownership, may be against political decisions on housing policy
  - Possibility: limit relative size of FHA mortgages to pre-2007 level and impose private mortgage insurance requirements on high LTV private loans (pre-2000)

# Macro-Prudential Tools for Addressing Correlated Risks

- **Liquidity rules for banks**—limit credit crunches from securities market distress
  - limit maturity mismatch liabilities and assets
  - high quality liquid assets must match uninsured bank debt due in 30 days or less
- **Better regulate money market mutual funds** (limit fire sales from redemptions with floating NAV), have emergency market-wide liquidity facilities (CPFF)
- **Improve derivative regulation to reduce systemic spillover effects**
  - Create clearinghouses making derivatives contracts more dependable
  - Address concentration issues in the tri-party repo market
- **Address systemic exposures and network effects across lenders** in stress tests and financial stability assessments. Consider interplay of different regulations.
- **Cap LTVs, limit mortgage equity withdrawal**, balance loan demand vs housing spillover risks on consumption and financial stability (e.g., Texas, Kumar, 2015)\*
- **Need to continue assessing tension between benefits and costs of regulation:**
  - Is regulation unduly limiting lending, the recovery, business formation, and long-run growth?
  - Or is most uncertainty and regulatory burden a temporary transition effect that is unwinding?

\* See Mian and Sufi (2009, 2011), Muellbauer and Murphy (1997), and Duca, Muellbauer, and Murphy (2013).

# Organization of Presentation

- Shifts in U.S. consensus on macro-prudential risks and policies
- What makes real estate vulnerable to booms and busts?
  - Focus on example of U.S. housing
- What drove the twin US real estate bubbles of the mid-2000s?
  - Owner-occupied housing
  - Commercial real estate (CRE)
- Major U.S. tools for addressing macro-prudential risks
  - **Some reasons why Canada avoided the U.S. experience of 2000-12**

# Some Reasons Why Canada Avoided the U.S. Experience of 2000-12 (source: Crawford, *JMCB* 2015)

- Stronger, more consistent credit standards in Canada, reflects
  - Larger share mortgage originators (80%) were regulated in Canada
  - Principles-based regulatory approach limits regulatory arbitrage more than a rigid rules or “black-letter” approach
  - Mortgage insurance required on high LTV loans, insurers regulated
    - Regulators’ lever of adjusting underwriting standards for high LTV loans, since ‘08:
      - LTV caps lowered for home purchase to 95 percent
      - LTV caps lowered for home refinancing from 95 to 80 percent—limits mortgage equity withdrawal
      - Debt-service burden caps on mortgage payments-to-income ratios
      - Use 5 year fixed mortgage rate to limit effect of short-term interest rate swings
- Recourse loans general rule in Canada, nonrecourse common
- Mortgage interest not deductible in Canada unlike U.S.
  - Older Canadians with less mortgage debt than U.S. counterparts
- Still risk from high Canadian household debt-to-income from prolonged low interest rates and earlier commodity boom



# Concluding Comments

- Crisis highlighted need for macro-prudential policy in U.S.
- Macro-prudential policy can be an extra and more precise tool for achieving financial stability among multiple goals.
- Financial crises can be tamed (Geanakoplos, 2009).
- Capital surcharges on very large banks—without more skin-in-the-game loss retention on securities—risks more regulatory arbitrage.
- U.S. reforms usually hurried after crises, kitchen sink approach.
- U.S. system safer, but is it overly constraining risk-taking, business formation/dynamism? Continue assessing costs and benefits.

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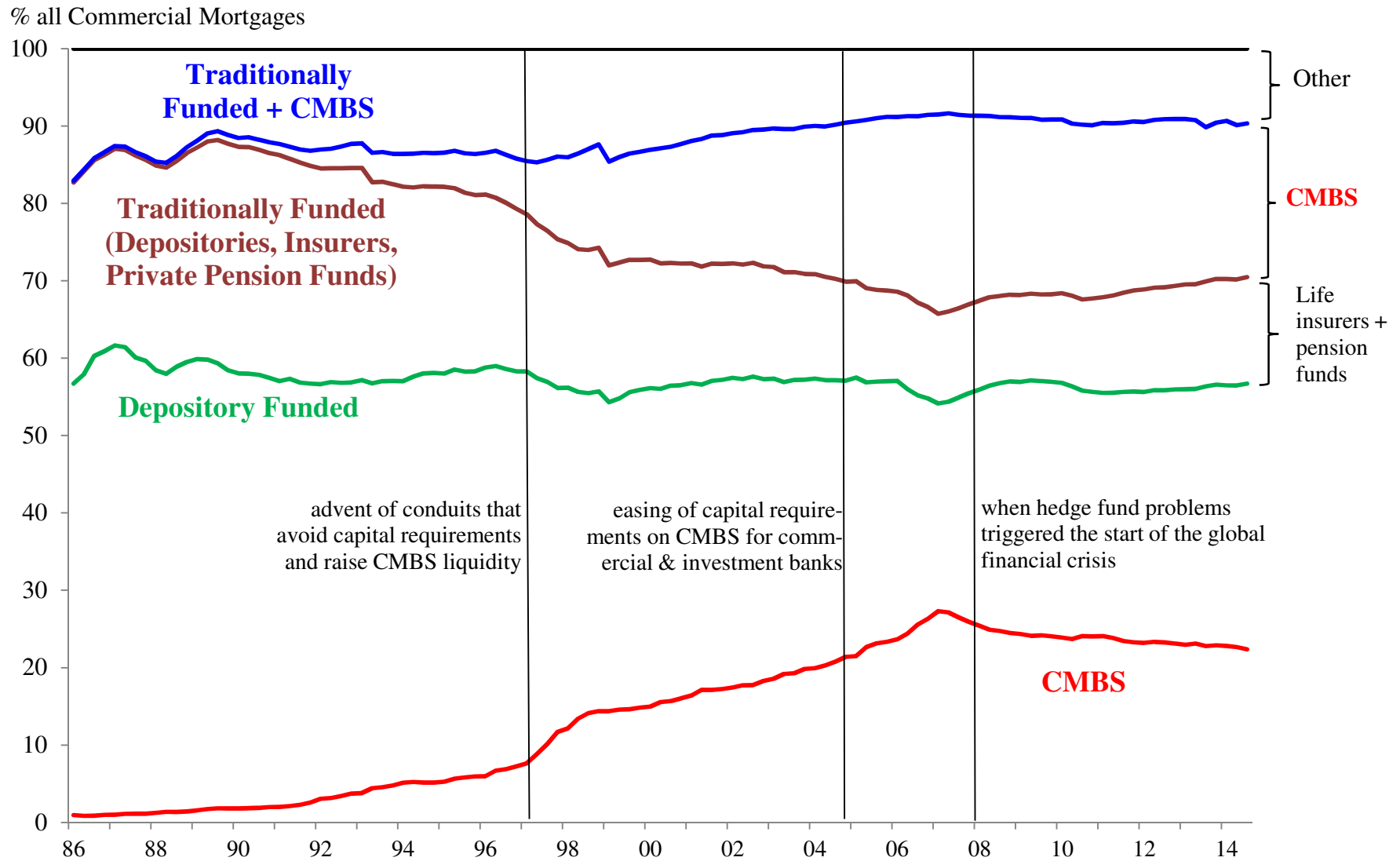
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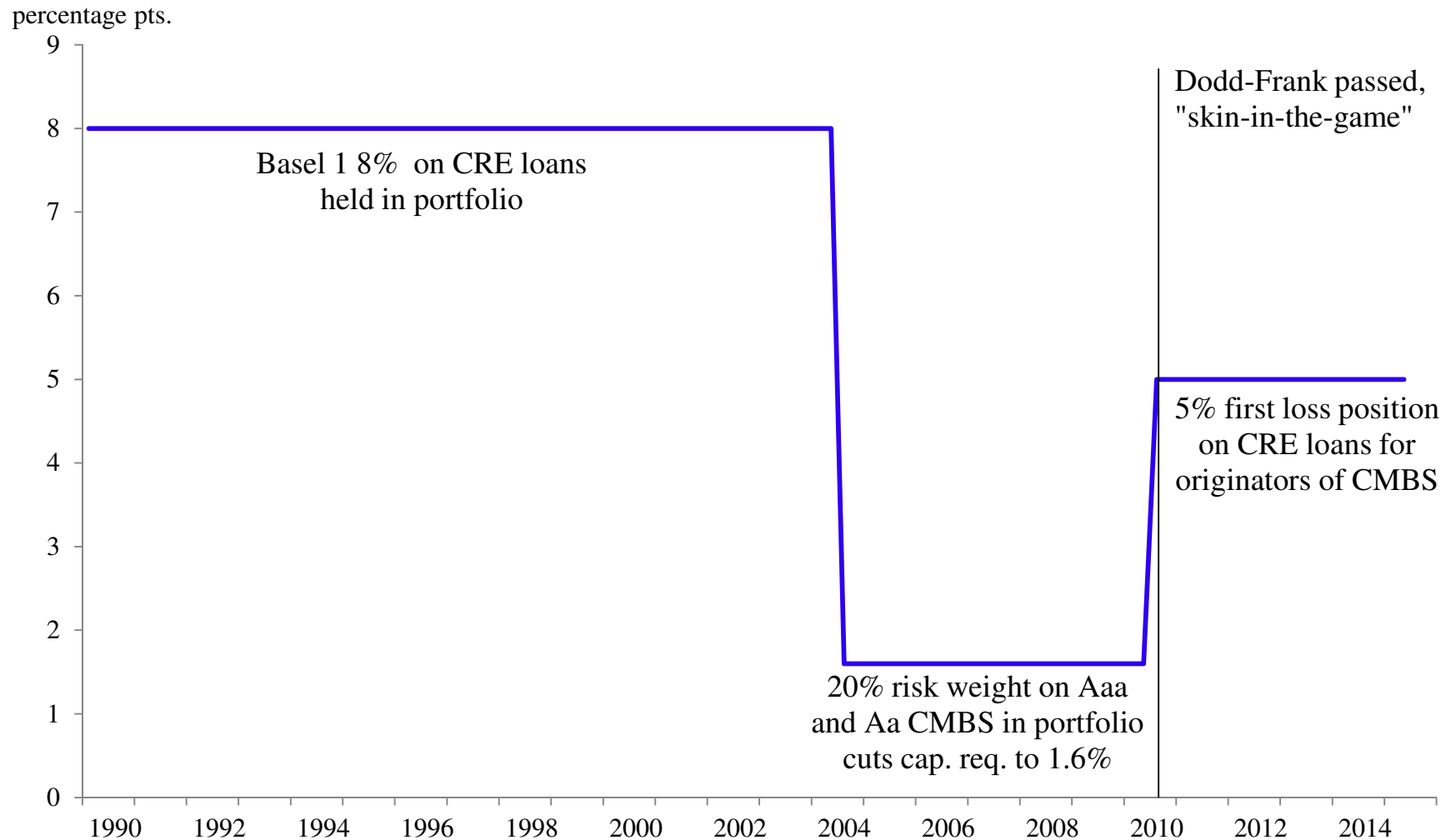
Back-up Slides follow

# Figure 3: The Evolution of How Commercial Mortgages Are Held



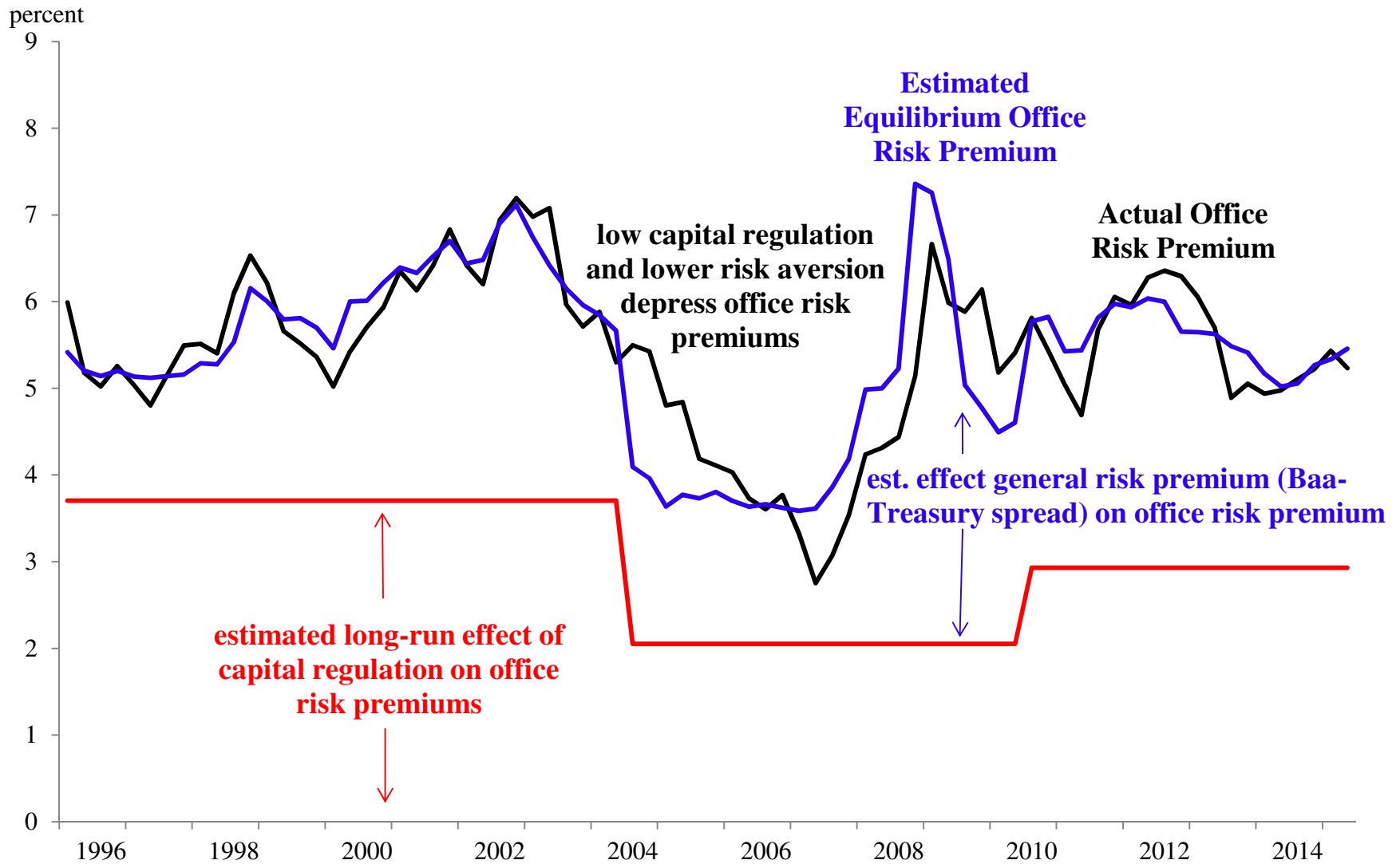
Source: Flow of Funds and authors' calculations. CMBS and "Other" adjusted for 130.4B reclassification of CMBS as REITS in 2013.q2. Other includes REIT holdings, *inter alia*.

# Marginal Effective Capital Requirements on CRE Assets at Commercial Banks/Marginal Investor



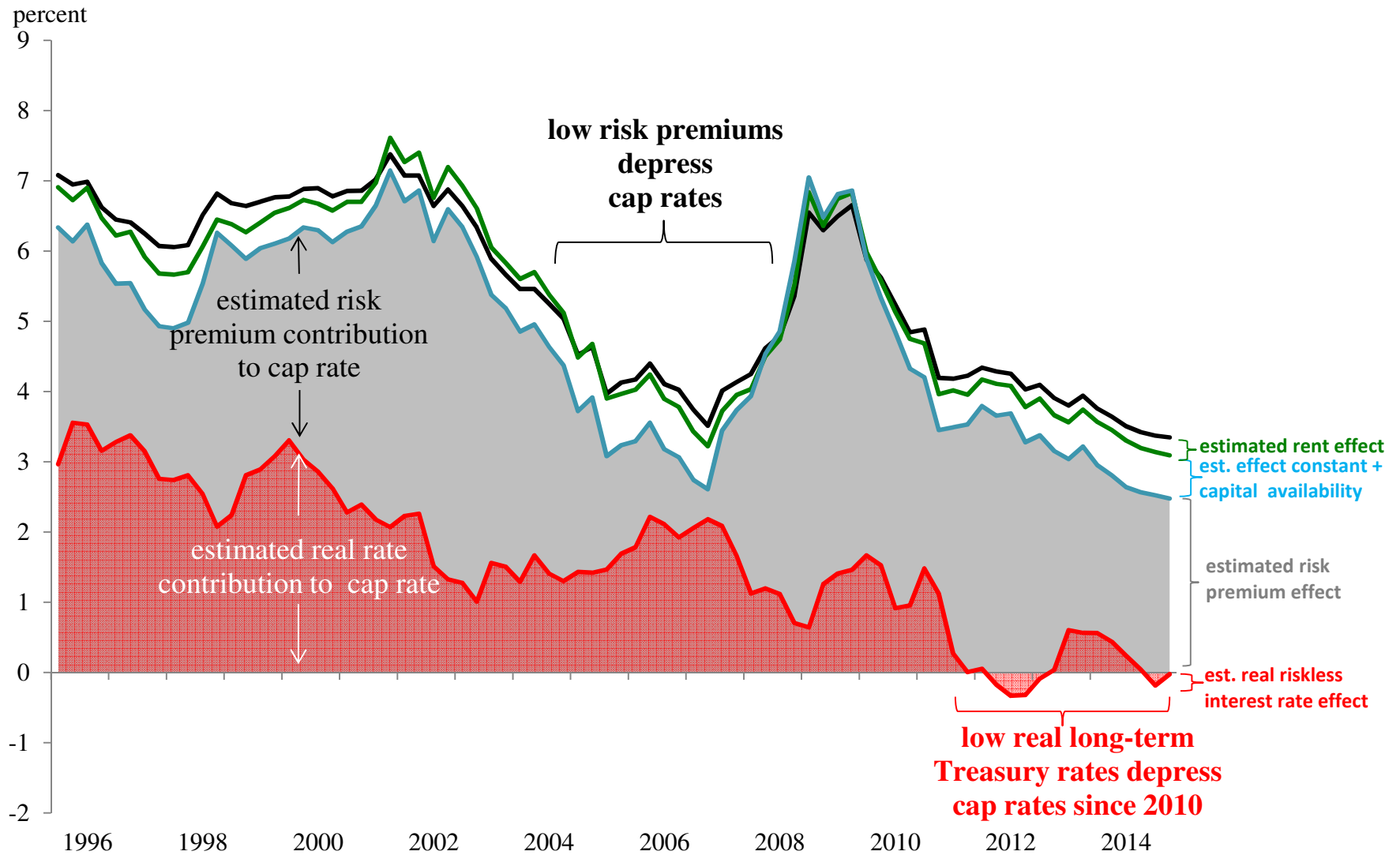
Source: authors' calculations.

# Figure 12: Decomposition of the Office Risk Premium



Sources: RERC required rates of return less 10-yr. Treasury yield, Federal Reserve, and authors' calculations.

# Figure 11: Decomposition of the Real Office Capitalization Rate



Sources: RERC value-weighted cap rates, Federal Reserve, Federal Reserve Board Model 10 yr. expected inflation, and authors' calculations.