

Countercyclical Capital Regime: A Proposed Design and Empirical Evaluation



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The ideas and views expressed in this presentation are those of the authors
and do not necessarily represent those of FHFA.

Why Countercyclical Capital

- Housing crisis exposed concerns about procyclicality of current capital rules
- Countercyclical idea is to require sufficient capital before any crisis
 - Basel III Proposed Countercyclical Capital Buffer
 - Application discretionary on part of regulators
 - Raises capital on all risk-weighted assets (RWA) by same amount
 - Buffer limited to 2.5% additional capital on RWA

Our Countercyclical Capital Design Goals

- Focused on Mortgage Assets
- Outcome Related Goals:
 - Mortgage assets must be fully capitalized at acquisition
 - Capital requirements for new acquisitions must increase during credit expansions along with risk exposure, but then be allowed to fall during downturns as risk exposure declines
 - If applied broadly, this design should mitigate any forming house price bubble

Implementation Design Goals

The countercyclical capital requirement will derive from a stress test that must be:

- Based on an appropriate risk driver(s)
- Conceptually straightforward/Easy to understand
- Focused on the risk of the firm's assets, not necessarily the state of the overall economy
 - Capital requirement should apply at the loan or asset level, such that high capital requirements are only assigned to assets vulnerable to significant decline in value – as with bursting of a price bubble
- Rule-based-- not discretionary

Setting the Countercyclical Capital Requirement: Overview of Stress Path

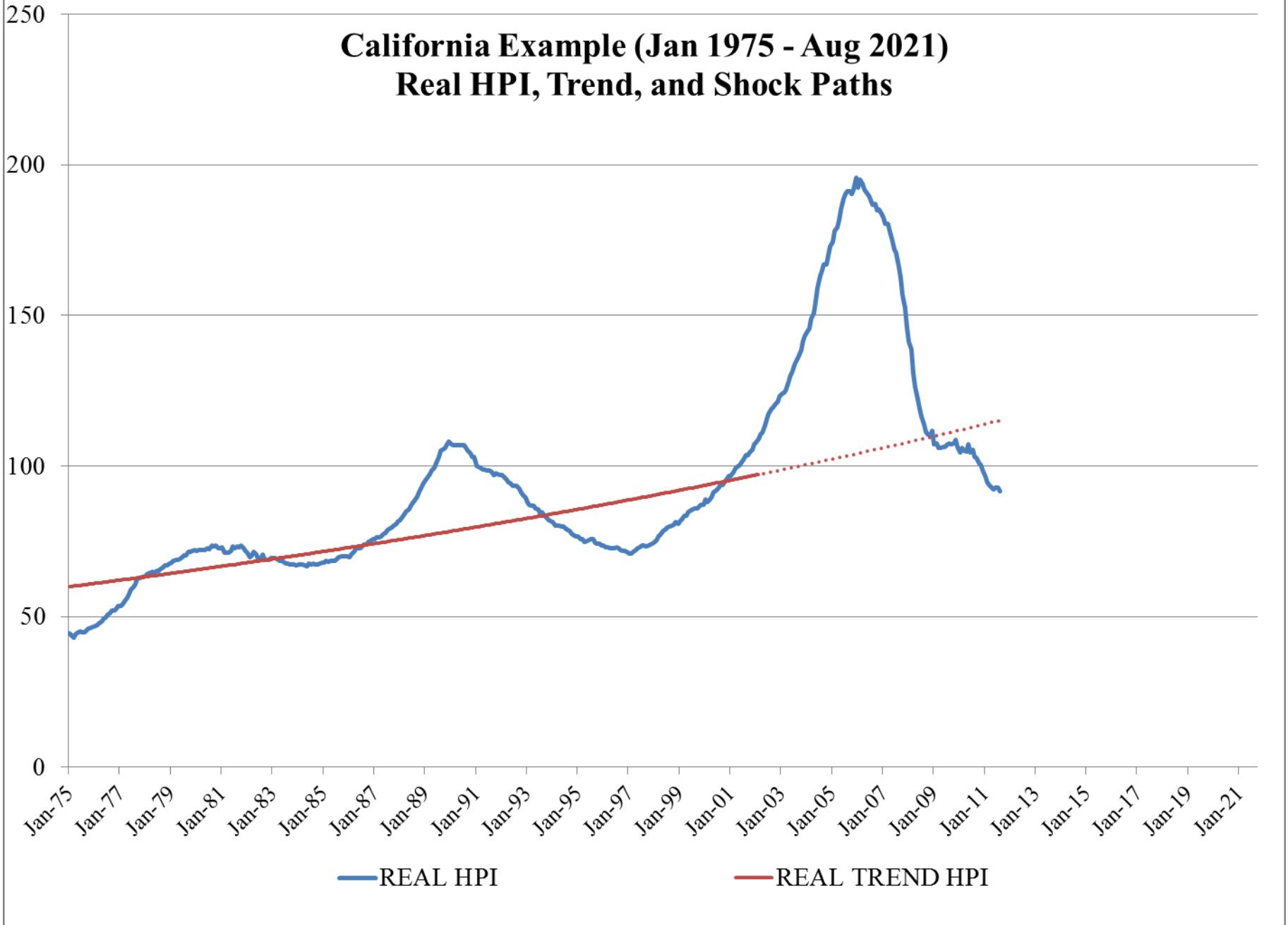
- For Mortgage Assets, the key risk driver is the deviation of the House Price Index (HPI) from its trend
- The Stress Path consists of determining:
 - HPI trend (state level)
 - A stress path trough for HPI (state level)
 - A time-path for the HPI shock

Calculating HPI Trend

- Applied at the State-level, we define the long-run real HPI trend as equal to the growth rate determined by regressing real HPI on time
 - The regression uses HPI data from 1975-2001, to avoid including the current and still incomplete cycle
 - Other formulations made little difference
- The estimated trend was constrained to be non-negative in real terms – this only applied to a few atypical states

California Example (Jan 1975 - Aug 2021)

Real HPI, Trend, and Shock Paths

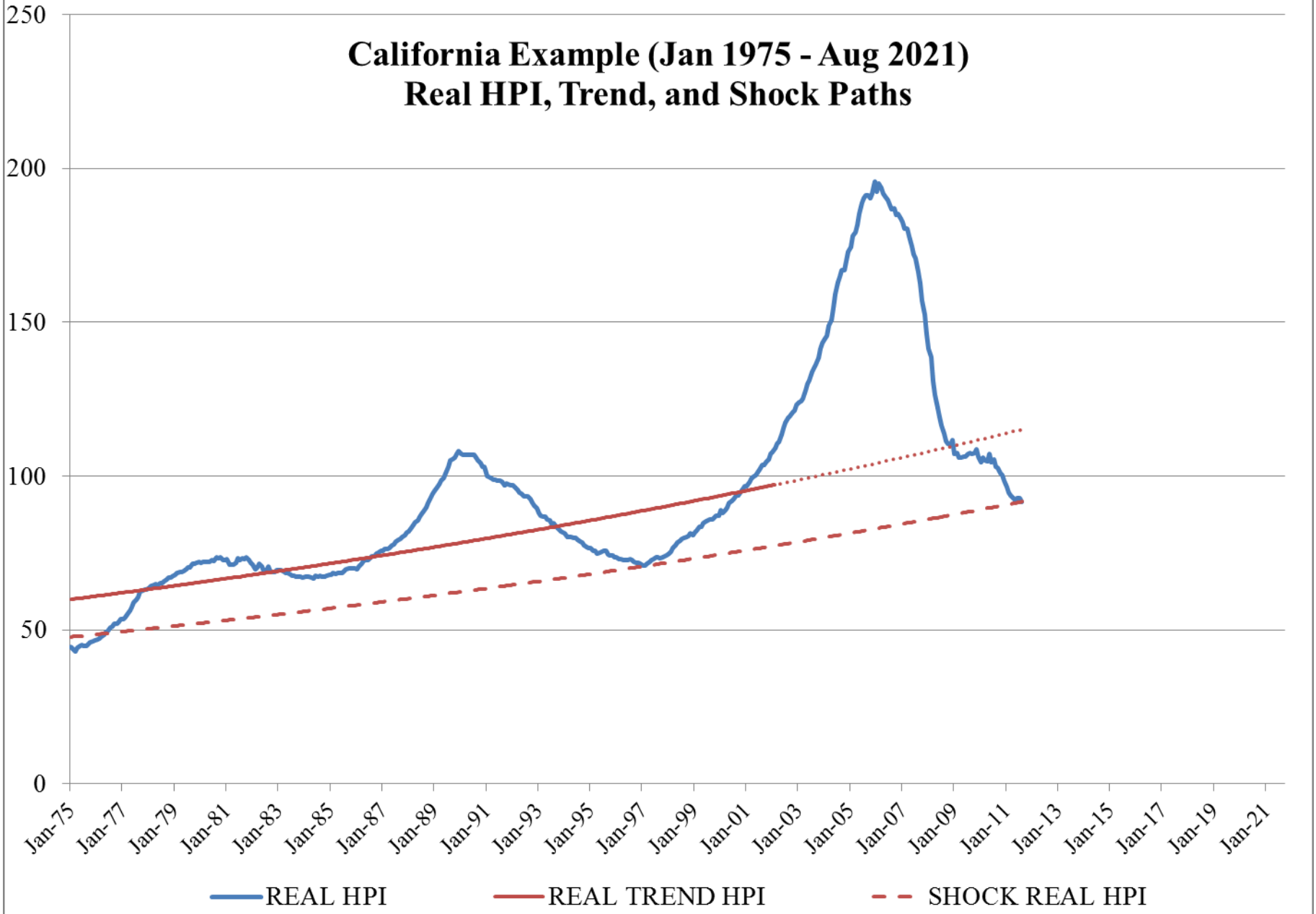


Determining the HPI Shock Trough

- Identify the 'worst HPI downturn' in each State
 - Only considered downturns of sufficient length, specifically where from peak through downturn and back to trend exceeded 4 years
- Define the trough as the lowest observed real HPI identified in the 'worst-downturn' applied as a percentage (less than 100) of trend,
 - e.g. worst-downturn might be at 75% of trend
- To ensure some stress is always imposed, we imposed a minimum HPI shock of 5% should a State's real HPI be at or below the 'worst-downturn' level at the beginning of the shock period

California Example (Jan 1975 - Aug 2021)

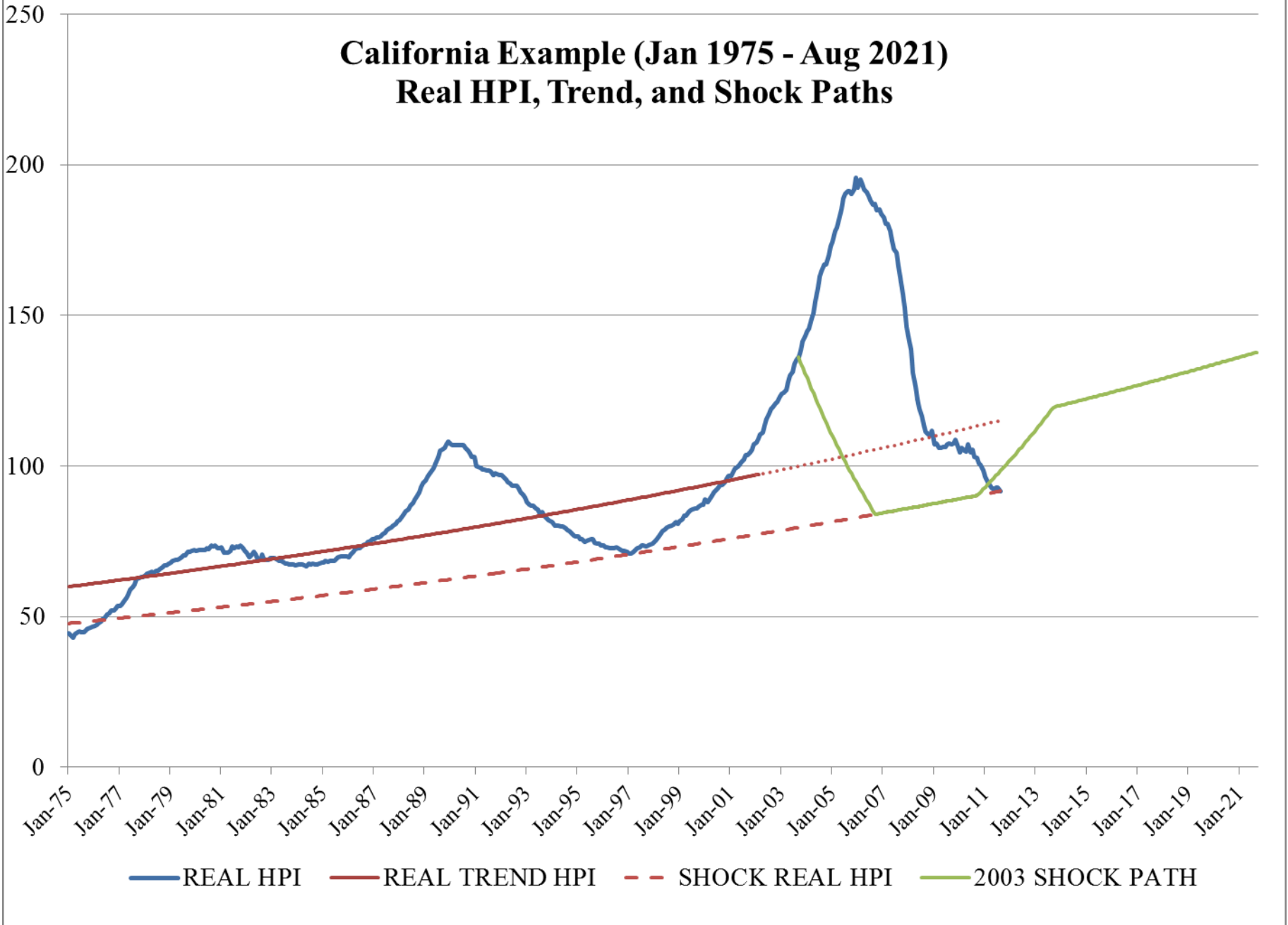
Real HPI, Trend, and Shock Paths



Defining the Shock and Time Path

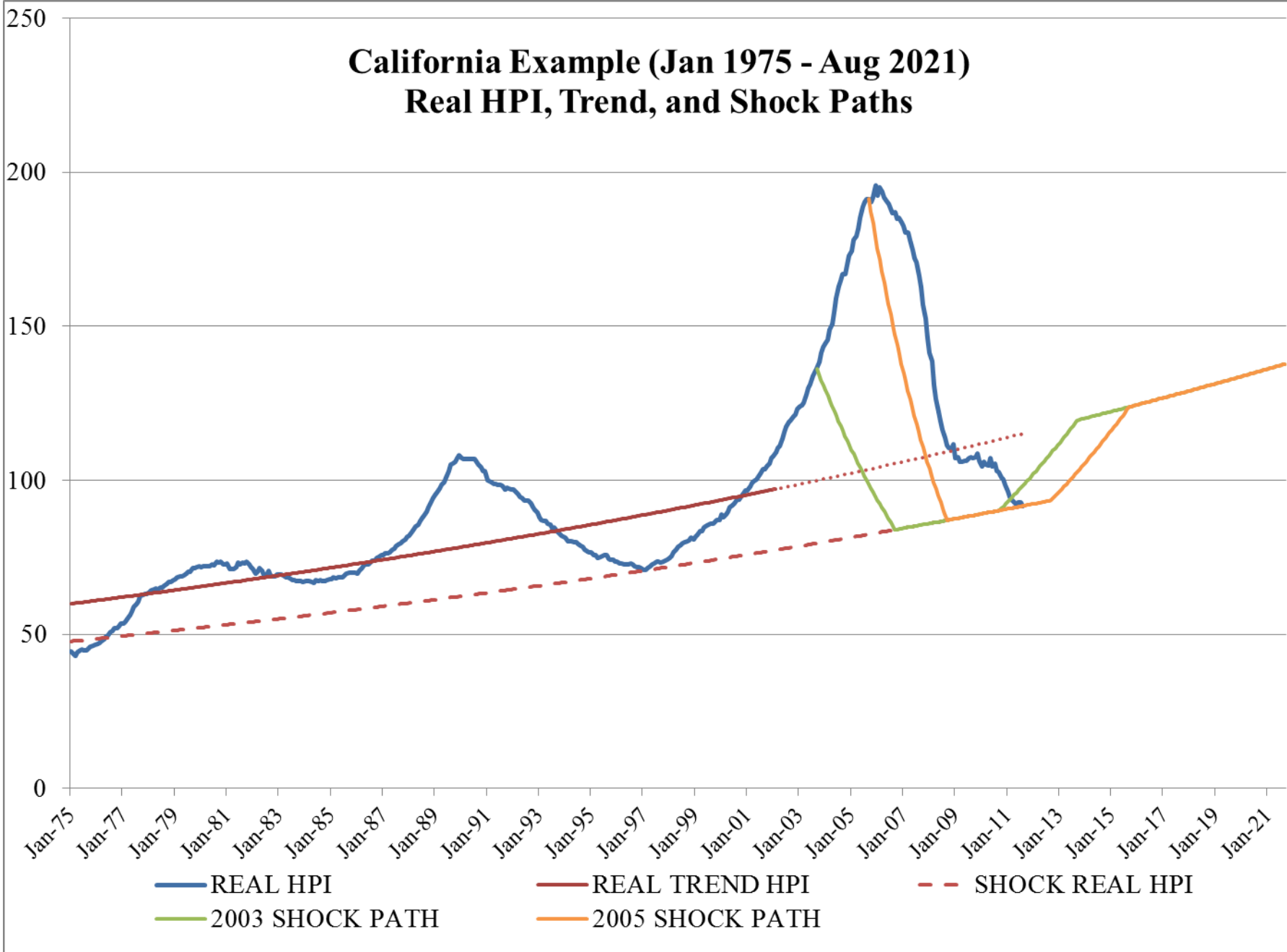
- For each State, we impose a single deterministic HPI shock and time path, and corresponding interest rate shock, where:
 - *HPI Shock Depth* = the difference between current HPI and its level in the worst historical downturn relative to trend.
 - *HPI Shock Time Path* = 3 years peak to trough, 4 years flat at trough, and 3 years up to trend, then continuing at trend. We based this path on historical averages.
 - *Interest Rates Shock Path* = set the same for all states and calibrated to reflect the Federal Reserve's policy actions during the housing crisis.
- Once the HPI shock path is determined in real terms, we convert to nominal using inflation rates similar to the recent crisis.

California Example (Jan 1975 - Aug 2021) Real HPI, Trend, and Shock Paths



California Example (Jan 1975 - Aug 2021)

Real HPI, Trend, and Shock Paths



Examples of Peak to Trough Nominal Countercyclical HPI Shocks by State and Year

(Shocks constrained to be a minimum 5% down from current level in real terms)

State	2002	2003	2004	2005	2006	2007	2008	2009	2010
US	-22.2%	-25.5%	-30.0%	-32.4%	-33.8%	-31.2%	-20.1%	-18.2%	-13.9%
FL	-24.8%	-32.1%	-41.9%	-50.8%	-53.2%	-48.9%	-27.3%	-20.5%	-12.3%
CA	-29.3%	-36.8%	-47.5%	-53.4%	-51.5%	-43.2%	-15.5%	-10.7%	-5.1%
OH	-19.0%	-19.8%	-20.4%	-17.7%	-17.3%	-12.7%	-2.7%	-3.6%	-2.6%

Empirical Test of Countercyclical Shocks

- The stress HPI and interest rate shocks were imposed on Fannie Mae's single-family fixed-rate 30-year loans
 - Capital requirements estimated for all loans in retained and guaranteed/sold (MBS) portfolios for most years 2003-2010
 - FHFA's internal default and severity models (2010 versions) were used
- Prior Expectations:
 - Requirements (losses) should increase for new acquisitions each year as HPI increases rapidly in 2004-2007
 - Requirements should equal the fully capitalized amount in the year of acquisition--sufficient to cover future losses of each cohort
 - This means the requirement or capital for each cohort should decline in each successive year post-acquisition

Estimated Countercyclical Capital Charges for Fannie Mae SF Fixed-30's Loans

(Capital charges are set equal to estimated loss amounts from charge-offs and REO related expenses, and assume full payment of mortgage insurance claims)

Discounted Losses	Activity Year (as of September 30)							
	2003	2004	2005	2006	2007	2008	2009	2010
Origination Year								
2001	1.45%		1.19%	1.11%	1.02%	0.80%		1.35%
2002	3.34%		2.11%	2.06%	1.78%	1.34%		2.52%
2003	3.51%		1.94%	1.80%	1.49%	1.12%		1.91%
2004			5.11%	4.92%	4.23%	3.34%		5.32%
2005			9.97%	9.83%	8.78%	7.54%		11.19%
2006				15.84%	14.69%	13.51%		20.82%
2007					16.88%	14.68%		22.11%
2008						8.79%		12.27%
2009								2.19%
2010								2.62%

Results Discussion

- Estimated capital requirements complied with expectations:
 - Capital requirements are reasonable for 2003 and 2010 (benchmarks)
 - Requirements for all cohorts decline each passing year (certainly in absolute amount even if not in percentage of remaining balance)
- The estimated capital requirements at acquisition would have deterred the Enterprises from acquiring many of the 2005-2008 loans responsible for most recent losses
 - Required capital per acquisition UBP doubled between 2003-2005, and quadrupled between 2003-2007

Disaggregated Results

- FICO/LTV risk bucket results show capital charges can vary significantly over risk factors when subject to a severe countercyclical shock as occurred in 2007
 - Thus, a firm could reduce its countercyclical capital requirement by either
 - Tightening underwriting standards, and/or
 - Targeting low-risk loans (high FICO, low LTV, certain geographic regions)
- State-level results also show significant differences-- consistent with differing shock severities across states

Setting Trend/Trough Using Pre-2002 Data Worked Well

- Our regime would have underestimated required capital for loans from some states
 - 13 states had real HPI drop below the pre-2002 worst level as of 2013 --they comprise 41% of U.S. housing stock
 - But, only 4 states had real HPI fall more than 5% below that worst level, representing 12.5% of the U.S. housing stock
- We would have overestimated required capital for loans from other states – hence cross-subsidization
 - For 35 states, real HPI stayed 5%+ above the pre-2002 worst level, comprising 53% of the U.S. housing stock
- The US, weighted-average real HPI did not fall to its pre-2002 worst level, remaining nearly 8% above that level

The Current Cycle May Soon Be Included Into Our Trend Estimation

- Real HPIs for 24 states are currently above their pre-2002 trend level. These states comprise 39% of the U.S. housing stock
- Real HPI for the U.S., which is a weighted average of all states, is still 5% below its pre-2002 trend

Conclusions

- Countercyclical Capital requirement, as herein designed, meets our goals and expectations to:
 - Fully capitalize the mortgage asset at acquisition, thereby
 - Effectively protect an entity from insolvency during an HPI price bubble
 - Mitigate the severity of a bubble, if broadly applied
- Opportunities for further development
 - Update trend/trough to include recent cycle
 - Model trough as function of the peak HPI to trend distance during the preceding boom

Comments Welcome

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Our working paper is available at:

<http://www.fhfa.gov/webfiles/24538/countercyclicalcapitalregime122.pdf>