

# Measuring and Forecasting House Prices

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# There Are Several Ways to Measure Home Value Change

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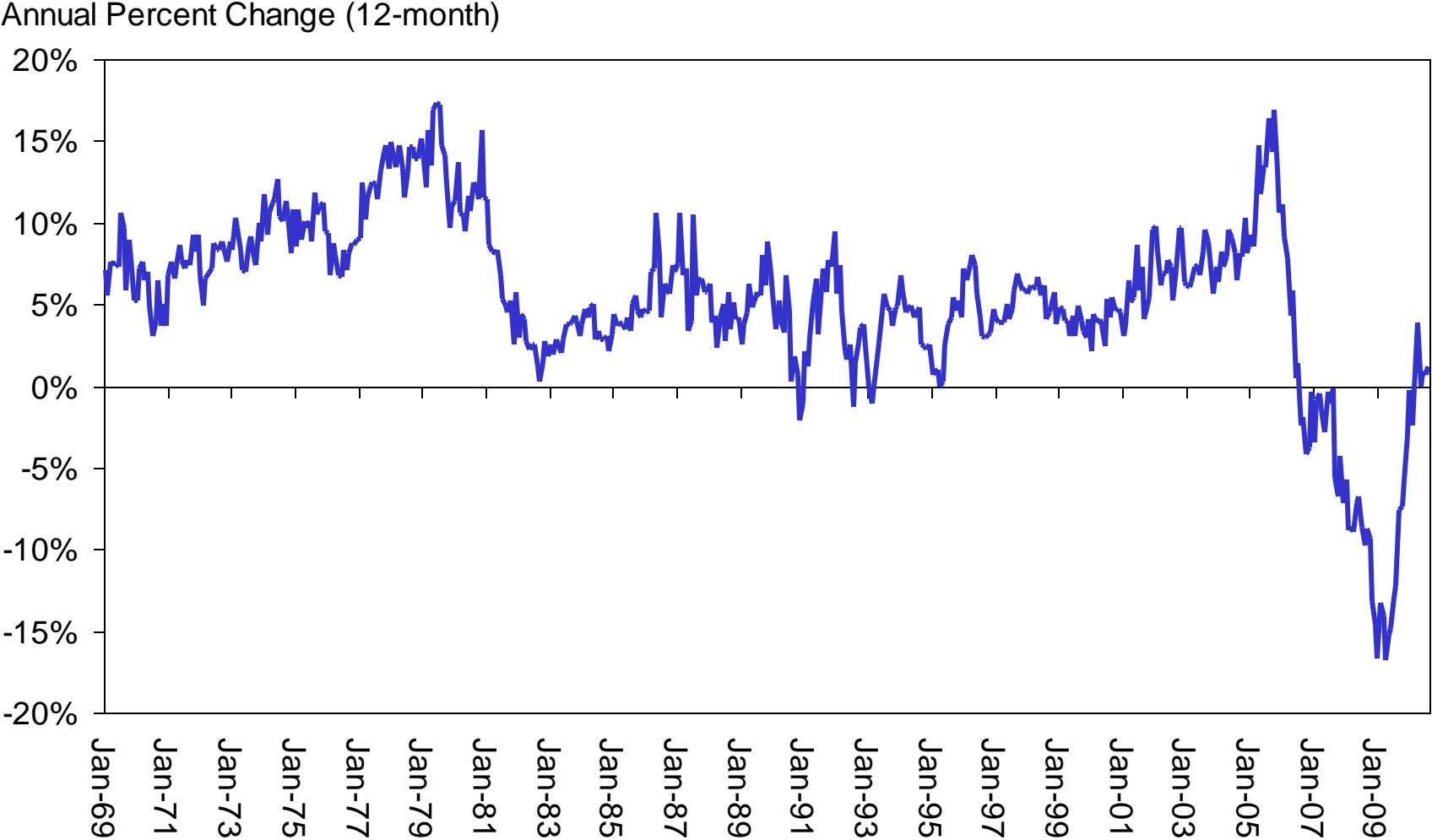
Many house price measures are means (or medians) of transaction values

- *Pro*: Gives actual, current dollar values; revision limited (one month)
- *Con*: Quality and type of homes sold will vary, distorting growth estimates; Insufficient sample to control for location effects
- Census Bureau new homes, National Association of Realtors existing homes, FHFA conventionally financed homes

Hedonic regression can create indexes

- *Pro*: Controls for major (not all) home characteristics that affect value
- *Con*: Requirement of detailed house characteristics limits applicability; Unobserved variables affect estimated index
- Census Bureau “constant-quality” new home index, American Housing Survey (biennial, owner’s estimate of value, long lag)

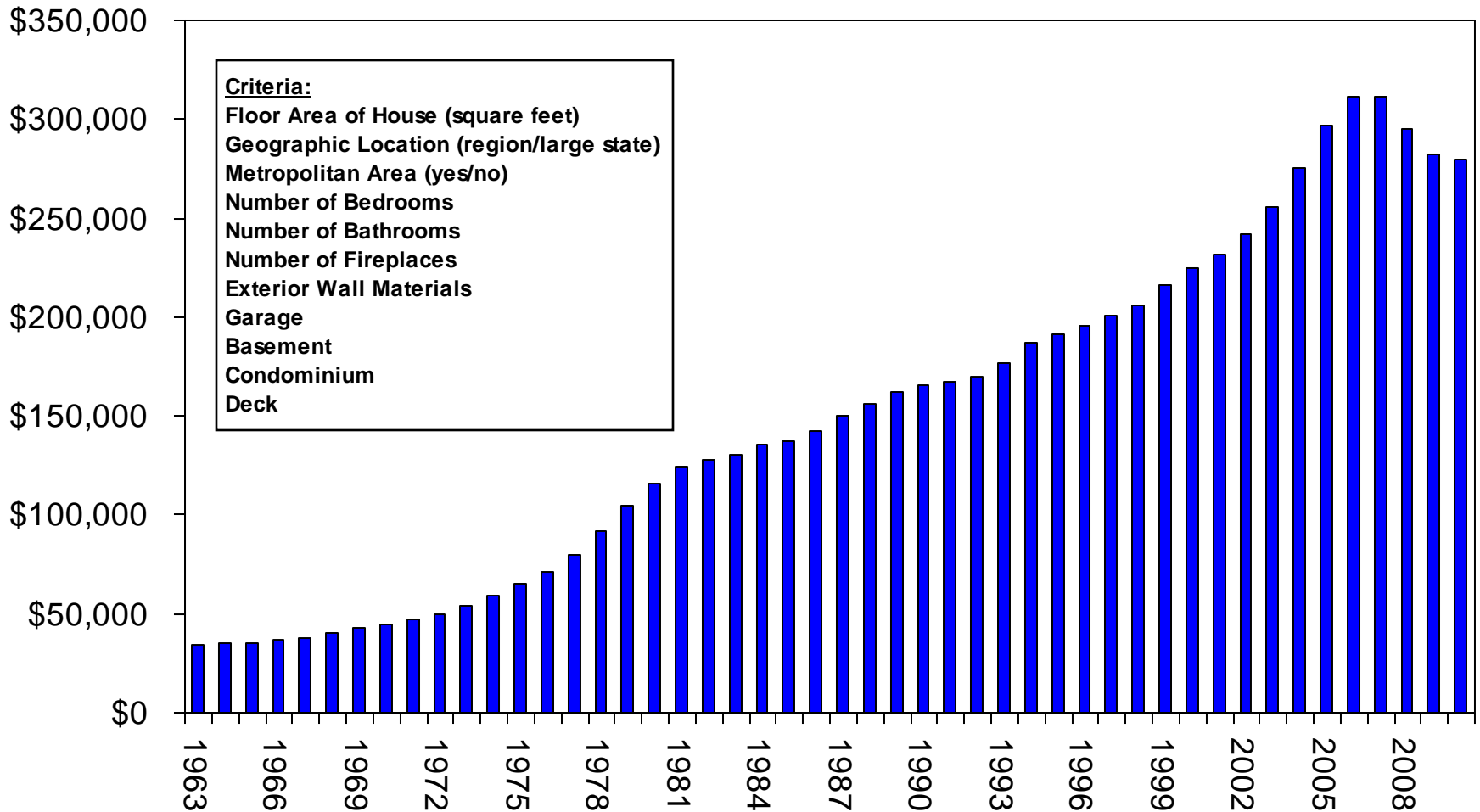
# Annual Change in Median Existing Home Prices



Source: National Association of Realtors®

# Census Bureau Uses a Log-Log Hedonic

Average Sales Price for a Typical 2005 House



Source: U.S. Census Bureau, Price Index of New One-Family Houses Sold (based on Log-Log hedonic); 2010 is average index of first two quarters relative to average 2009 index.

# “Repeat Sales” Is Latest Technology

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“Repeat sales” is a “constant-property” index

- K. Case & R. Shiller (*American Economic Review*, 1989)
- *Pro*: Controls for mix and location of homes sold
- *Con*: Index values are revised with each update, assumes no depreciation or improvements (i.e., not “constant quality”), does not give “price” but growth rate
- Freddie Mac Conventional Mortgage Home Price Index (CMHPI), FHFA House Price Index (both use conventional loans purchased by Freddie Mac and Fannie Mae), S&P/Case-Shiller House Price Index
  - CMHPI is available on the web:  
<http://www.freddiemac.com/news/finance/> and click on “Housing and Mortgage Data”, then look under “CMHPI”  
Excel files (Census Division, State, MSA) and FAQs  
Archive has previous releases

## Construction of a “Repeat Sales” Index

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Setup of “Repeat Sales” Regression

$$Y_i = \sum_{\tau=1}^T \beta_{\tau} D_{i\tau} + \varepsilon_i$$

Dependent Variable: Log price growth between transactions

$$Y_i = \ln(P_{it} / P_{is})$$

Independent Variable: Dummy showing time of transactions

$$D_{i\tau} = 1 \quad \text{when } \tau = t \quad \text{time of the latter transaction}$$

$$D_{i\tau} = -1 \quad \text{when } \tau = s \quad \text{time of the earlier transaction}$$

$$D_{i\tau} = 0 \quad \text{for all other quarters}$$

# Example of “Repeat Sales” Observations

Dr. No bought house June 1990

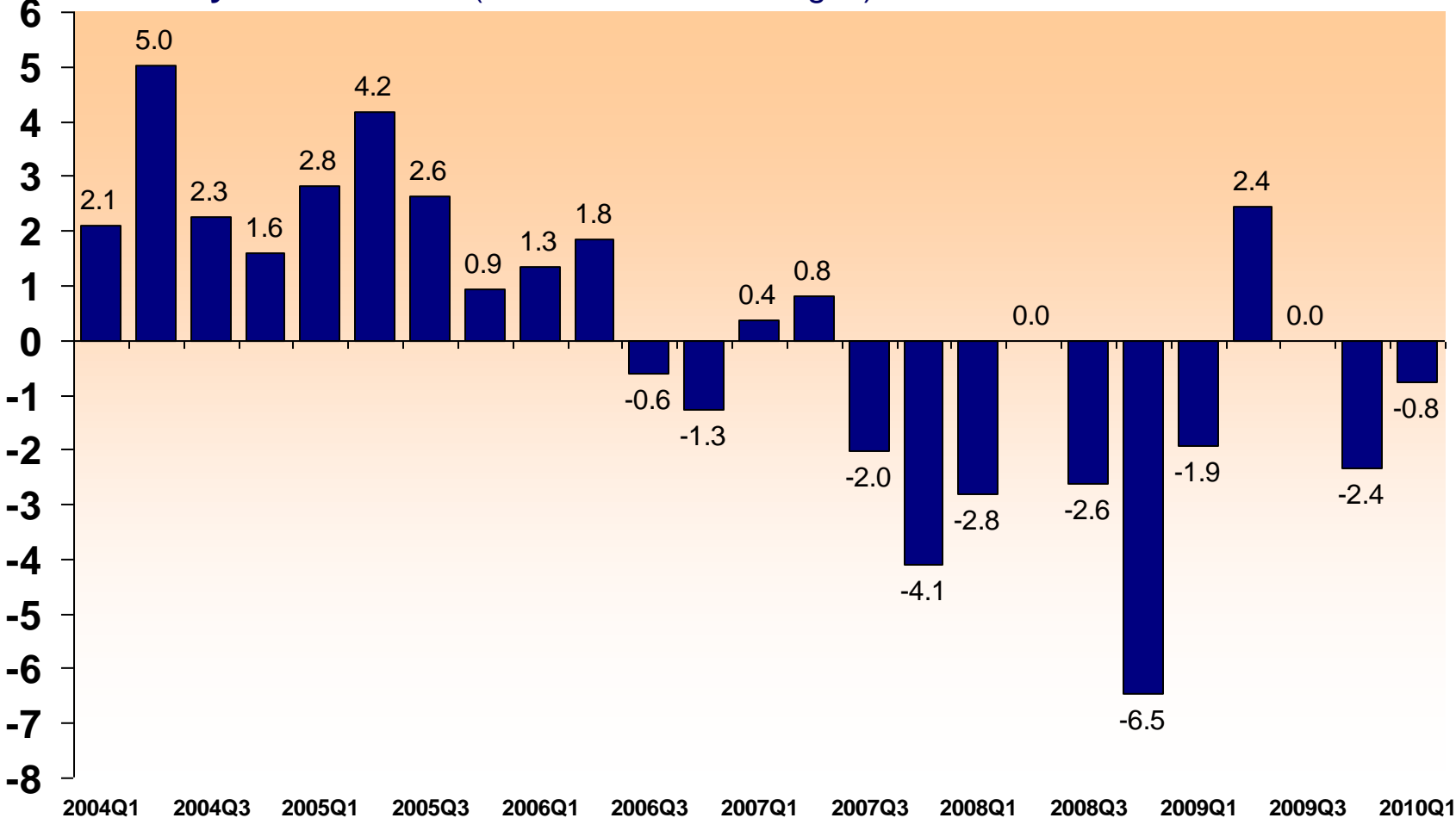
Dr. No Refinanced Dec 1990

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Obs. 1			-1		1						
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Dr. No Sold house Sept 1991

# Freddie Mac's U.S. House Price Index Has Experienced a Cumulative Decline of About 20% Since June 2006

Quarterly Growth Rates (Numbers in Percentages)

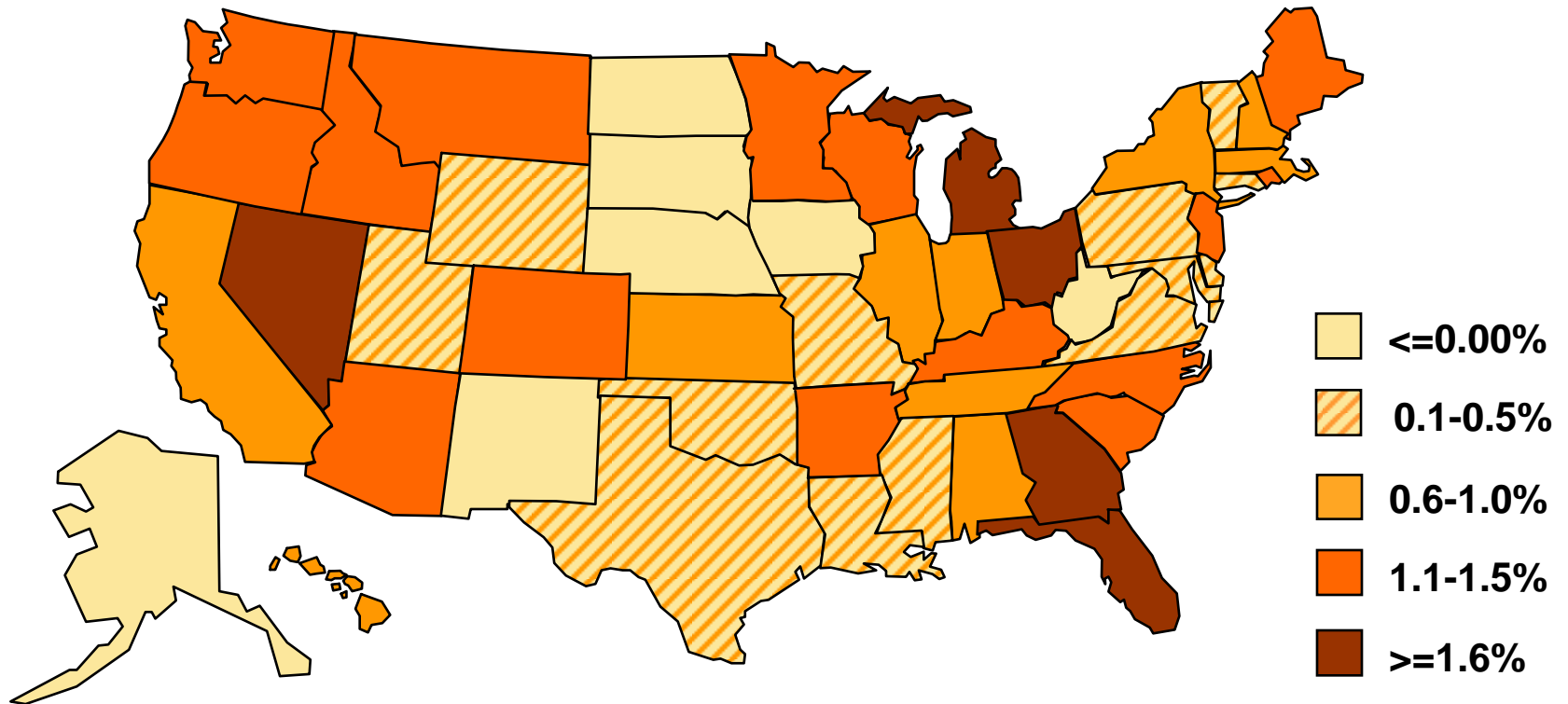


Note: National home prices use the internal Freddie Mac Index, which is value-weighted based on Freddie Mac's single-family portfolio. The US index is a monthly series; quarterly growth rates are calculated as a 3-month change based on the final month of each quarter.

Source: Freddie Mac

# Excess Homeowner Vacancy Rate by State

Estimated overhang of vacant-for-sale homes as a percent of state homeowner dwellings



Source: U.S. Census Bureau and Freddie Mac calculations (difference between 2009 homeowner vacancy rate and 1996-2005 average homeowner vacancy rate for each state).



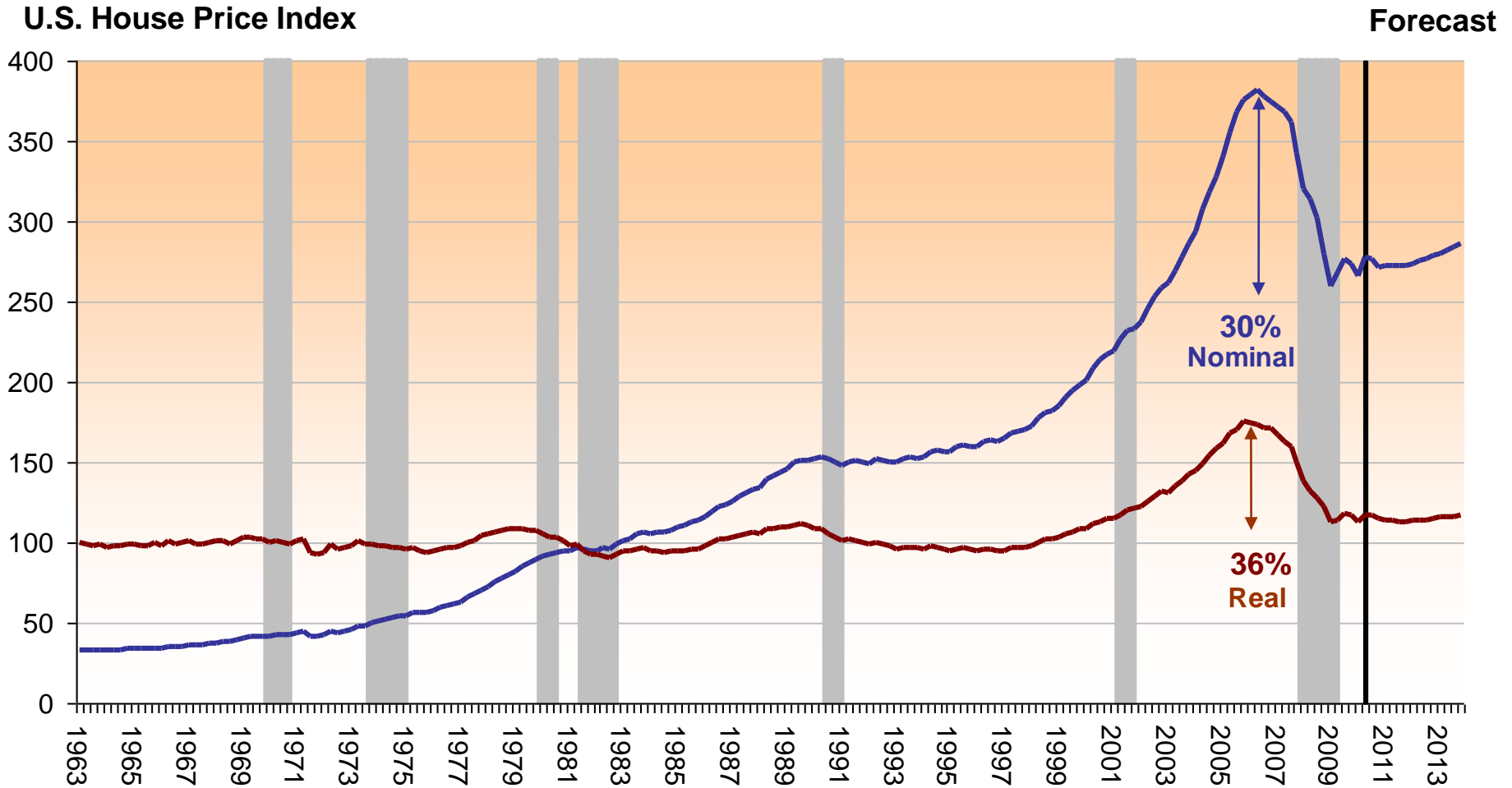
# House-Price Measures Show Similar Trends

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House Price Measure	Nominal Peak (Date)	Peak-to-Current
NAR Median Existing Homes	\$230,900 (July 2006)	-22% (August 2010)
Census Bureau New Homes (Constant-Quality)	\$311,700 (2007)	-10% (2010:H1)
S&P/Case-Shiller® (Index Level)	190.4 (2006:Q2)	-28% (2010:Q2)
Freddie Mac Index (Index Level)	1.25 (June 2006)	-20% (June 2010)

Sources: U.S. Census Bureau, S&P/Case-Shiller® National Index, National Association of Realtors®, Freddie Mac

# S&P/CSI Peak-to-2010:Q1 Decline in US House Prices Was 30% Nominal, 36% Real



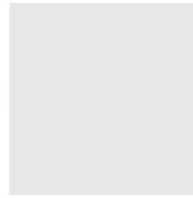
Sources: Nominal House Prices - Census Bureau's Constant Quality New-House Purchase Index (1963-1970), Freddie Mac's Conventional Home Price Purchase-Only Index (1970-1986), S&P/Case-Shiller® National Index (1986-2010) and MacroMarkets Expectations Survey (2010-2013); Consumer Prices - U.S. Bureau of Labor Statistic's Consumer Price Index quarter-end NSA (1963-2010); October 2010 Blue Chip Forecasts (2010-2011) and Macroeconomic Advisers Forecasts (2012-2013).

# Past Financial Crises Have Had Substantial Value and Output Declines

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	Peak-to-Trough Change (%)	Length of Time (Average)
Real House Price	-35%	5 years
Stock Market Values	-56%	3-4 years
Unemployment Rate	7%	5 years

**As of first quarter of 2010, S&P/CSI U.S. Real House Prices are down about 36% from peak of four years earlier**



# Where to Get More Information

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commentary and data at  
[www.FreddieMac.com/news/finance](http://www.FreddieMac.com/news/finance)

Contact us at [chief\\_economist@freddiemac.com](mailto:chief_economist@freddiemac.com)

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