

# Speculative Asset Prices

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Prize Lecture

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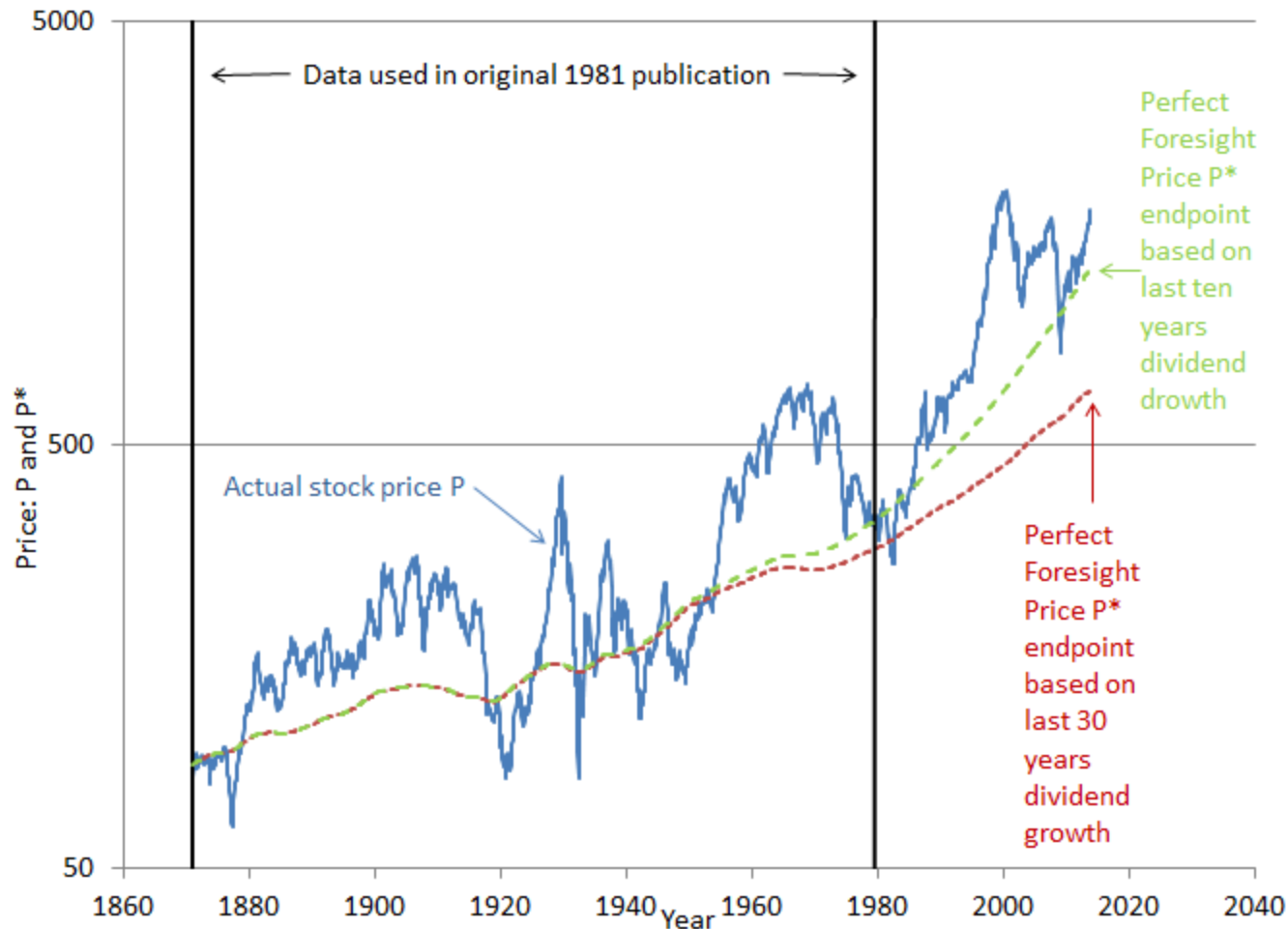
# Prices as Expected Present Values –

## Constant Discount Rate Case

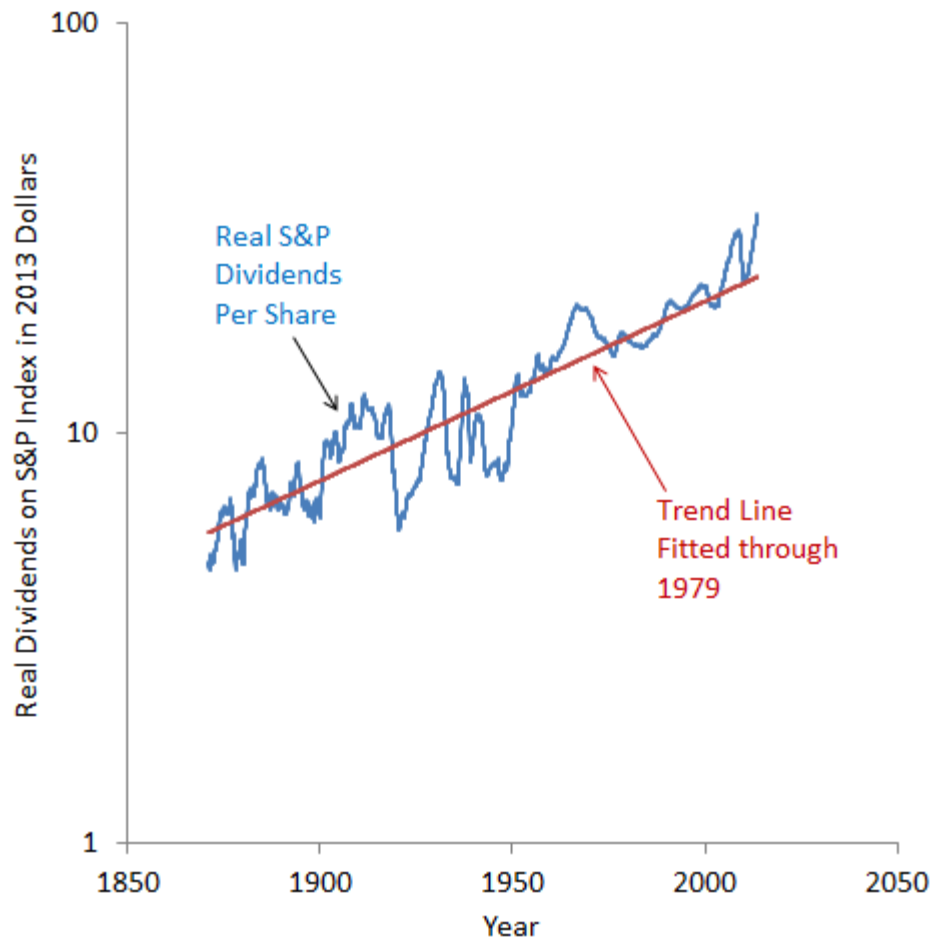
- $P_t = E_t P_t^* = E_t \sum_{k=1}^{\infty} \frac{D_{t+k}}{(1+r)^k}$
- Where  $P_t$  is real stock price index,  $P_t^*$  is the perfect-foresight or ex-post rational price, and  $D_{t+k}$  is the real dividend per share accruing to the index at future date  $t + k$
- $E_t$  is the mathematical expectations operator conditional on information at time  $t$ .
- $r$  is the rate of discount, constant through time, embodying notion that returns are unforecastable

# Real Stock Prices 1871-2013

Actual (Blue) and Ex-Post Rational (Red)  
Based on Shiller (Am. Econ Rev. 1981)



# Real S&P Composite Dividends Per Share 1871-2013



# Alternative Present Value Models

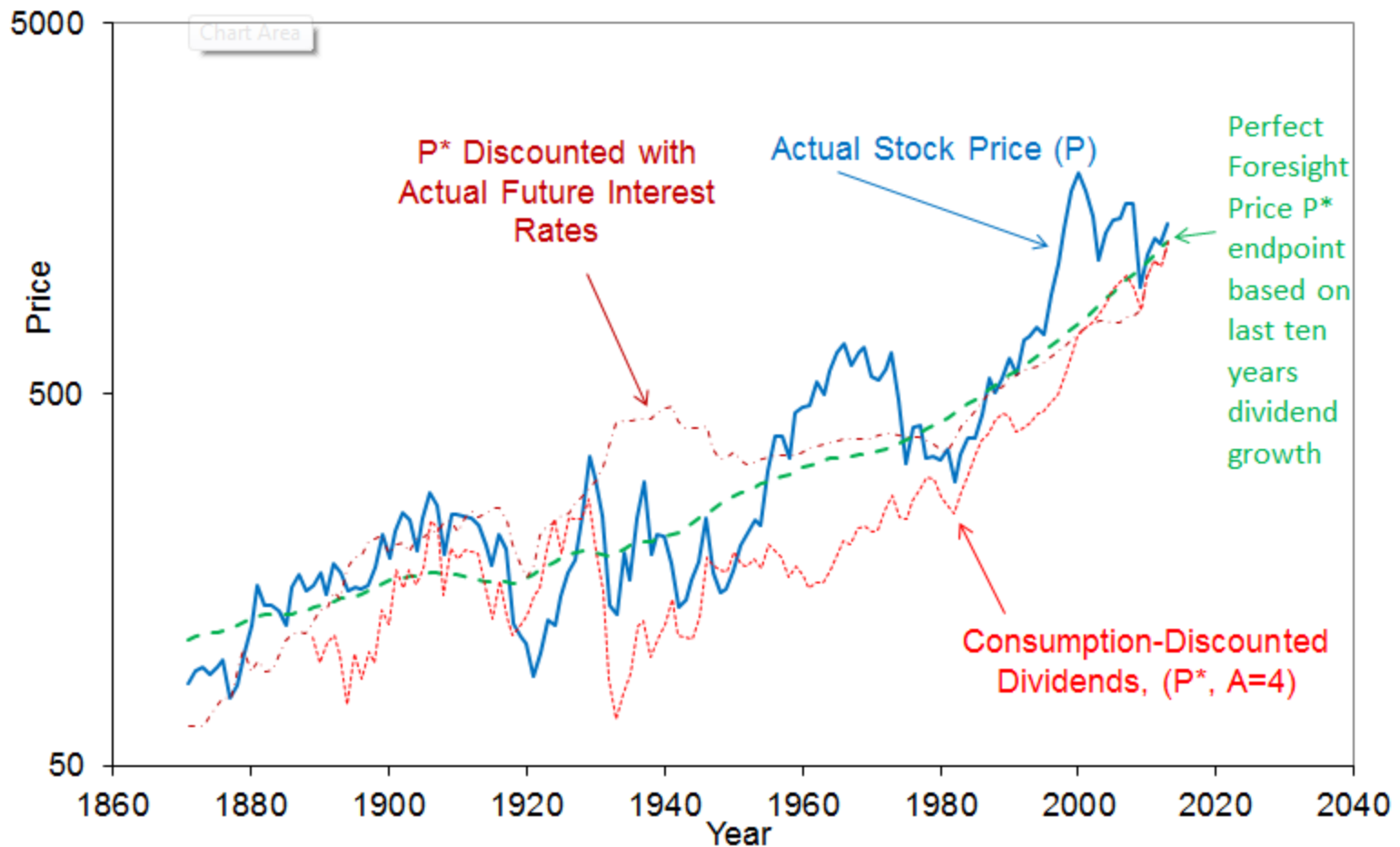
- $$P_t = E_t(P_t^{*r}) = \sum_{k=1}^{\infty} \prod_{j=1}^k \frac{1}{(1+r_{t+j}+\varphi)} D_{t+k}$$

Where  $r_t$  is the one-period interest rate

- $$P_t = E_t(P_t^{*C}) = E_t \sum_{k=1}^{\infty} \prod_{j=1}^k M_{t+j} D_{t+k} \quad (3)$$

- where  $M_t$  = marginal rate of substitution in consumption between  $t$  and  $t+1$ , which is, assuming constant relative risk aversion  $A$ ,  $\rho(C_t/C_{t+1})^A$  and  $C_t$  is real per capita consumption at time  $t$ . LeRoy (1973) - Lucas

# Alternative Present Values 1871-2013



# Variance Bounds Tests, Tests of “Excess Volatility” etc.

- Proposers of inequality tests: Shiller (1979, 1981, 1982), Singleton (1980), LeRoy and Porter (1981), West (1988), Hansen and Jagannathan (1991), Shiller and Beltratti (1992) [antecedent: Shiller and Siegel 1977]
- Discussions of some of these tests: Flavin (1983), DeBondt & Thaler (1985) Kleidon (1986), Marsh and Merton (1986), Goyal and Welch (2003), Ang and Bekaert (2007)

# Linearized Present Value Model

$$e_{t+1} - E_t e_{t+1} = (E_{t+1} - E_t) \left\{ \sum_{j=0}^{\infty} \rho^j \Delta d_{t+1+j} - \sum_{j=0}^{\infty} \rho^j r_{t+1+j} - \sum_{j=1}^{\infty} \rho^j e_{t+1+j} \right\}$$

- Where  $e_t = \log$  one-period excess return of stocks over risk free rate,  $d_t = \log$  dividend,  $r_t = \log$  one-period real interest rate. (Campbell and Shiller 1987, 1988, 1989, Campbell 1991, Campbell and Ammer 1993, Campbell & Viceira 2002)
- Campbell and Ammer (1993) conclude with US aggregate stock market 1952-1987 data that future excess returns innovation has standard deviation



# Beauty Contests

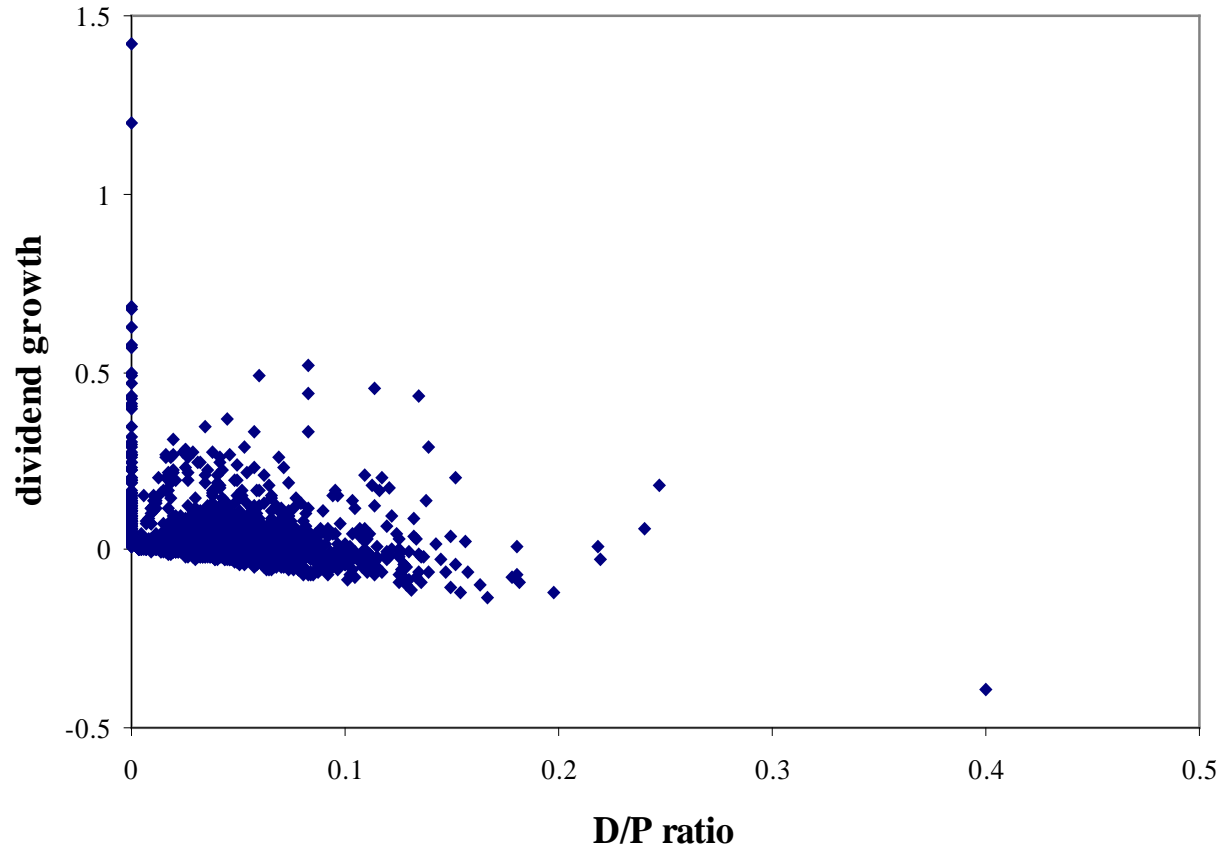
- Keynes (1936) likened stock market to a beauty contest, contestants trying to predict who others will find prettiest
- Beauty-contest-like models of speculative prices: Harrison and Kreps (1978), De Long, Shleifer, Summers and Waldman (1990), Morris (1996), Scheinkman and Xiong (2003), Wu and Guo (2004), Hong Scheinkman and Xiong (2006) and Hong and Sraer (2011).

# Breakdown of Individual Stock Market Volatility into that Due to Information about Dividends and Due to Expected Future Returns

- Tuomo Vuolteenaho (2002) for individual stocks in US
- Concludes using CRSP-Compustat monthly data 1954-1996 that the variance of expected return news is approximately one half of the variance of news about future dividends.

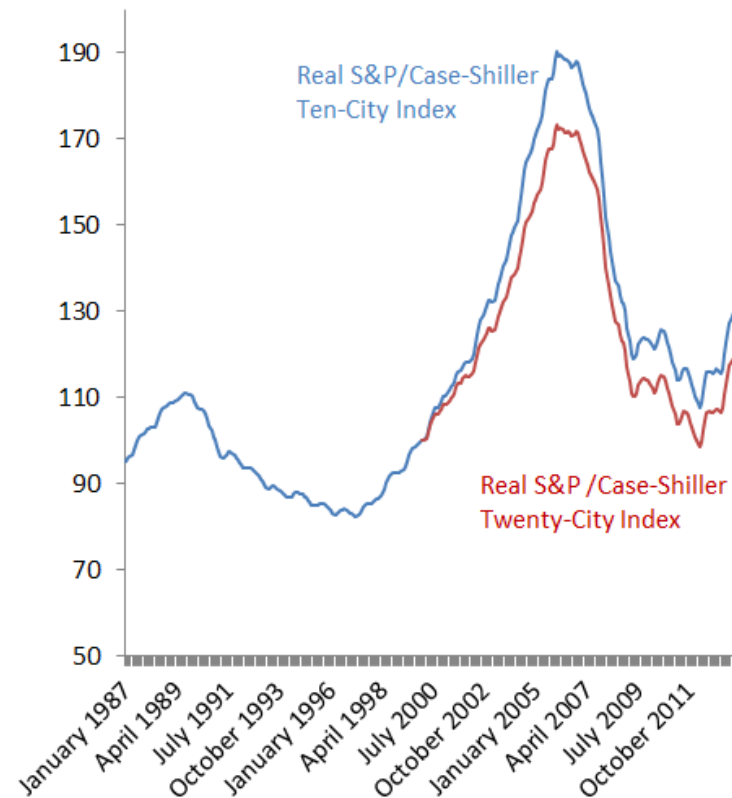
Jeeman Jung and Robert Shiller

PDV of Dividend Changes for next 25 years/ Price  
Against D/P Ratio, 1926-76  
49 firms, 2499 observations

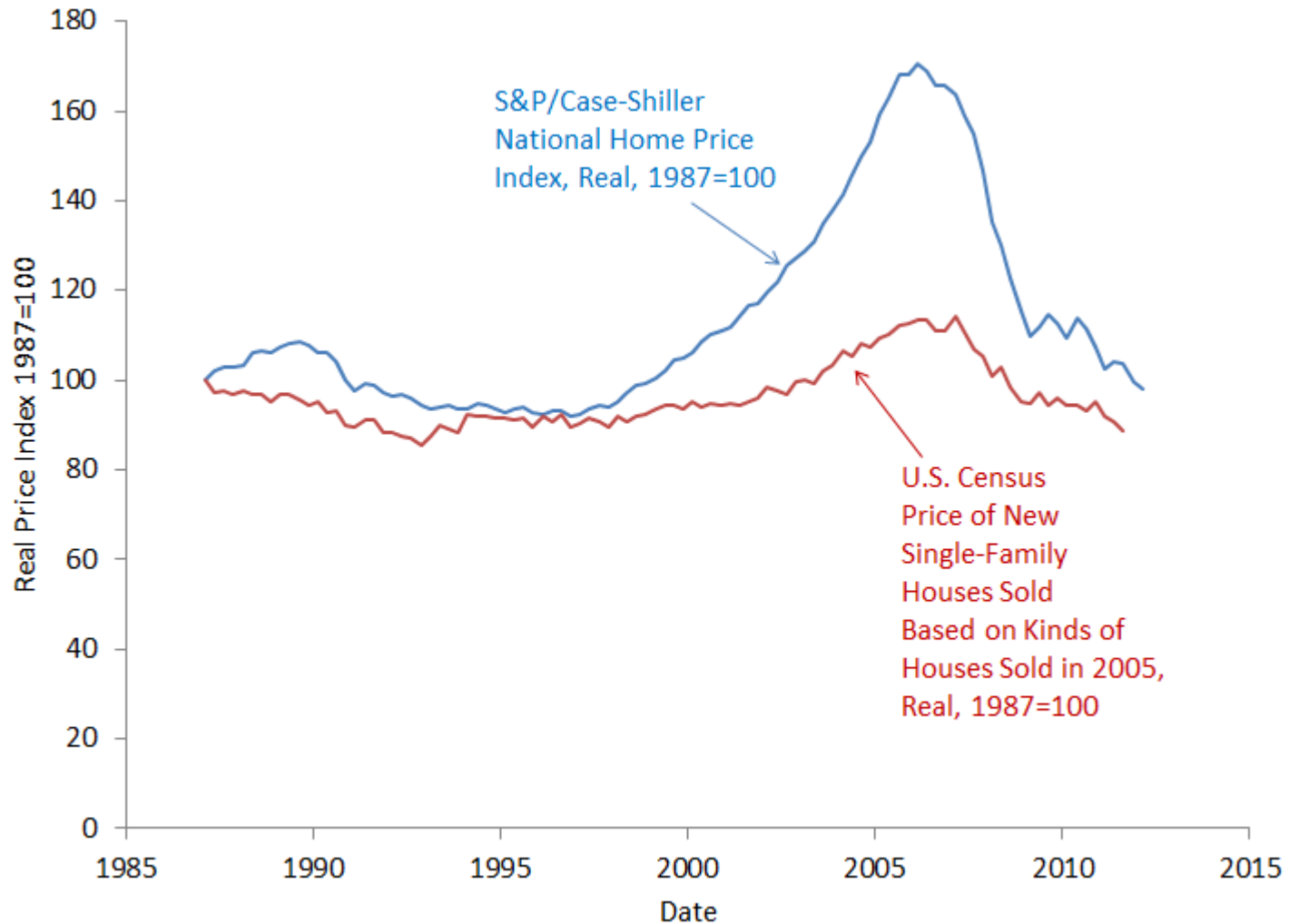


# Repeat-Sales Home Price Indices

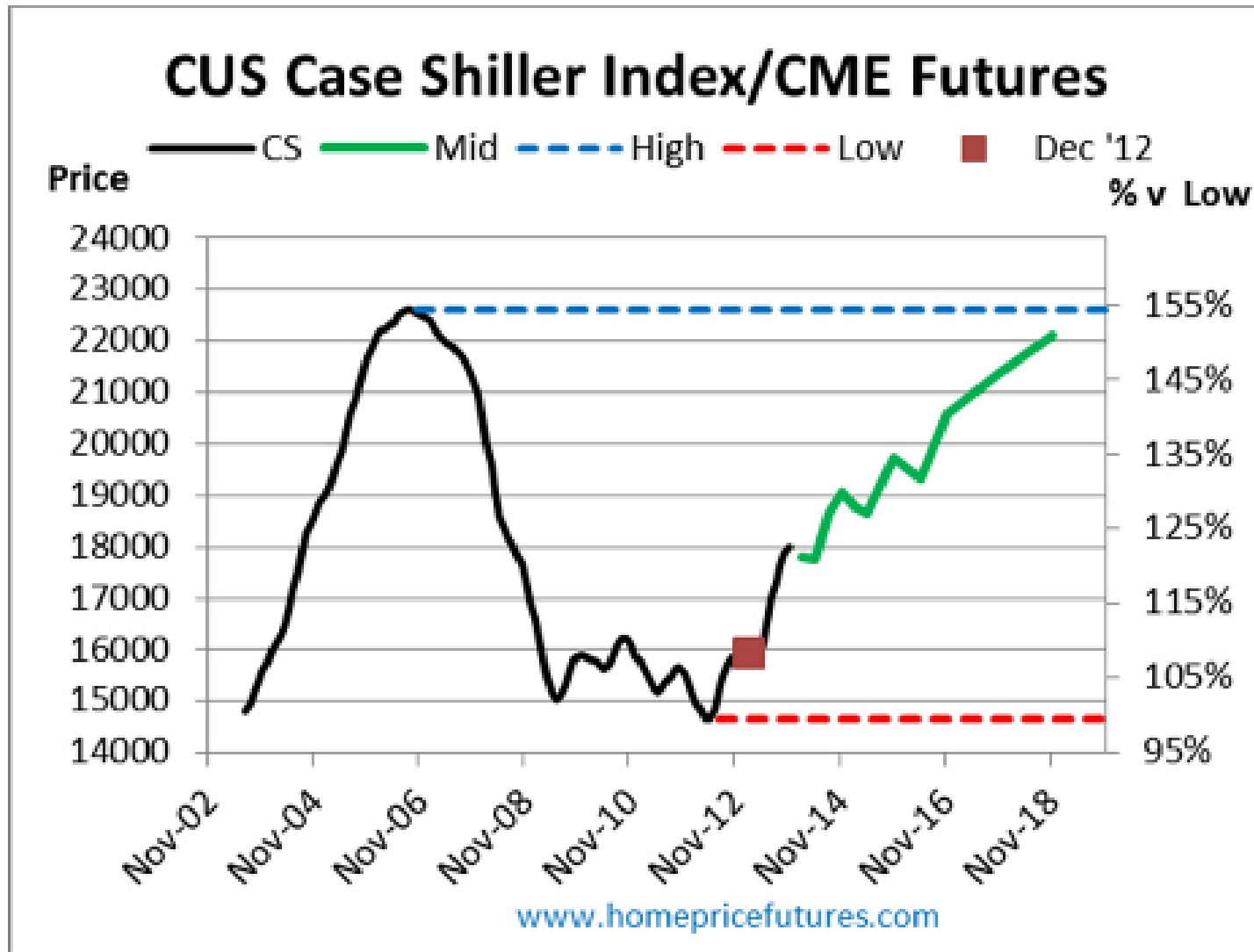
- Bailey Muth & Nourse (1963), Case (1986), Case & Shiller (1987, 1989, 1990), Shiller (1991), Case, Shiller and Weiss (1993)
- Infers a home price index only from changes in prices of individual homes, despite infrequent sales



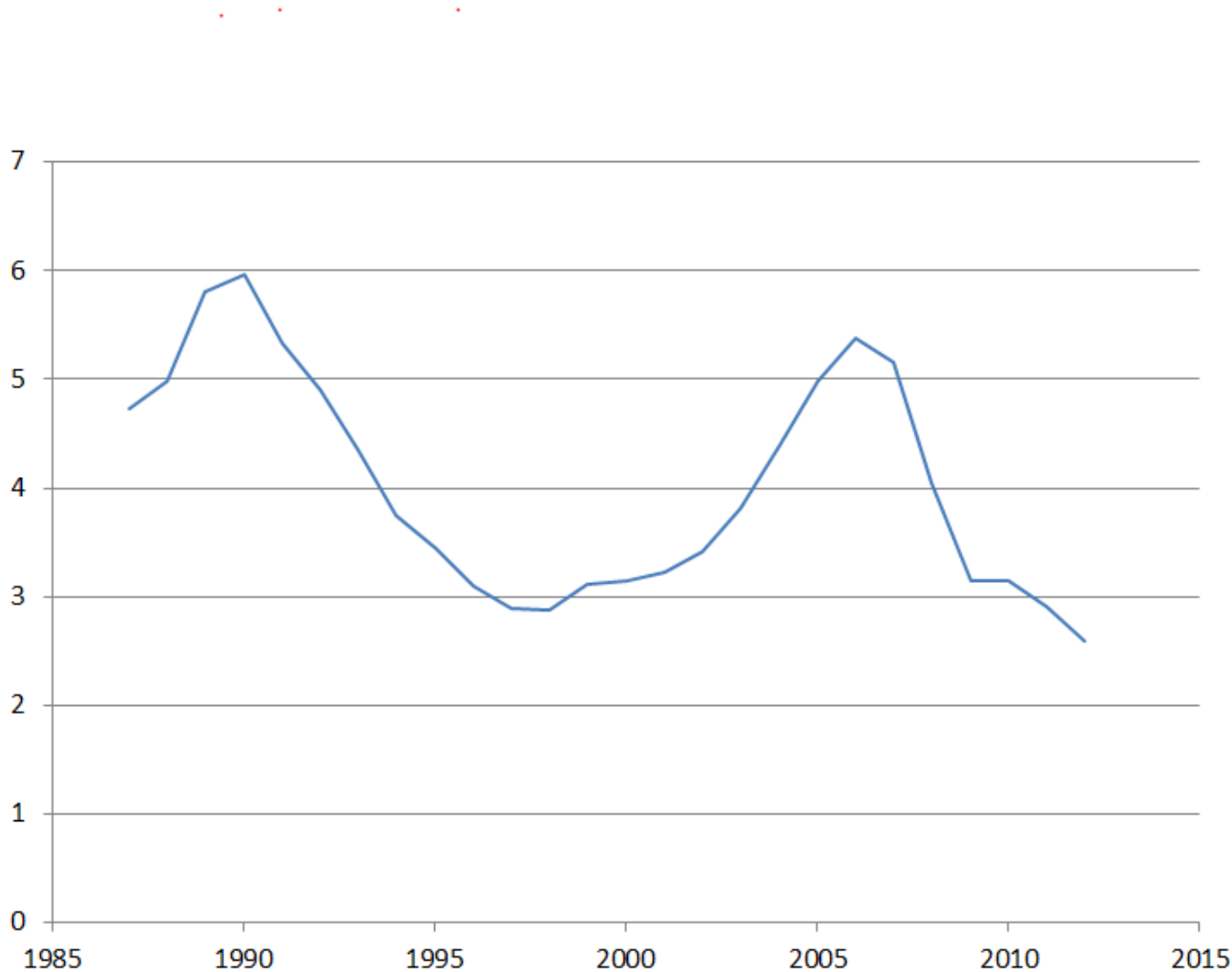
# Comparing Real S&P/Case-Shiller U.S. National Home Price Index and Real U.S. Census Constant-Quality Index 1987-2011



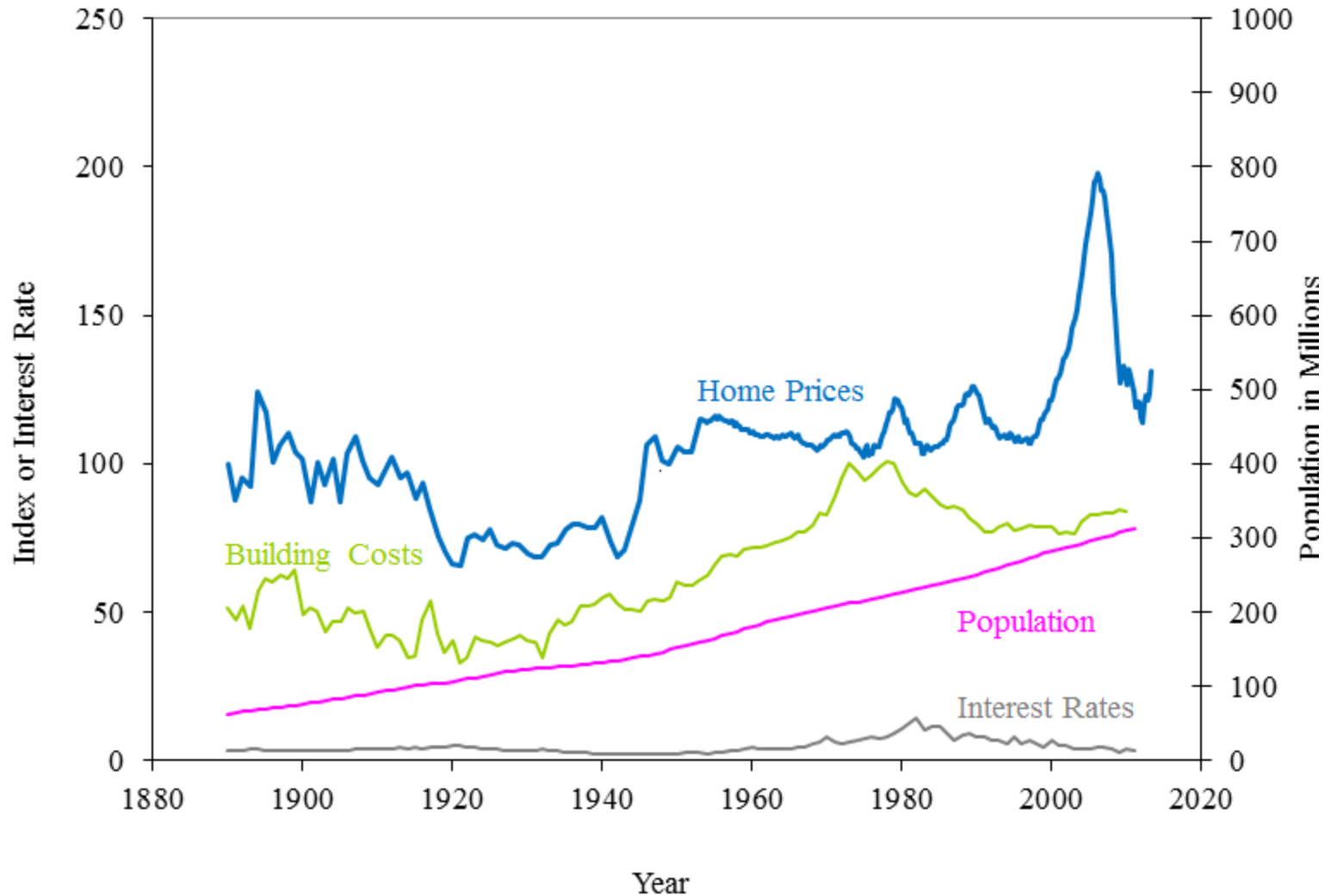
# S&P/Case Shiller Index and CME Group Futures Price (John Dolan)



# Case-Shiller Repeat Sales Home Price Indices Relative to Personal Income Los Angeles 1987-2013



# USA Real Home Prices and Housing Fundamentals 1890-2013





# The Behavioral Finance Revolution

## After 1990

- Sociology: Collective consciousness Durkheim (1893), collective memory Halbwachs (1925)
- Social psychology: *Groupthink*, Janis (1971)
- Selective attention: William James 1890, (“rational inattention” Sims 2003)
- Equity premium puzzle, Prescott & Mehra (1985), Siegel and Thaler (1987), Siegel (1993), Benartzi & Thaler (1995)
- News media, Internet, amplify social epidemics Shiller, *Irrational Exuberance* (2000, 2005)
- Even population biology, epidemiology, and neuroeconomics are coming into play

# And Yet Fundamentally Important Uses of Long-Term Prices

- Price discovery is somewhat meaningful, at least for assets with volatile fundamentals
- Markets for long-term prices are useful and should be expanded: markets for broader asset classes, such as real estate, longevity, and markets that capitalize flows such as GDP, energy prices, occupational income indices
- Better future use of computer technology
- Shiller, *Finance and the Good Society* 2012