

Long-Term Predictability

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Outline: Long Term Predictability

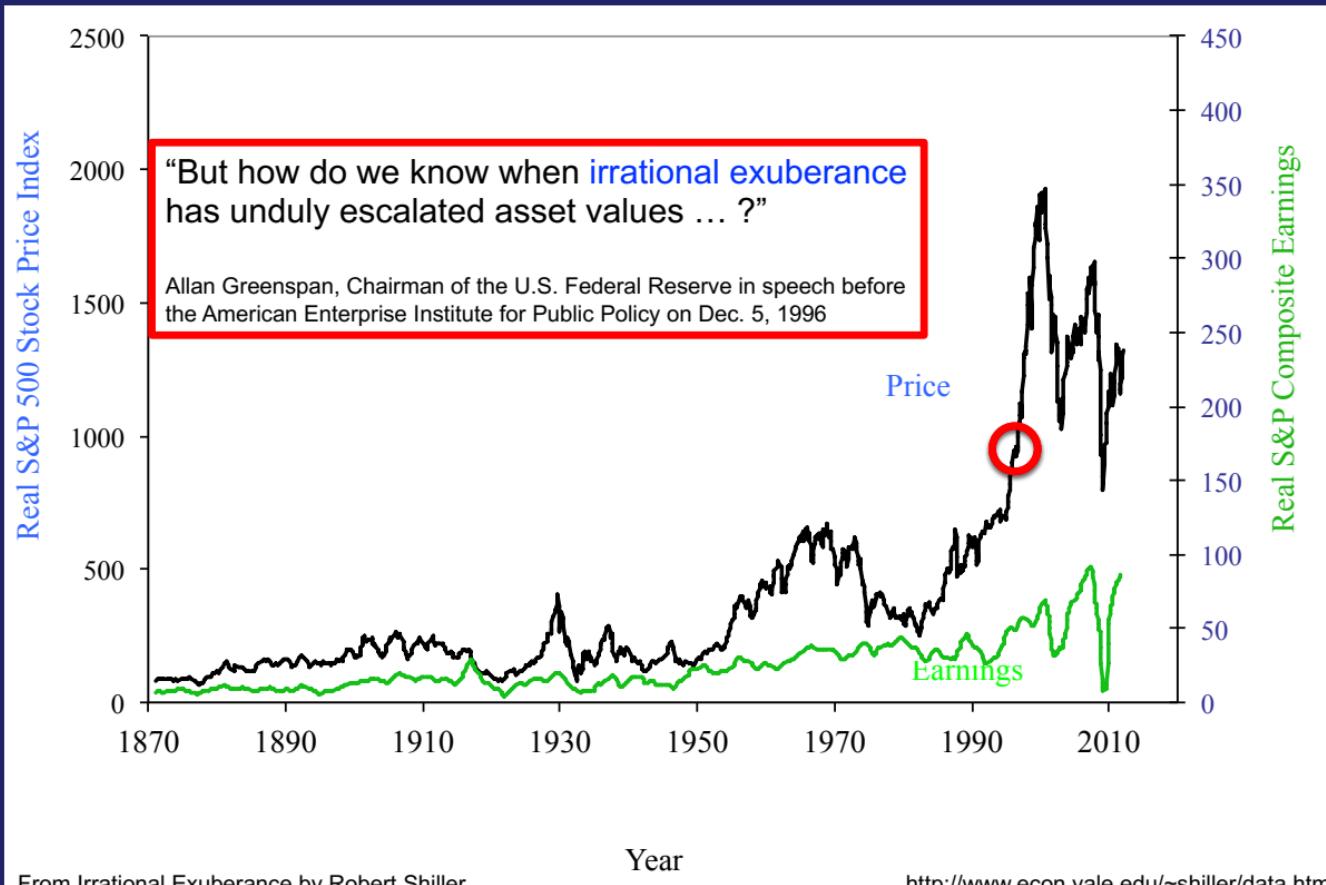
Predictability: Behavioral vs. Rational

1. We'll start with Robert Shiller's arguments that markets can deviate from their fundamental value for long periods of time.
 - Fundamental value is related to the price we pay for future earnings or dividends.
- These deviations generate long-term predictability as prices revert to their "correct" level.
 - when prices are too high, forecast future negative return.
- Evidence:
 - US, World Markets, Australia
 - Price paid for earnings over time (P/E)
 - when prices are below, signal future positive return

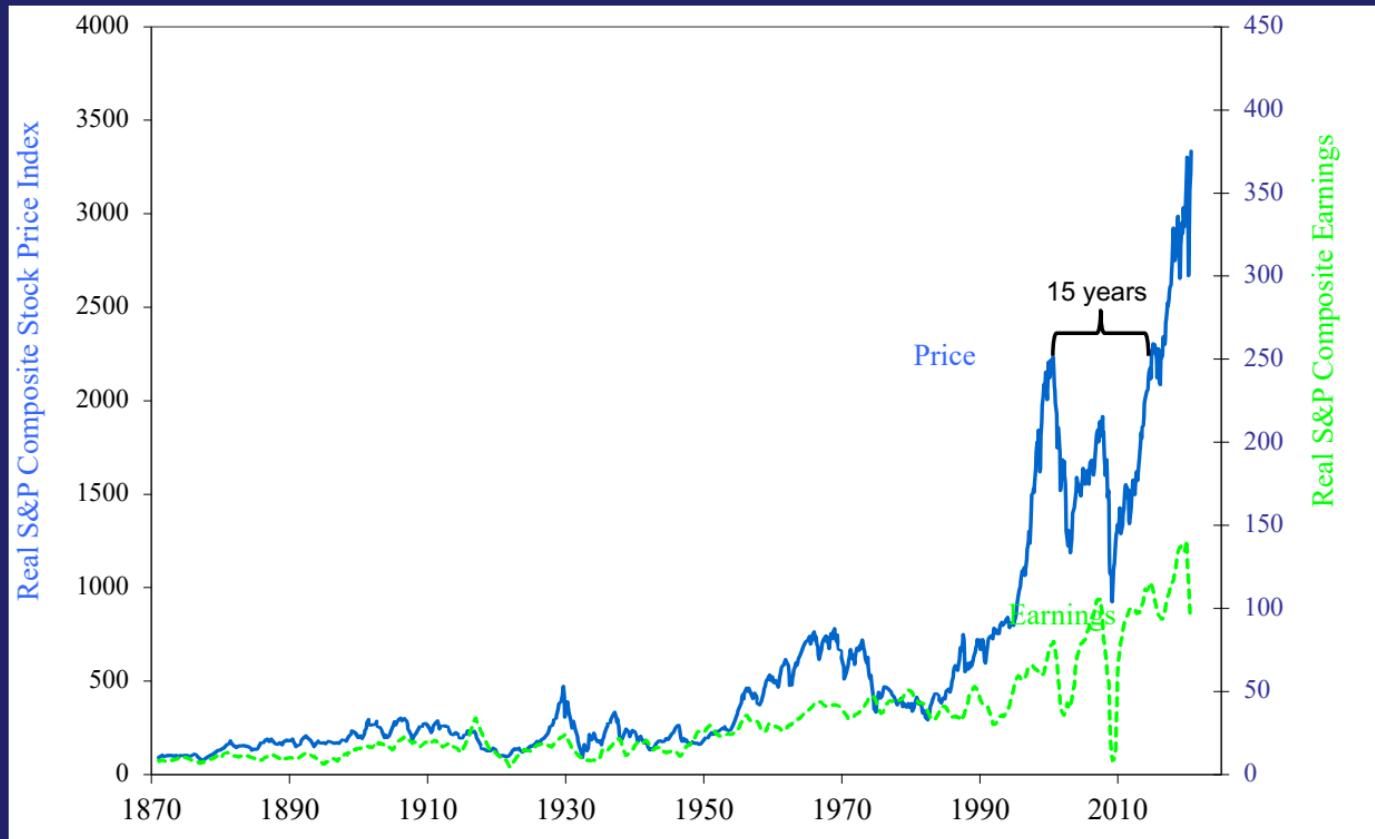
Outline: Long Term Predictability

- We continue with John Cochrane's evidence of long horizon predictability using other measures
 - Dividend Yields
 - Earnings Yields
 - Short Term Interest Rates
 - Consumption to Wealth Ratio (cay)
- Present the rational explanation: risk

Evidence of long-term inefficiency?



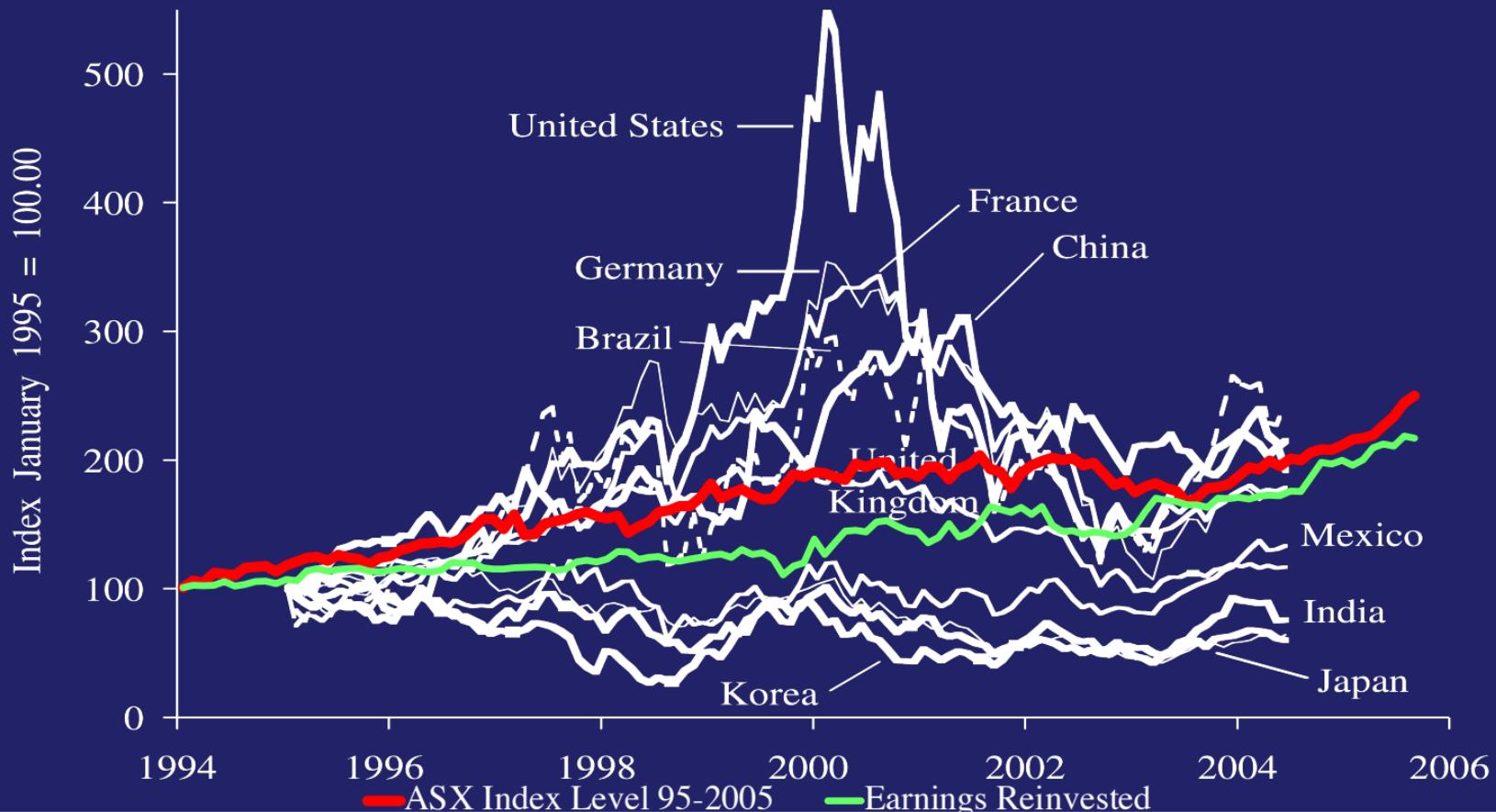
Evidence of long-term inefficiency?



Were stock prices excessive?

- Shiller (2005) argues they were
 - Over 1994 to 1999 stock returns were up 300%
 - But GDP up only 40%
 - Corporate profits up only 60%
- There were similar patterns around the world
 - Australia – for the same period
 - Stock prices were up 250%
 - GDP up 45%
 - Corporate profits were up 217%

ASX All Ordinaries



ASX All Ordinaries

Real Stock Price Levels and Real Earnings



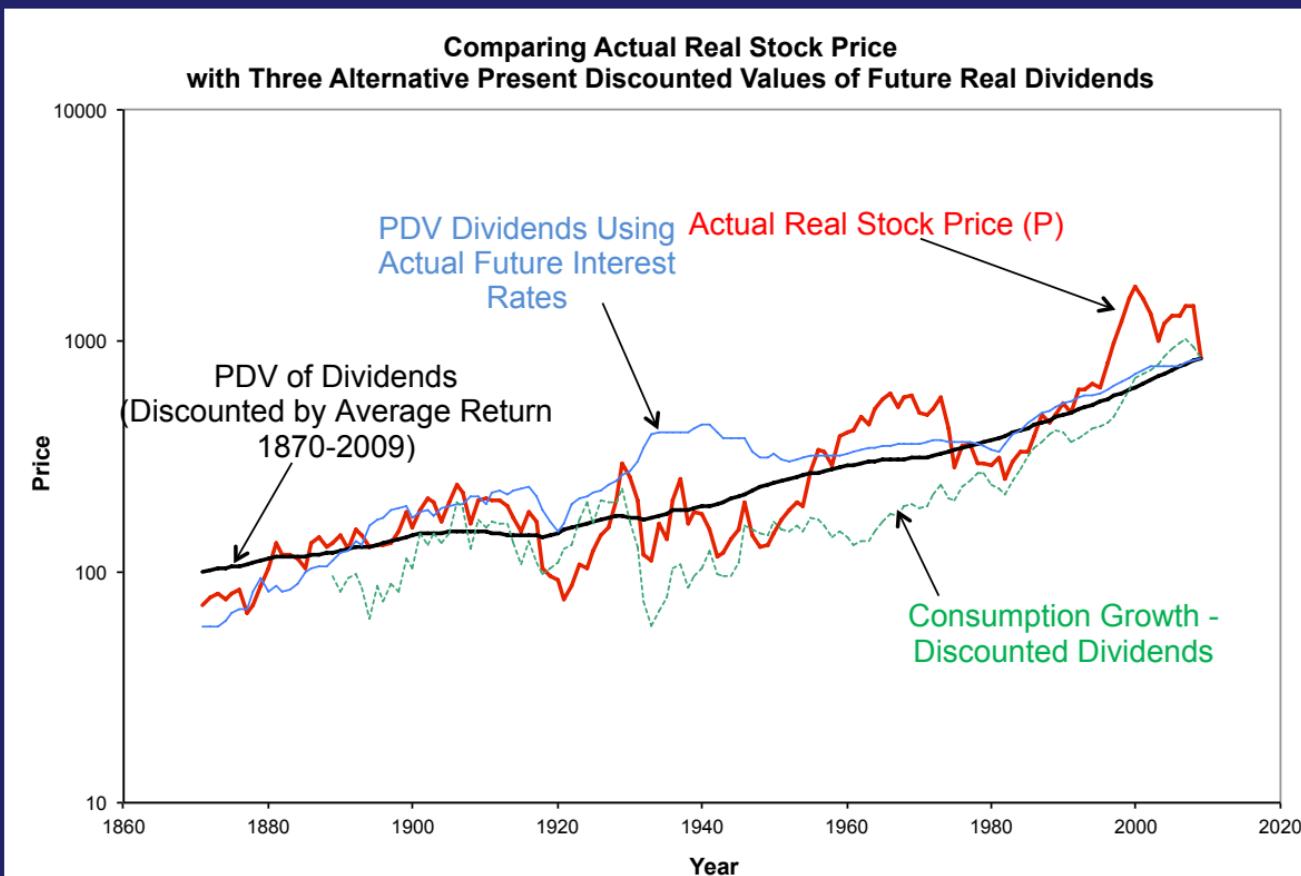
Excess volatility

- What is really puzzling is why is there so much volatility?
 - On a typical day returns can be up or down 1 or even 3%!
 - Are dividends up or down 1 or 3%??
 - Is there news that suggests greater dividend growth or changes in discount rates?
- Shiller drives this point home by calculating the present value of future dividends
 - In the U.S. 1870 to 2008

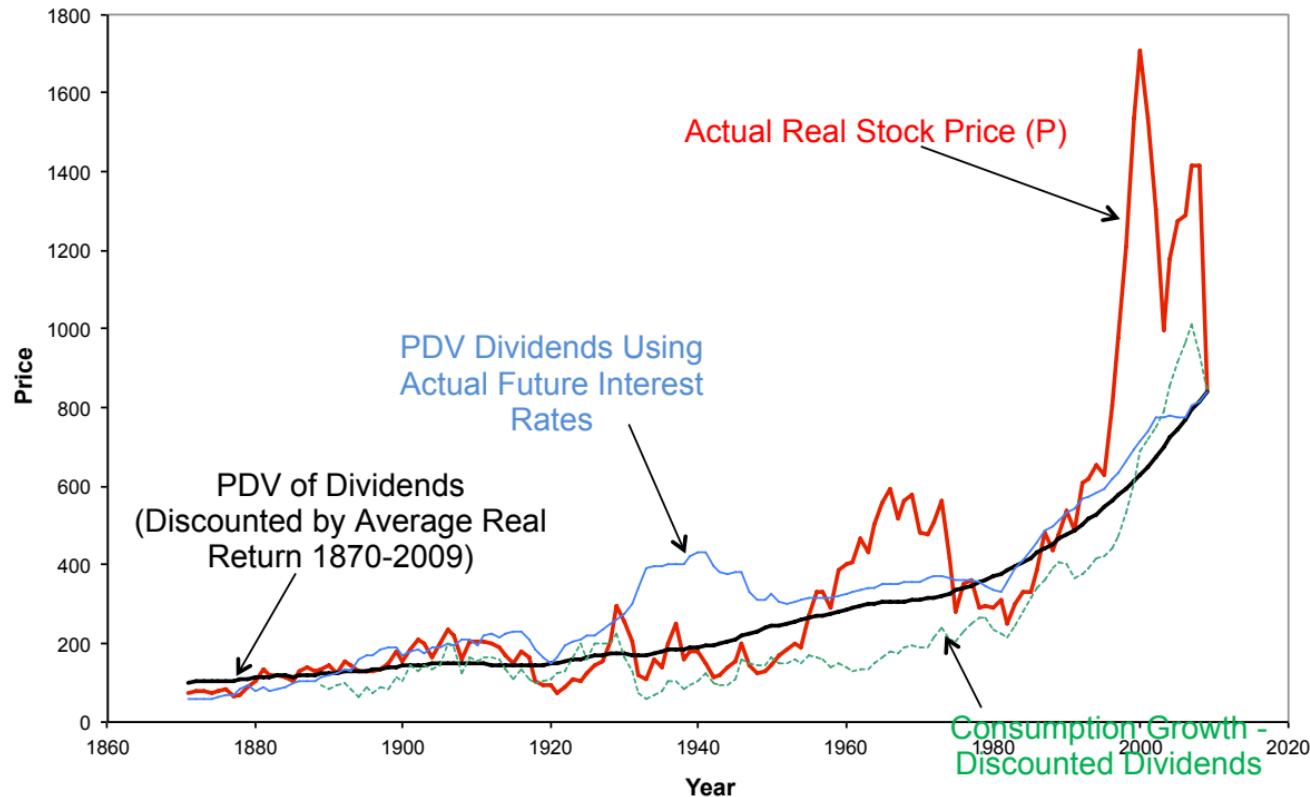
$$P_{year} = \left(\sum_{t=year}^{2008} \frac{D_t}{(1+k)^{(t-year)}} \right) + \frac{P_{2008}}{(1+k)^{(2008-year)}}$$

Stock Prices are much more volatile than dividends

stock prices
vary around
the fundamental
value from
the dividend
discount model



Comparing Actual Real Stock Price with Three Alternative Present Discounted Values of Future Real Dividends



Evidence of long term inefficiency?



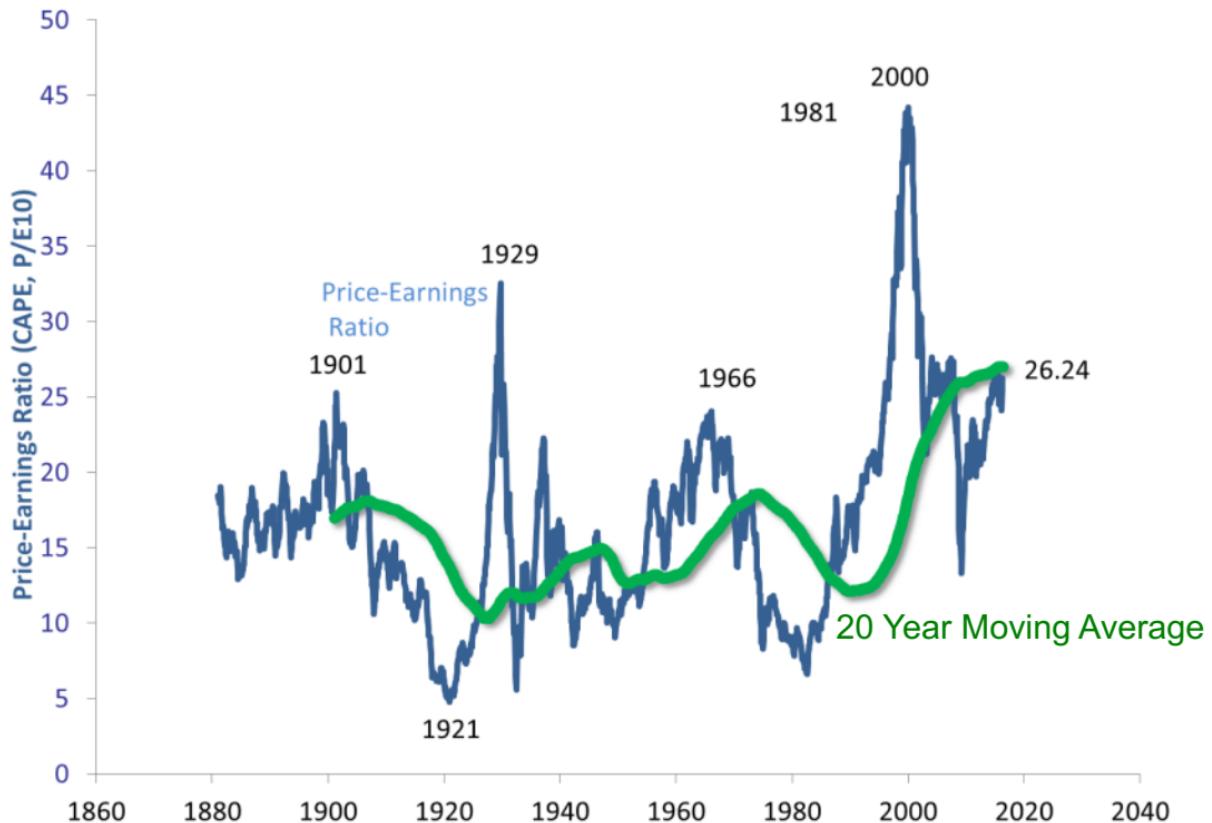
From Irrational Exuberance by Robert Shiller

Year

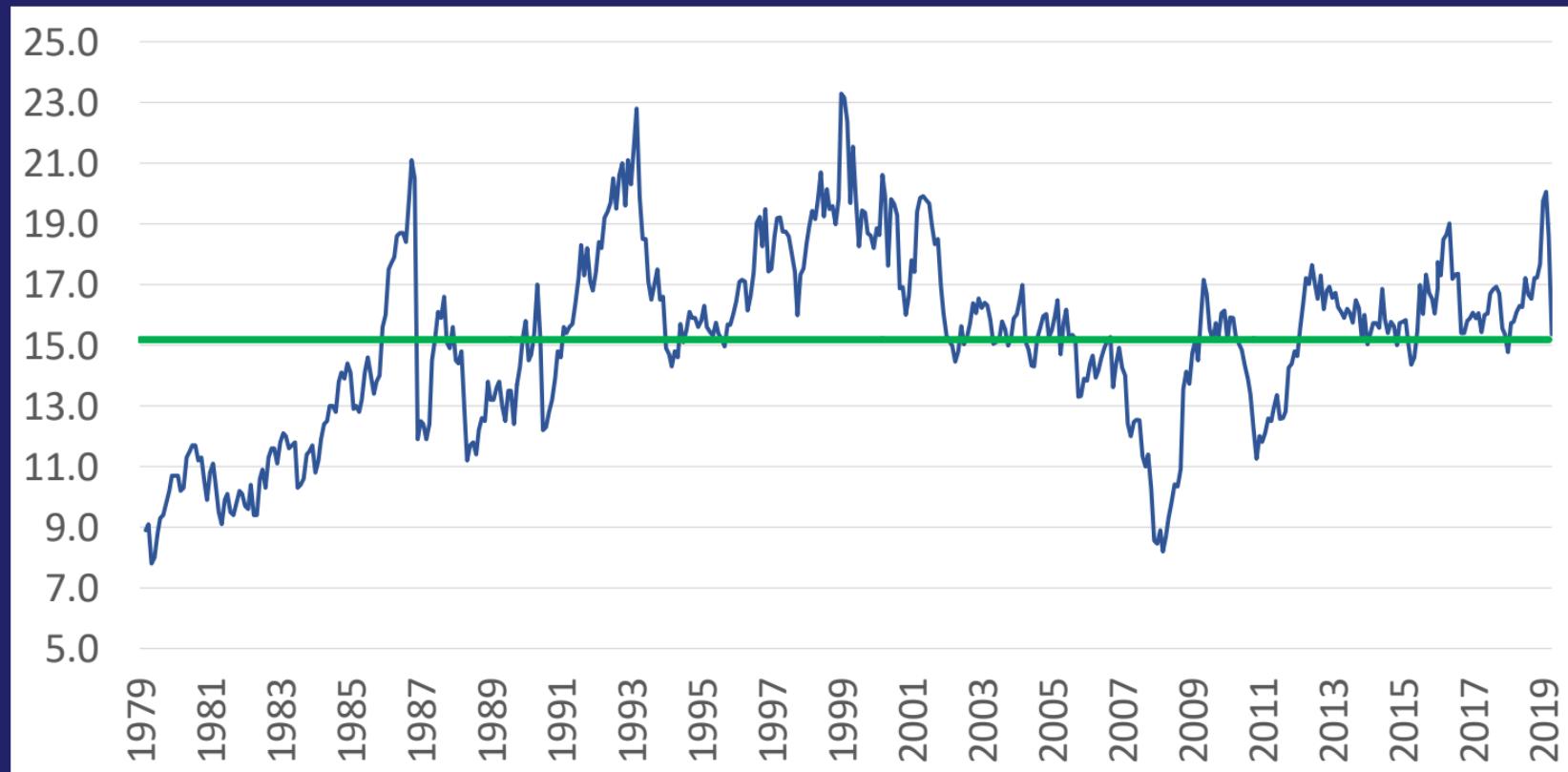
<http://www.econ.yale.edu/~shiller/data.htm>

U.S. Price-Earnings Ratio





Australia - Price Earnings Ratio



P/E and Predictability

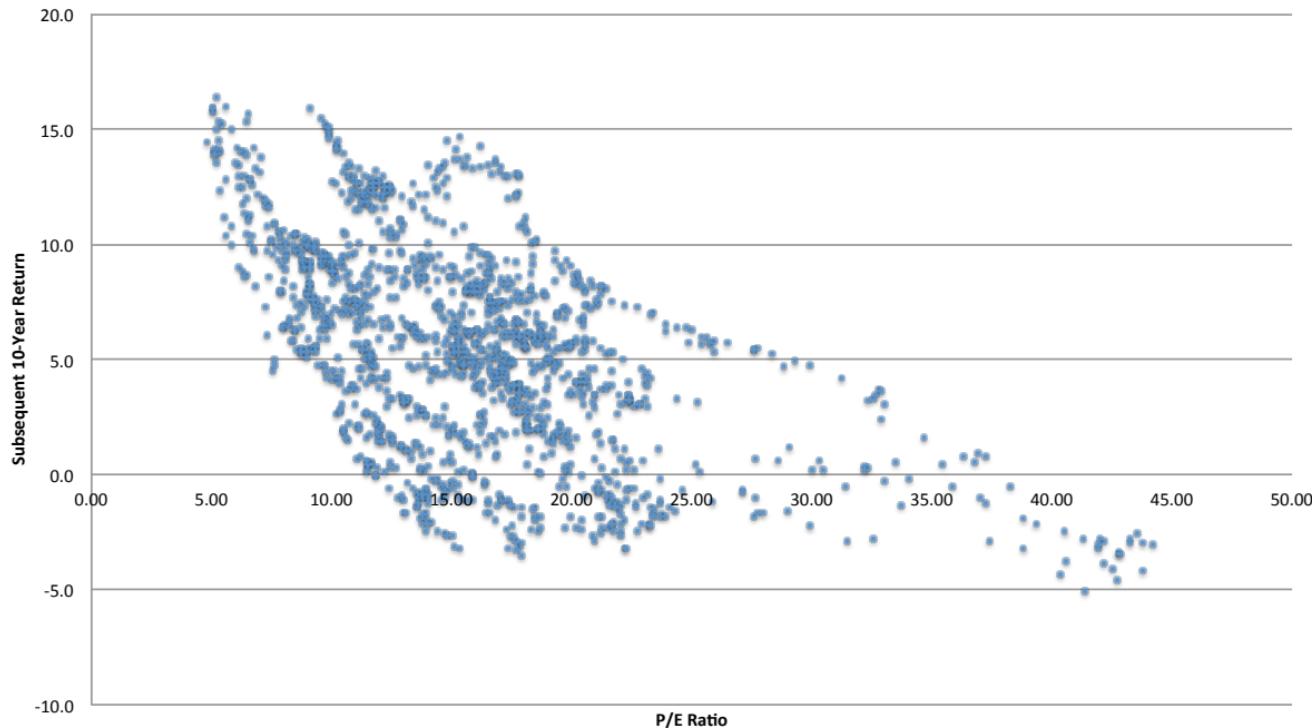
- The previous chart provides evidence that P/E ratios are mean reverting
- The mean reversion can generate predictability:
 - When prices are high, they will tend to go down
 - When low, up.

Annualized 10-Year Return vs. P/E in January

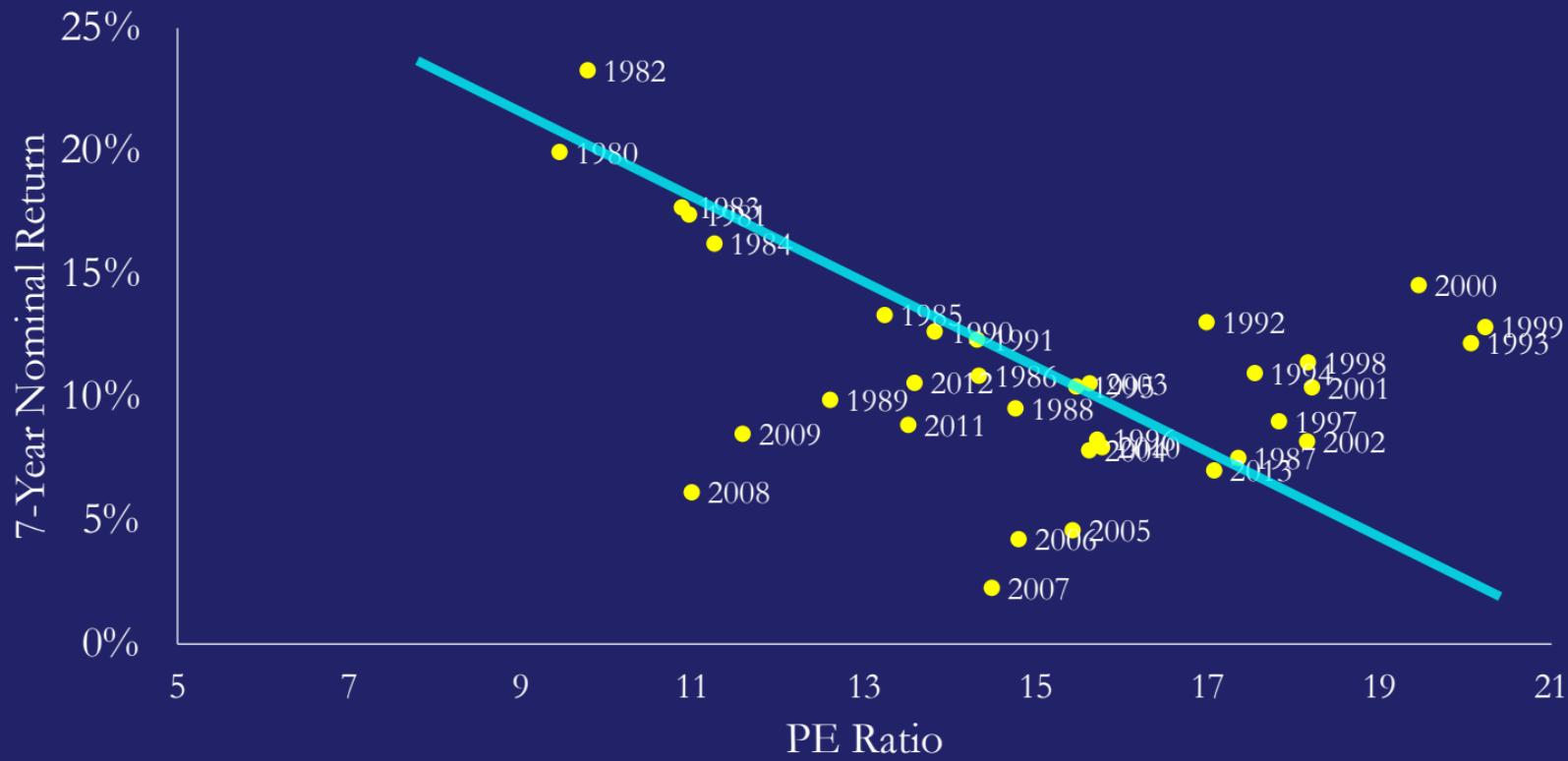


Price-earnings ratio for January of year indicated

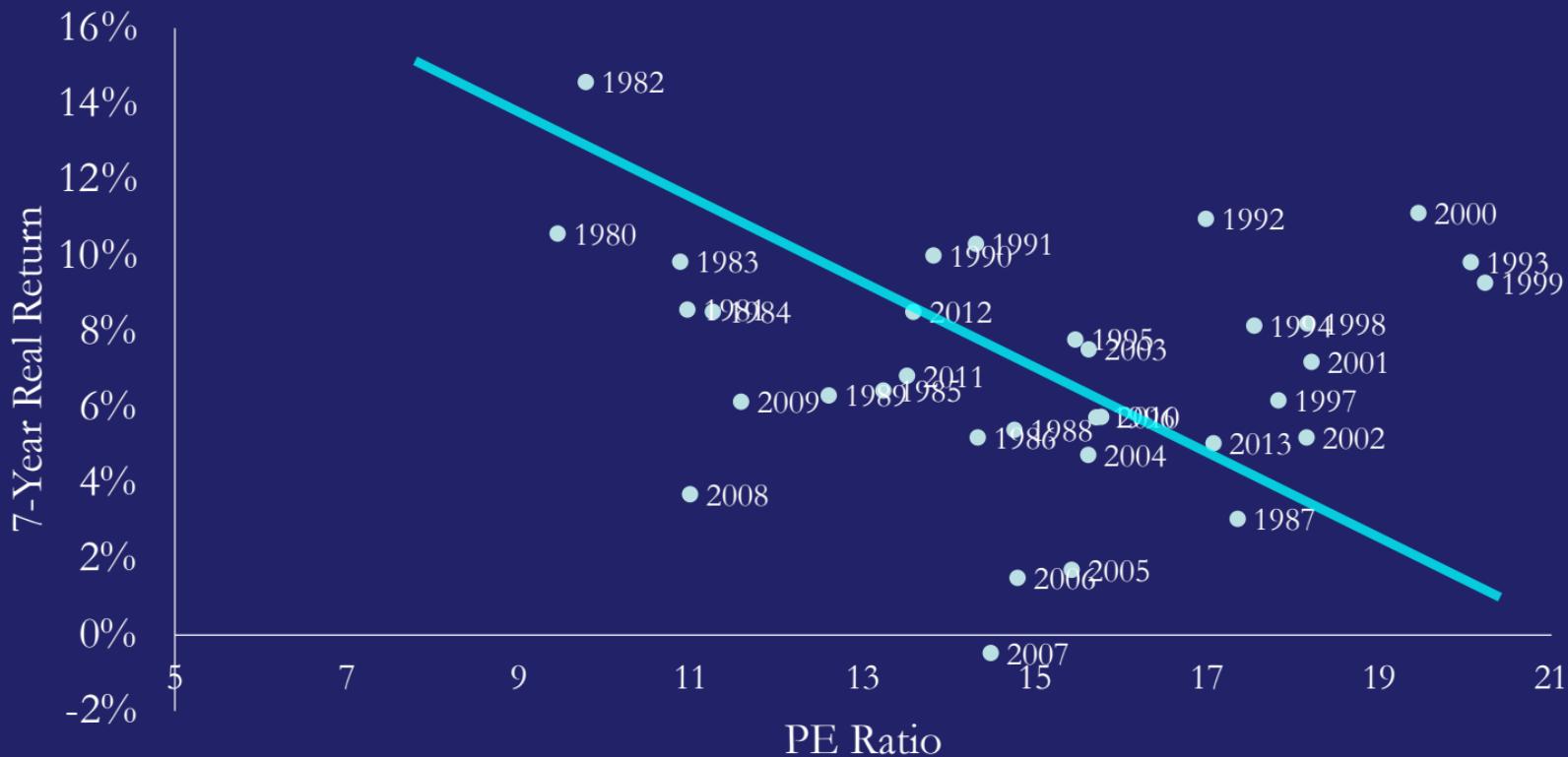
P/E Ratios as Predictors of Future 10-Year Returns



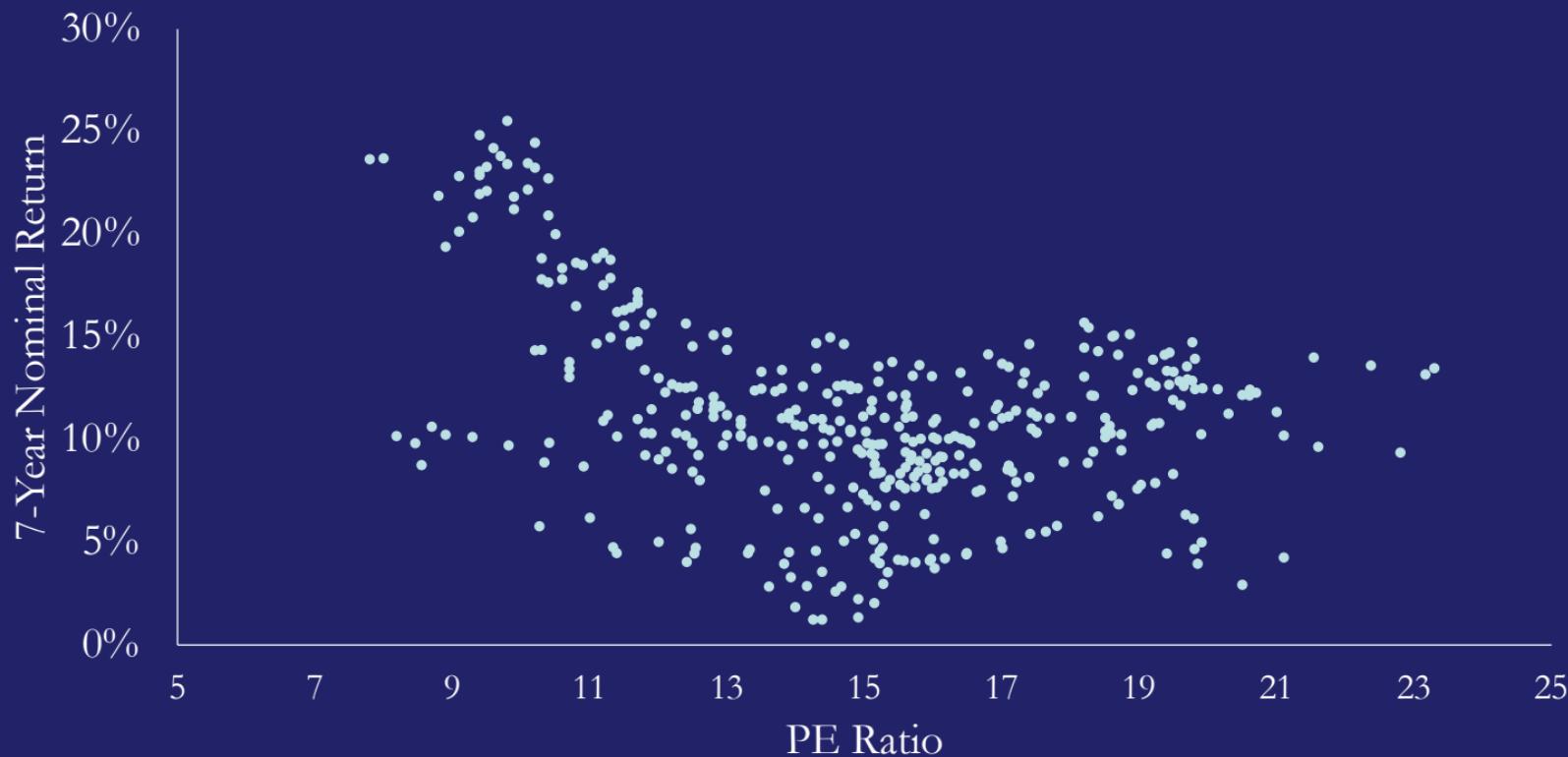
Australia



Australia



Australia – All Months



Long Run Predictability

- Shiller looks at these patterns in stock returns and sees periods when the stock market is over or under priced.
- But there are rational explanations.
- Cochrane (and many others) sees these same set of facts and sees a risk story...

Future Returns, Discount Rates and Cash Flows

Based on John Cochrane's Seminar on Discount Rates

Real Price-Earnings Ratio (Inflation Adjusted)



What causes changes in P/E or P/D ratios ?

- All of these ratios are highly correlated:
 - Price to Earnings
 - Price to Dividends
 - Price to Book Value
 - Even Price to Moving Average Price
 - Though no one seems to use this
- Cochrane focuses on Dividend to Price (D_t/P_t) Dividend Yield.
 - ① • More direct relation to returns investors receive
 - ② positive relation : high dividend yield , high return
- If prices are high it must be that:
 - Investors expect dividends (or earnings) to rise in the future
 - Investors expect returns to be low in the future
 - Investors expect prices to rise

Rearranging:

$$1 + E_t[r_{t+1|t}] = \frac{E_t[D_{t+1}] + E_t[P_{t+1}]}{1 + E_t[r_{t+1}]} - 1$$

$$E_t[r_{t+1}] = \frac{E_t[D_{t+1}] + E_t[P_{t+1}]}{P_t} \xrightarrow{\text{future price about selling stock}} - 1$$

$$\Rightarrow P_t = \frac{E_t[D_{t+1}] + E_t[P_{t+1}]}{1 + E_t[r_{t+1}]}$$

Rearranging:

$$P_t = \frac{E_t[D_{t+1}] + E_t[P_{t+1}]}{1 + E_t[r_{t+1}]}$$

If I plan to buy the stock which do I prefer?
Increases in $E[D]$ Increases in $E[P]$ or Decreases in $E[r]$?

$P_t \Rightarrow \begin{cases} E[D] / E[P] & \text{healthy company going forward} \\ E[r_{t+1}] \downarrow & \text{lower return} \rightarrow \text{capm} \rightarrow \text{less risk} \end{cases}$

Rearranging:

$$P_t = \frac{E_t[D_{t+1}] + E_t[P_{t+1}]}{1 + E_t[r_{t+1}]}$$

↓ ↓

↑ ↑

based on CAPM.

in the future! high return means more risk

high return on average

If I plan to buy the stock after a price decline which do I hope it is?
Decreases in $E[D]$ Decreases in $E[P]$ or increases in $E[r]$?

Due to increasing returns or decreasing cash flows?

- If investors expect low returns, it causes higher prices so that:
- Low dividend yields forecast low future returns (on average)

$$\frac{D_t}{P_t} = \frac{E_t[D_{t+1}] + E_t[P_{t+1}]}{1 + E_t[r_{t+1}]}$$

*tell us nothing about future
since D_t past dividend*

D_t is observed dividends, it tells us nothing about the future

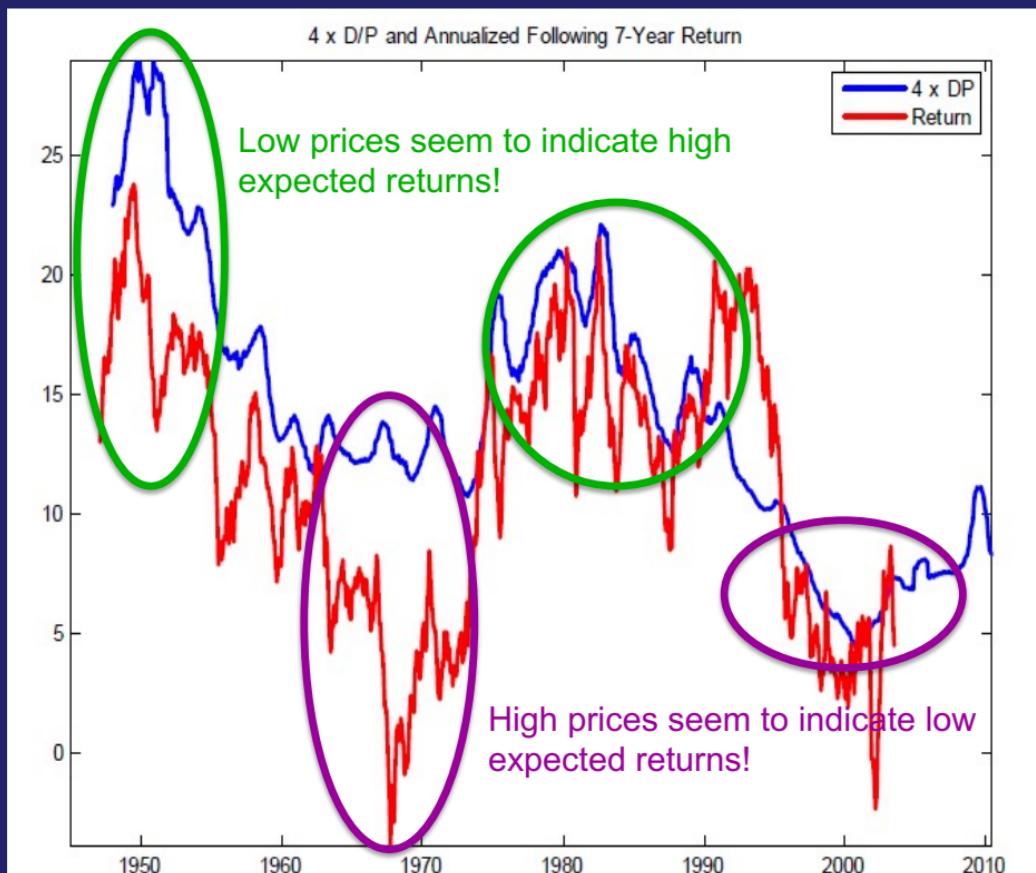
$E[r_{t+1}] \downarrow \quad P_t \uparrow \quad \frac{D_t}{P_t} \downarrow$

tell us about future

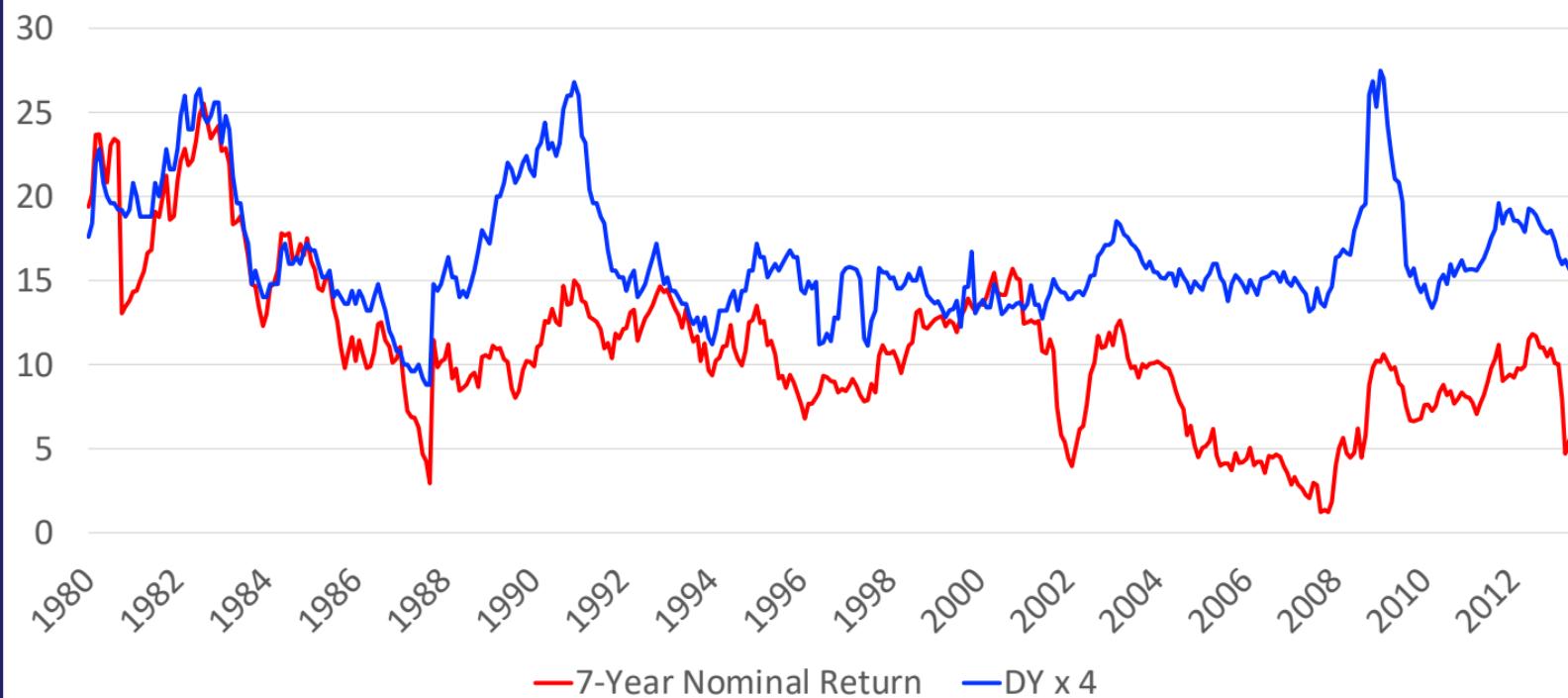
- High Dividend Yields mean prices are low and forecast high returns $\frac{D_t}{P_t} \uparrow \quad P_t \downarrow \rightarrow E[r_{t+1}] \uparrow$
- If this were all about expected cash flows, then:
 - Low dividend yields would forecast higher corporate profits, but **no different stock returns** $\frac{D_t}{P_t} \downarrow \rightarrow P_t \uparrow \Rightarrow$ hold $E[r_{t+1}] \downarrow$ but $E[\ln(P_{t+1})] \uparrow$

Dividend to Price and Future 7-year Return (proxy for $E[r]$)

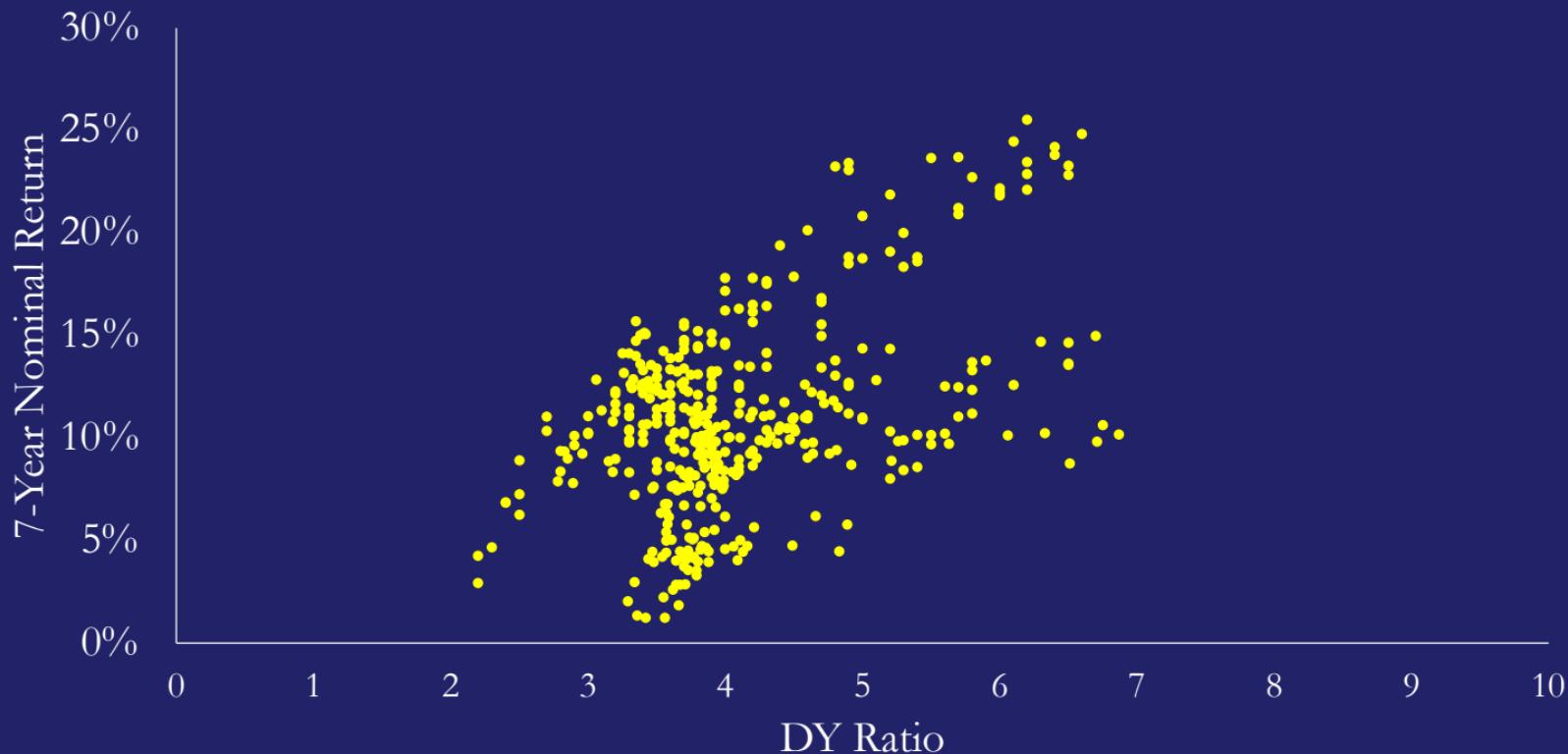
in US,
change in E(r)
mostly drives change
in Dividend Yield
(not change in corporate
profit)

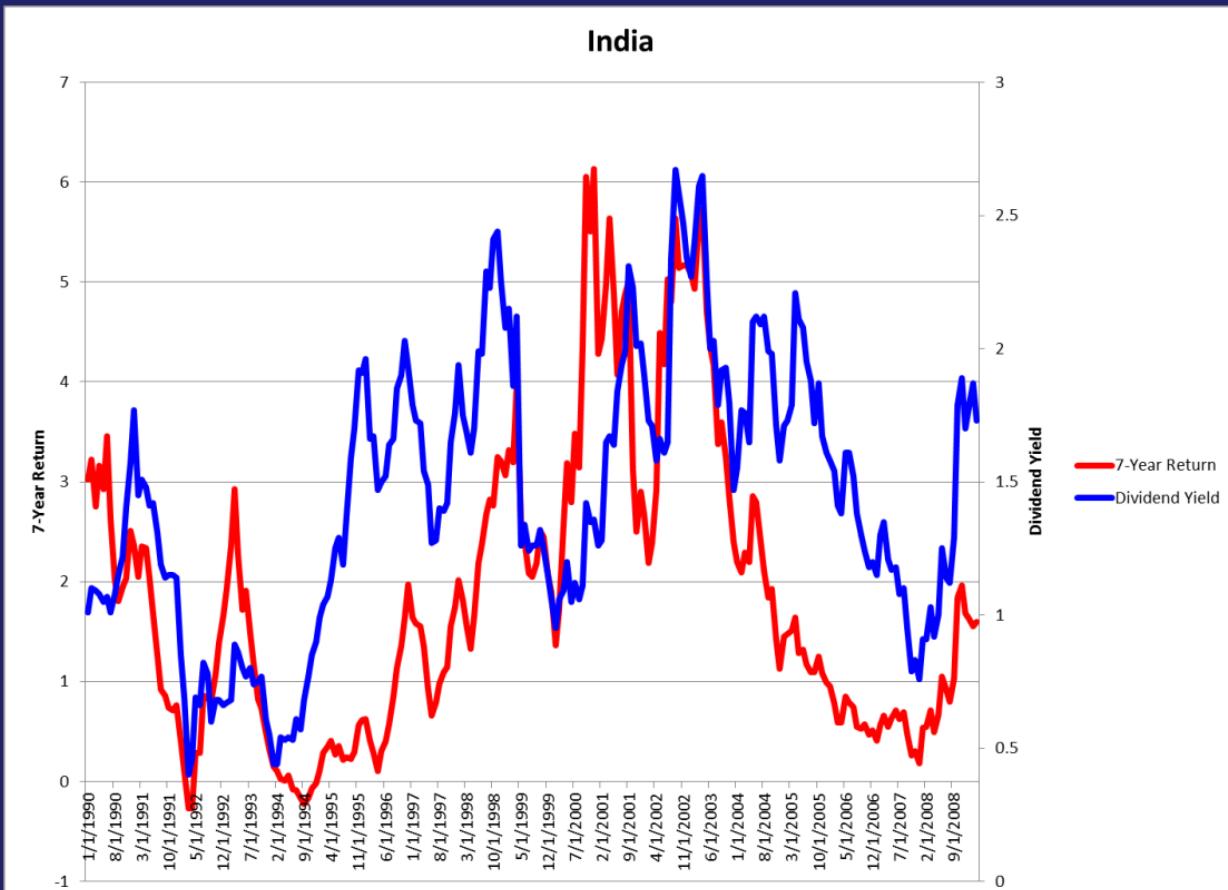


Australia



Australia

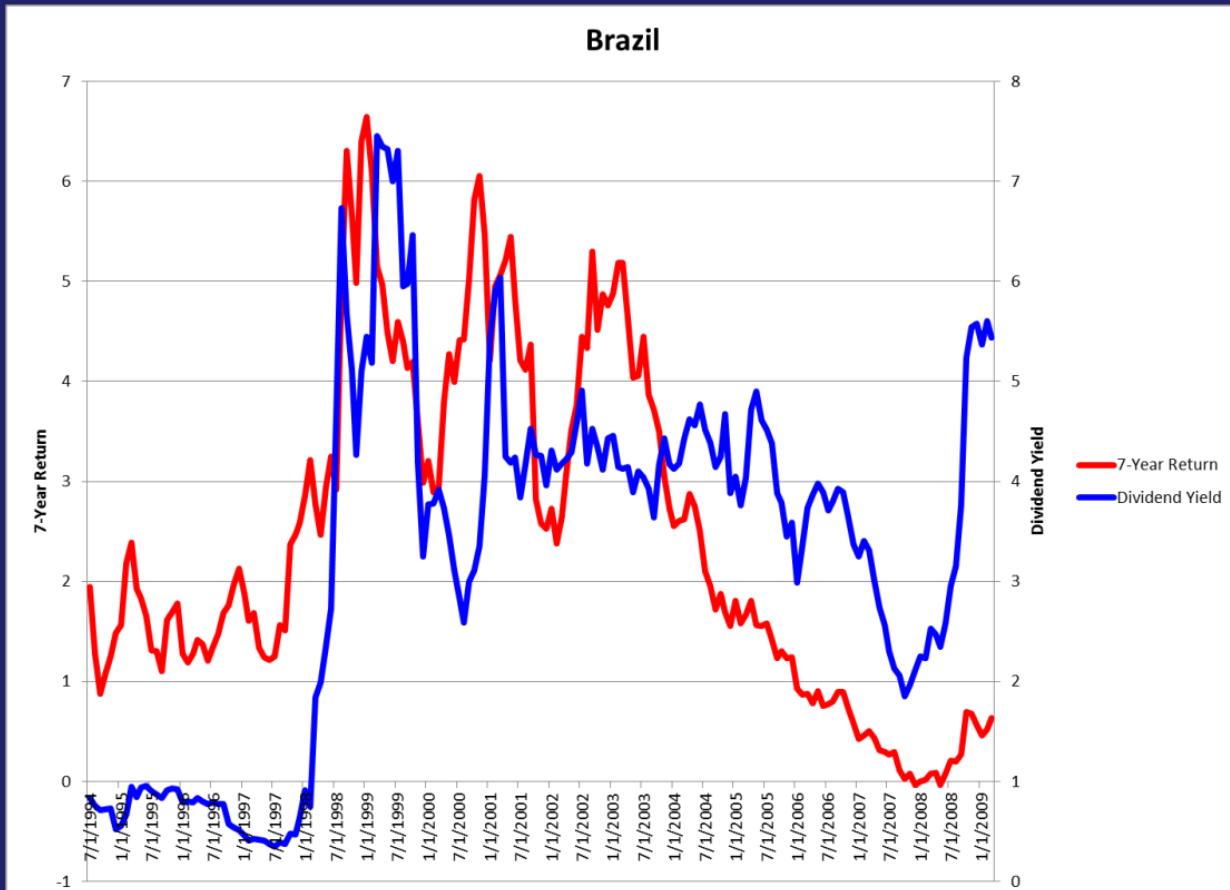




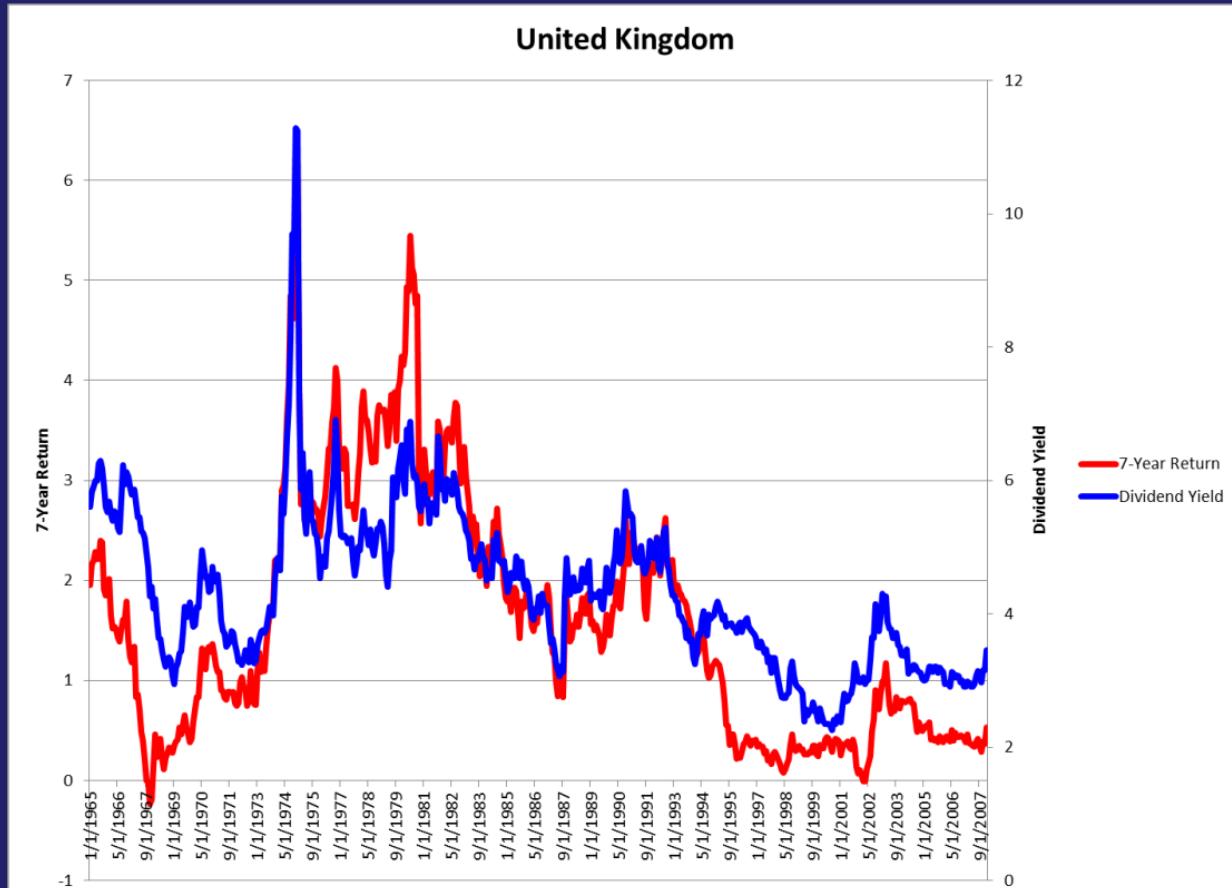
dividend yield
in Russia is
driven by
cash flow



Brazil



United Kingdom



Classic view

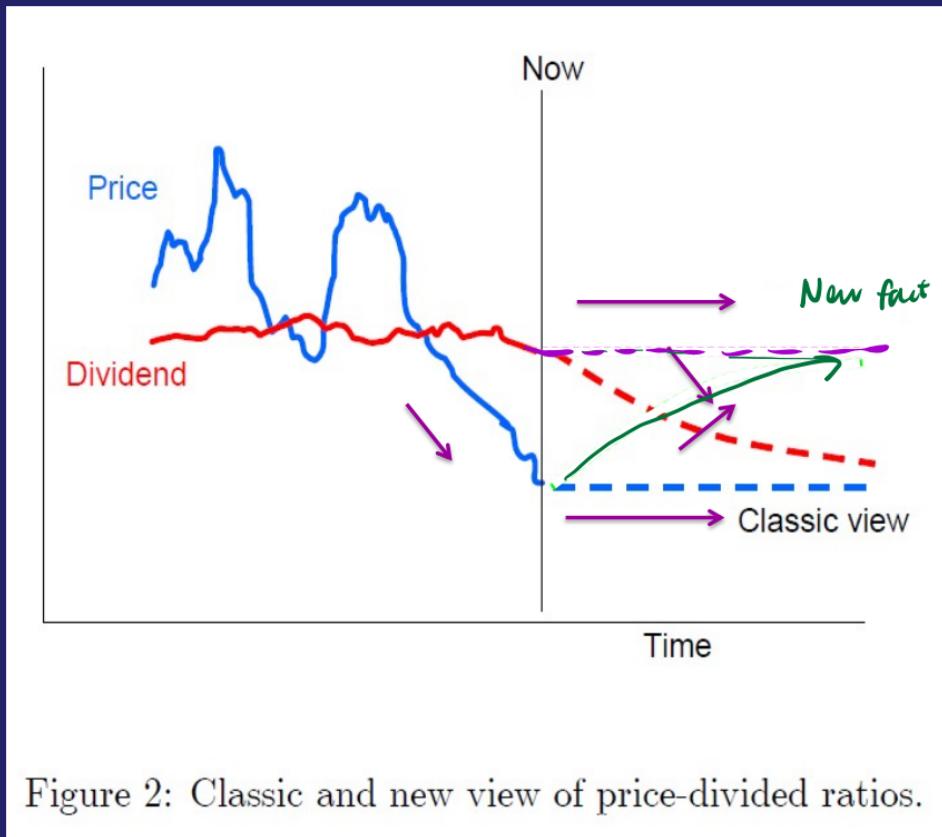
- The classic view is that all dividend-yield volatility is a function of changes in dividend-growth expectations.
 - Past thinking: $E[r]$ is relatively constant so all D/P changes are a function of changes in dividends/cashflows – NOT true!
- What Cochrane shows is that
 - Almost all D/P volatility comes from variation in $E[r]$
 - Almost none is from variation in expected dividend growth
 - It would be nice, but it just doesn't seem to be the case
 - None from “rational bubbles”
 - When prices are just on the expectation of future higher prices
 - That is – high expected returns, because prices will be higher in future, not high expected returns because prices drop now.

$$P_t = \frac{E_t[D_{t+1}] + E_t[P_{t+1}]}{1 + E_t[r_{t+1}]}$$

*If future price is higher,
then rationally, people
would pay more*



Classic vs. Current View

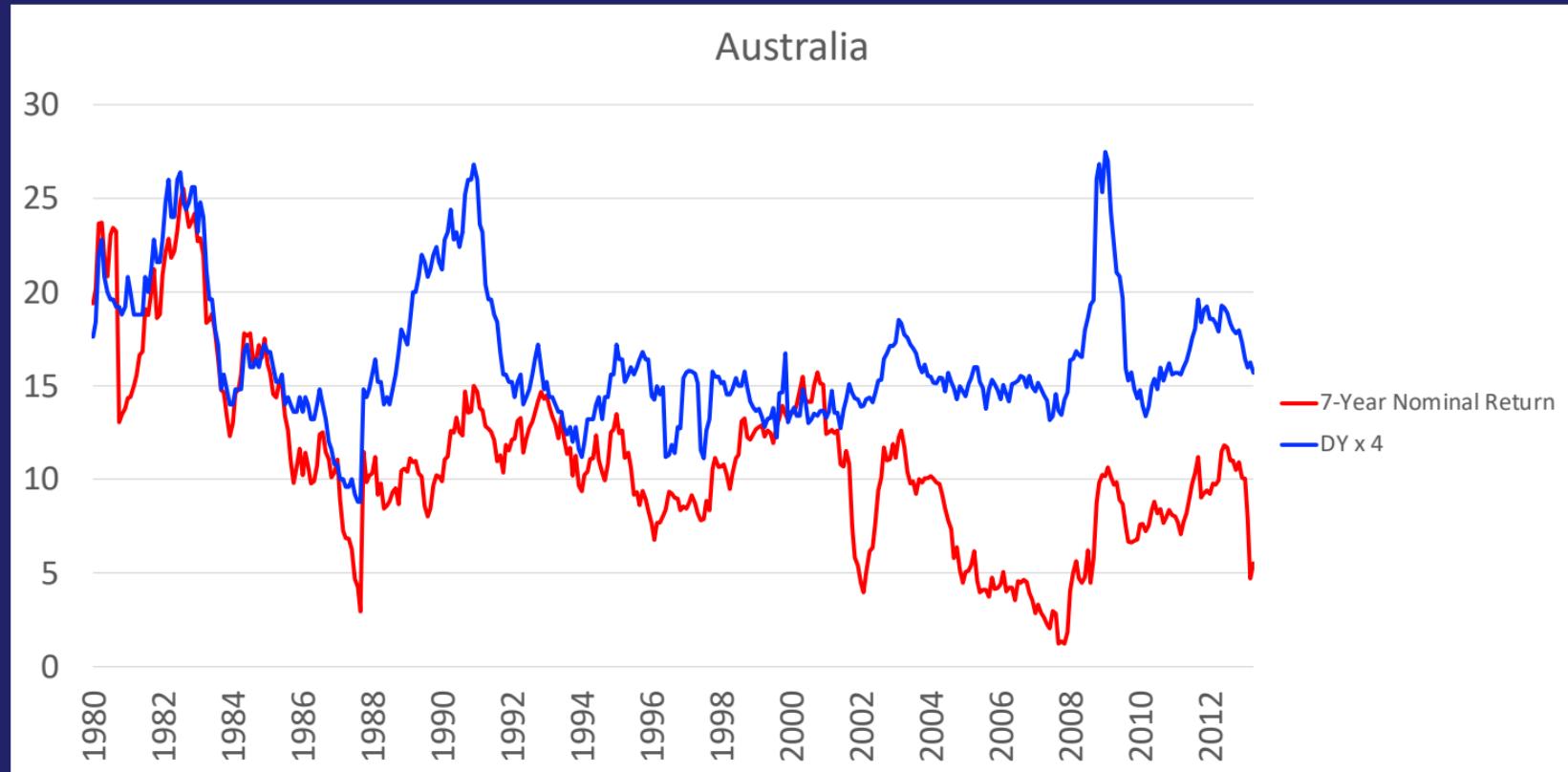


old view:
P↓, means dividend ↓.

new fact
P↓, while dividend is
stable.

Figure 2: Classic and new view of price-divided ratios.

Australia: Perhaps E[CF] and E[r] changes?



$E[r]$ and the business cycle

- Fama and French (1989) suggest a natural interpretation:
 - When the economy is bad, it takes a higher risk premium to encourage investors to invest in risky assets.
 - Implying high $E[r]$
 - When the economy is good it does take much of a risk premium to get investors to invest in risky assets
 - Implying a low $E[r]$

tricky !

★. *good economy $\rightarrow E[r]$ low.*

NOTE

- Important
 - This is NOT that changes in D/P cause changes in $E[r]$.
 - It is the other way around. Changes in $E[r]$ drive changes in D/P.
 - We simply can't observe $E[r]$ directly
- Caution:
 - The fact that changes in $E[r]$ explain almost all of changes in D/P does not mean that changes in $E[r]$ is the sole driver of changes in returns or prices.
 - BOTH changes in discount rates and changes in dividend growth affect prices and returns.
 - Cochrane estimates that as much as half of price variation is due to changes in dividend growth (at firm level) most of price variation
when we aggregate to firm level, \checkmark is due to Δ in $E[r]$

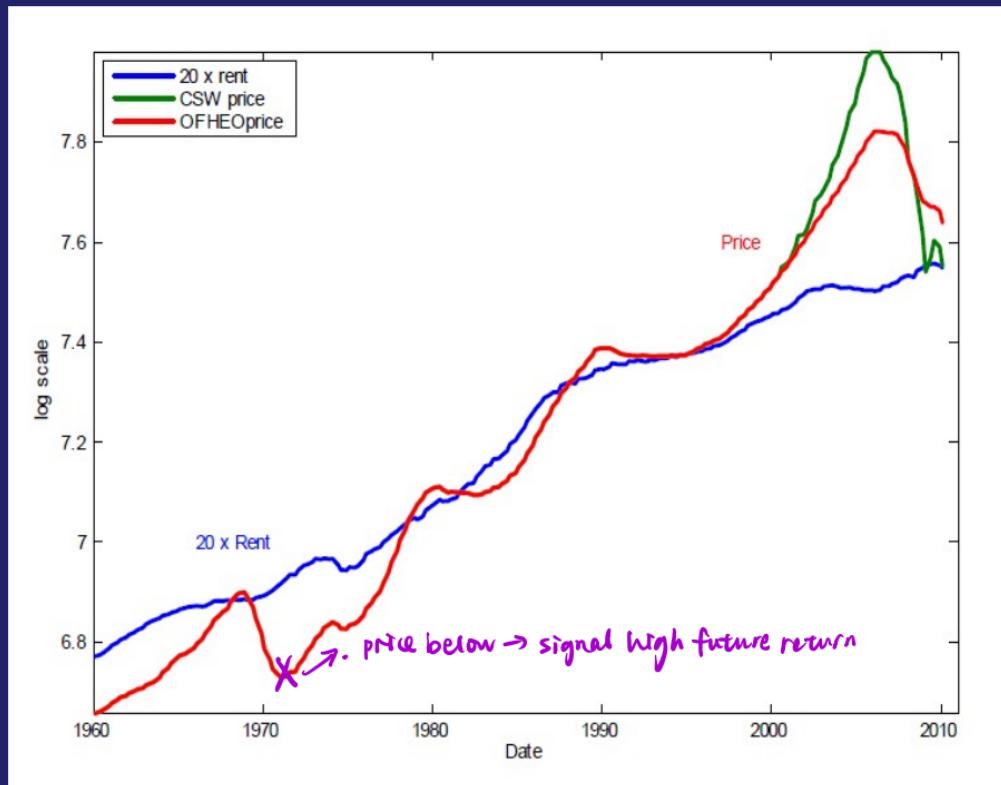
The Effect is Pervasive!

- High yield/valuation → High Expected Returns
 - Not low future cash flows or lower prices
 - Stocks: High D/P → High Returns
 - Not low corporate profits
 - US Treasuries: Rising Yield Curve → High 1-year Returns for long-term bonds,
 - not rising interest rates
 - Bonds/Credit Spreads: High Yields → High Returns,
 - not default (i.e. lower profits)
- difference in interest paid by long-term debt vs
short term debt
- difference between interest rate paid by low quality, high default debt
versus high quality, low default corporate debt

The Effect is Pervasive!

- High yield/valuation → High Expected Returns
 - Not low future cash flows or lower prices
- Foreign Exchange: High foreign rates to domestic rates signal higher return on foreign bonds (the carry trade)
 - not devaluation of currency
- Sovereign Debt: High levels of sovereign debt or foreign debt signal low $E[r]$
 - ① on debt
 - not government or trade surpluses.
- Houses: High Rent/Price → High Returns,
 - not lower future rents

Rent to Price



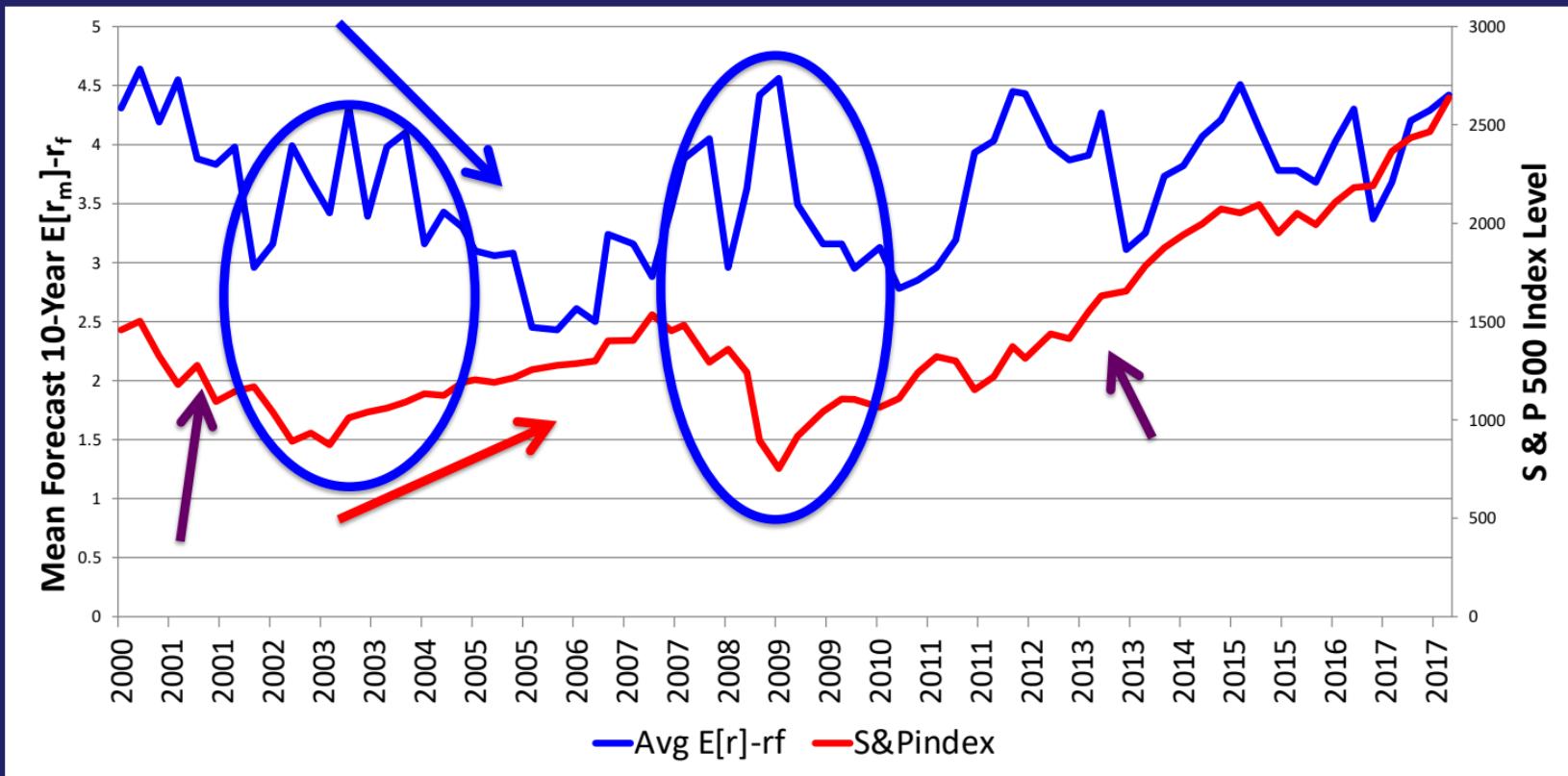
Reconciling Behavioral and Rational Arguments

- Shiller argues that high PE ratios indicate prices are irrationally high.
 - So future returns are low
- Cochrane says that high PD indicates the $E[r]$ is low
 - So future returns are low
- These are two sides of the same coin:
The real question is why prices are high
 - Rational: $E[r]$ is low because investors perceive low risk → drive $P \uparrow$
 - Behavioral: P/E or P/D is high because investors **incorrectly** think: prices will be higher, dividends will be higher or there is little risk.

Are we really able to forecast long-term returns?

- Even in the U.S. we only have a handful of observations.
 - 1901 high PE followed by low returns
 - 1921 low PE followed by high returns
 - 1929 high PE followed by low returns
 - 1966 high PE followed by low returns
 - 1982 low PE followed by high returns
 - 2000 high PE followed by low returns
 - 2009 high PE followed by low returns
- It could all just be coincidence!
- What would be really nice is if we could actually measure investor expectations and see how they relate to current priced

10-Year Forecast of the $E[r_m] - r_f$



What does the future hold for the Australian market?

Australia

