



Are Stocks Too High? A Historical Perspective

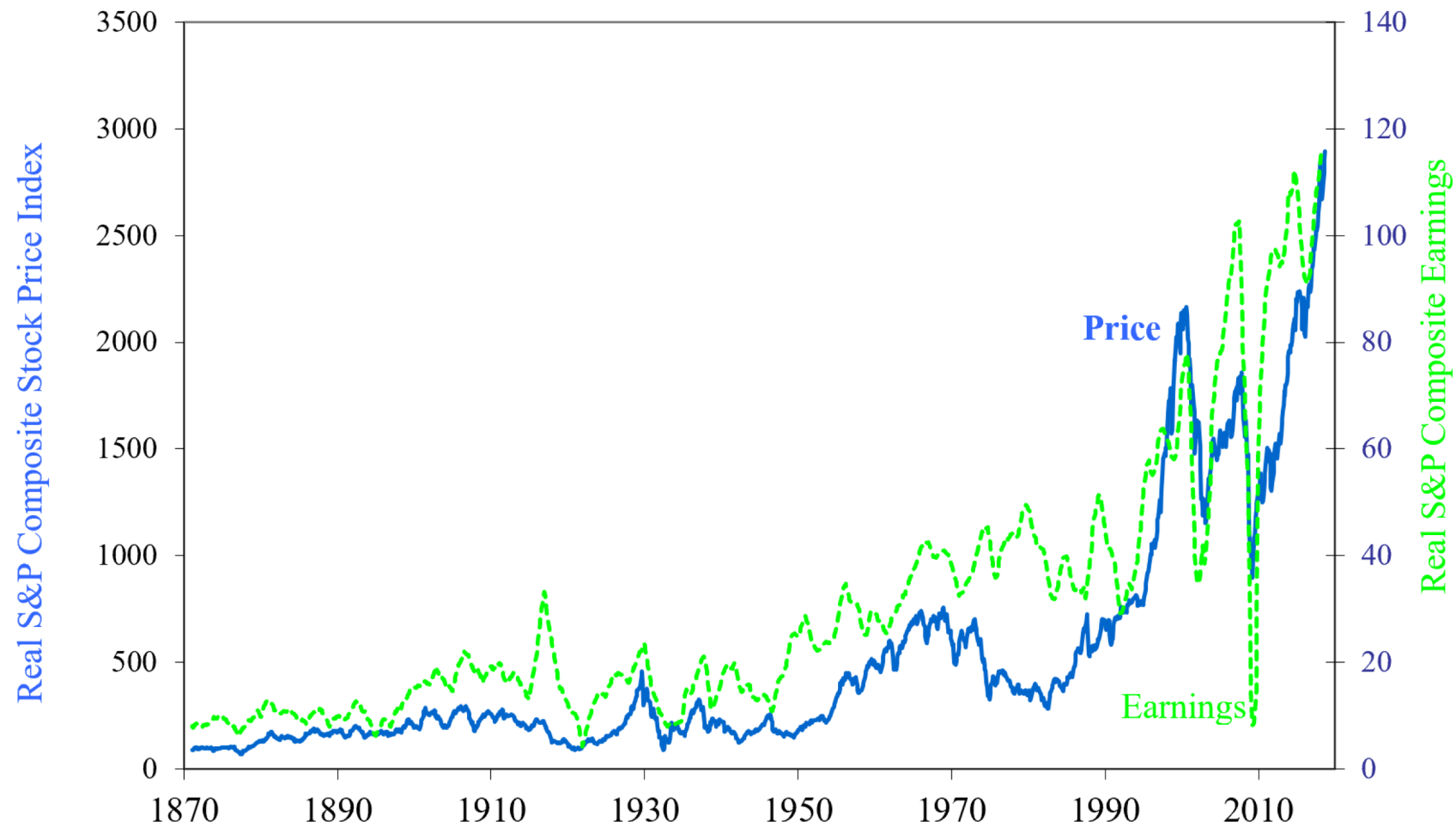
Robert J. Shiller (Presenting joint work with Farouk Jivraj)
2018 Jacobs Levy Center Conference



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2. Multiple-horizon predictability regressions
3. Comparison of different CAPE constructions (“Alternative CAPEs”)
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1. Introduction: S&P Prices & Earnings Since 1871



1. Introduction: The CAPE® Ratio

The Cyclically Aadjusted PE (**CAPE**®) ratio, “Campbell-Shiller PE(10)”, or “Shiller 10”

$$\text{CAPE}^{\circledR} = \frac{\text{Inflation Adjusted Index Price}}{10Y \text{ Average of Inflation Adjusted Index Earnings}}$$

- Formally defined by John Y. Campbell and I during the 1980s
- Characterises the strong relationship between an inflation adjusted earnings-price ratio and subsequent long-term returns
- Is now often used to identify long-term under and over valuations of equity markets

1. Introduction: The advocates and critics

- The CAPE ratio has had both its advocates and critics¹
- Advocates generally point to the basic idea of smoothing out earnings over business cycles as intuitive and sensible
- Critics on the other hand mainly focus on ways to claim that the observed CAPE ratios are too high...specifically:
 - That the differences between traditional and smoothed P/E can lead investors to different conclusions
 - That accounting standards have changed over the years
 - That other “valuation” measures are less affected by accounting differences and incentives

1: Advocates being:

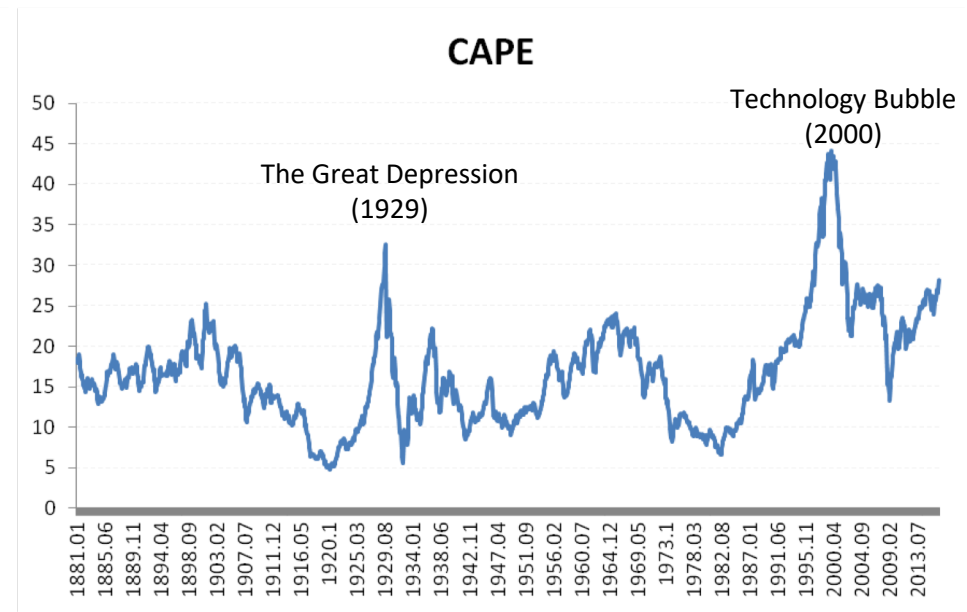
- “An Old Friend, The Stock Market’s Shiller P/E”, Asness, November 2012
- “In Defense of the Shiller P/E”, The Economist, May 2011

Critics being:

- “Shiller’s powerful market indicator...”, Wall Street Journal, June 2016
- “Shiller vs. Siegel”, NYTimes, April 2011

1. Introduction: From PE to CAPE

- Critics often cite that P/E is just as good as CAPE...
- However even on simple inspection of the two time series, landmark events are not particularly apparent based on P/E versus the CAPE ratio



Source: Shiller website (<http://www.econ.yale.edu/~shiller/data.htm>) and Barclays, from 1881 to December 2017.

1. Introduction: Forward looking prospects?

- CAPE is currently at 33.2 (Beginning of September 2018)
- And history is very clear: The average of ten-year forward returns decreases as the starting value of CAPE increases, with both worse and best cases getting weaker...

S&P 500® 10-year forward annualised returns from different starting CAPE ratios, Q1 1926 – Q2 2017

Starting CAPE ratio			Real 10-year S&P 500® Ann. Returns			
Average	Low	High	Average	Worst	Best	Std Dev
8.6	5.6	9.6	9.8%	4.2%	17.2%	2.2%
10.3	9.6	11.0	10.6%	3.8%	16.9%	3.4%
11.5	11.0	12.1	10.0%	2.6%	14.7%	3.4%
13.0	12.1	13.9	8.7%	0.7%	14.1%	3.7%
15.0	13.9	16.1	7.8%	-1.6%	15.0%	4.9%
17.0	16.1	17.8	5.4%	-3.8%	14.6%	5.4%
18.7	17.8	19.9	5.0%	-4.0%	13.5%	4.2%
21.0	19.9	22.0	2.7%	-3.3%	8.6%	3.9%
24.1	22.0	26.4	2.5%	-4.0%	7.3%	3.6%
33.2	26.4	44.2	0.9%	-6.1%	5.8%	3.4%

We are currently
here →

Note: This table is a compilation of the ten-year forward real returns of the S&P 500® over every possible rolling decade since 1926 for different starting CAPE ratios and is then separated by deciles.

Source: Shiller website (<http://www.econ.yale.edu/~shiller/data.htm>) and Barclays from Q1 1926 to Q2 2017.

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2. Multiple-horizon predictability regressions: The data

- We note the full list of predictor variables, the data source and any complimentary academic references below
- All data is quarterly, with each variable on the numerator constructed as a trailing 1-year per share number, apart from CAPE.

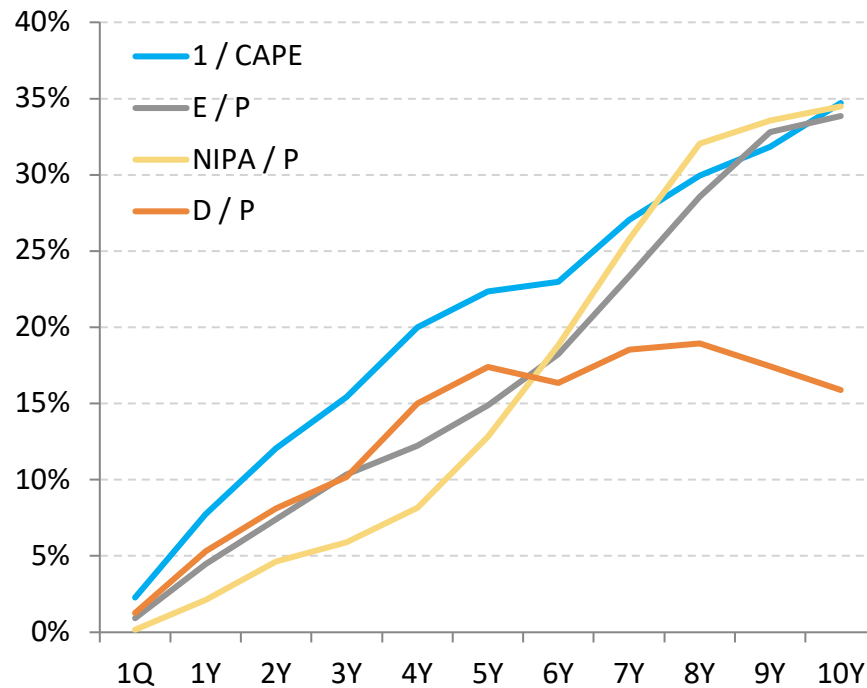
Predictor variable	Data Source	Academic References
1/CAPE	Shiller website	Campbell & Shiller (1988)
Reported Earnings / Price (E/P)	Shiller website	Campbell & Shiller (1988)
National Income and Production Account profits / Price (NIPA / P)	Bureau of Economic Analysis (BEA)	Siegel (2016)
Operating Earnings / Price (O/P)	S&P	Siegel (2016)
Dividends / Price (D/P)	Shiller website	Fama & French (1988), Campbell & Shiller (1988), Goetzmann & Jorion (1993, 1995), Hodrick (1992), Goyal & Welch (2003, 2004), Campbell & Yogo (2006)
Book Value / Price (B/P)	S&P	Kothari & Shanken (1997)
Cash Flow / Price (CF/ P)	S&P	None
Sales / Price (S/P)	S&P	None

2. Multiple-horizon predictability regressions: Concerns

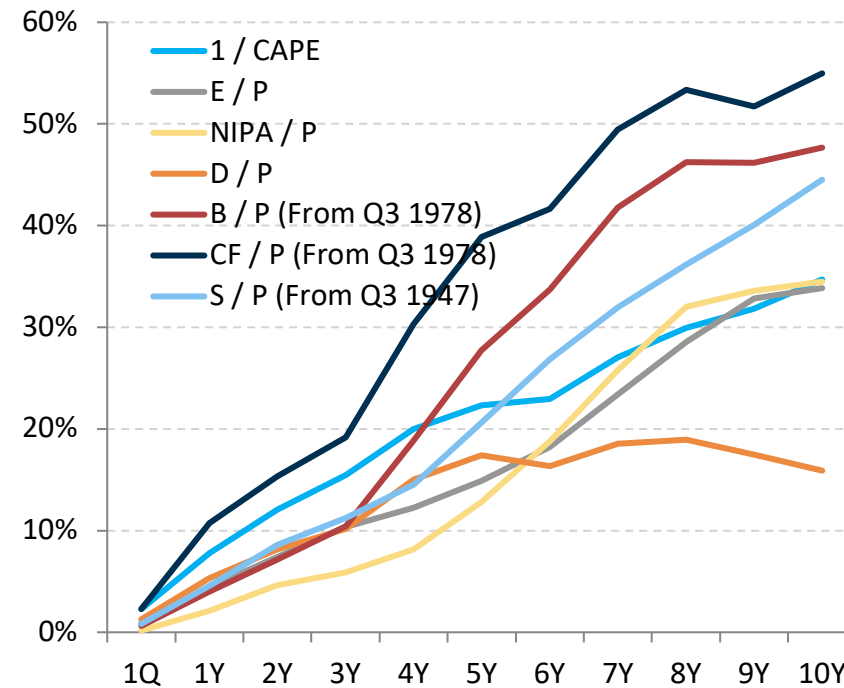
- The predictability literature is rich, especially on the robustness of running long-horizon predictability regressions, whereby we acknowledge the following concerns:
 - Endogenous regressor problem – whereby price appears on both sides of prediction equations (violating the standard OLS assumptions)
 - Use of overlapping data: Boudoukh, Israel & Richardson (2018)
- **As such, there are two main statistical concerns:**
 1. Spuriousness of (long-horizon) R^2 s
 2. Biased t-statistics leading to an over rejection of the null hypothesis:
 - Overlapping observations and time-varying volatility cause OLS to over reject the null of no predictability too often
 - Need **robust t-stats**: Hansen-Hodrick (1980) & Hjalmarsen (2011)

2. Multiple-horizon predictability regressions – The R^2

Adjusted R^2 versus forecasting horizon for variables with longest available history, Q3 1930 – Q2 2017



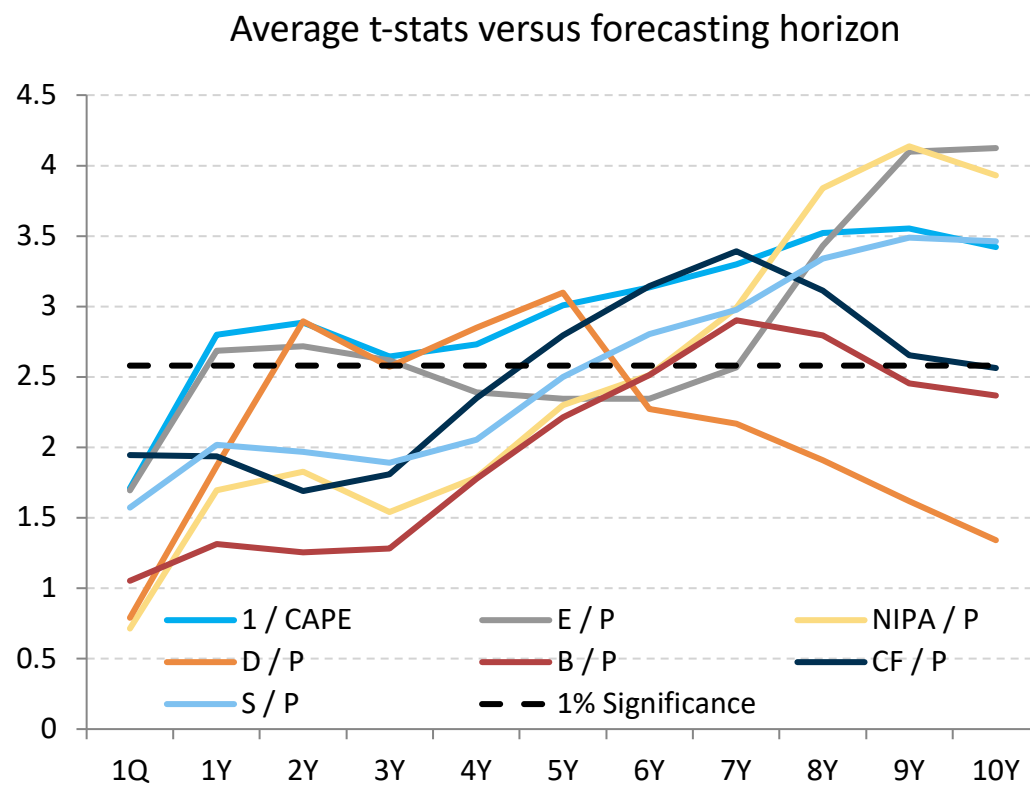
Adjusted R^2 versus forecasting horizon for all variables, Q3 1930 – Q2 2017 (unless from date is noted on legend)



Source: Barclays, Bloomberg, BEA and Standard & Poor's.

2. Multiple-horizon predictability regressions – The t-stats

- CAPE, or CAPE yield specifically, is by far the most **consistent predictor** of subsequent equity returns at both shorter and longer term horizons...



Source: Barclays, Bloomberg, BEA and Standard & Poor's.

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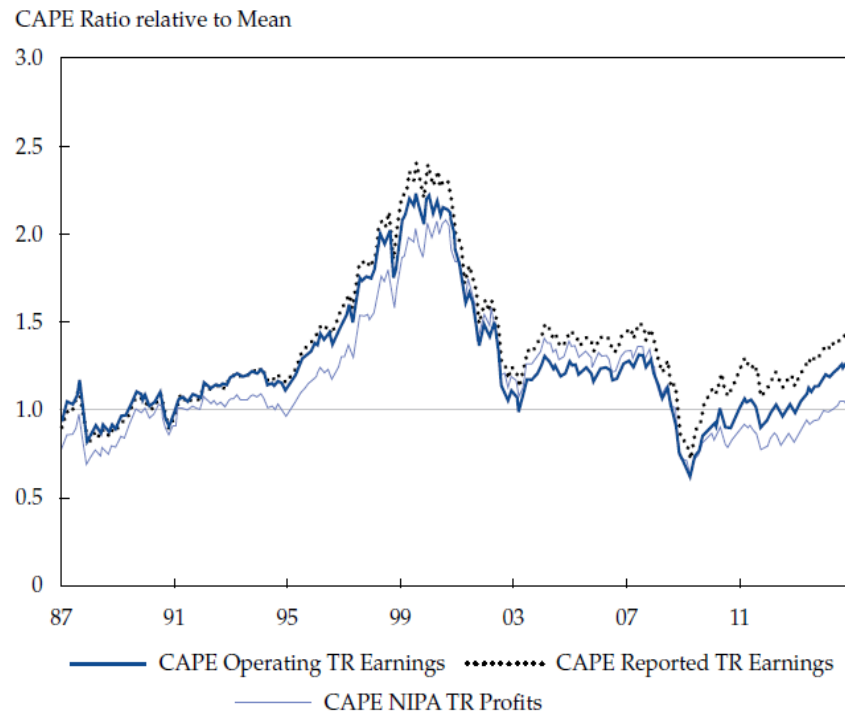
3. Alternative CAPEs: As advocated for by Siegel (2016)

- Siegel (2016) has been a strong critic of CAPE because of the use of Reported Earnings in its construction:
 - Changes in accounting rules since the 1990s may have led to a downward bias in Reported Earnings resulting in an upward bias of CAPE...
 - Thus the current overvaluation of the market as indicated by CAPE may not be well justified?
- In the spirit of this debate by Prof. Siegel, we evaluate the following alternative variables to re-construct CAPE and compare market valuations:
 - National Income & Product Account (NIPA) profits – Advocated by Siegel (2016)
 - Operating Earnings – Also recommended by Siegel (2016)
 - Cash Flows
 - Sales
 - Book Value

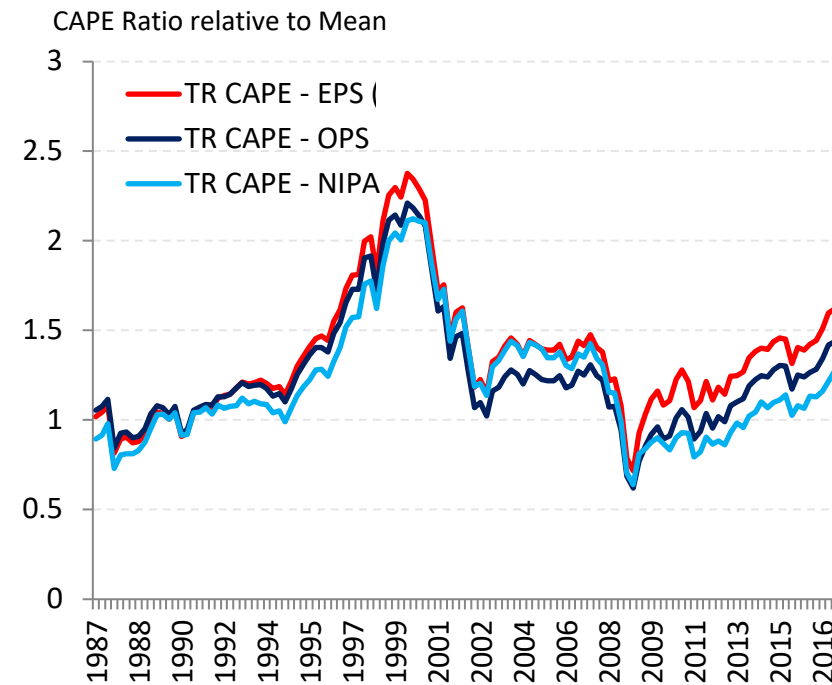
3. Alternative CAPEs: Replicating Prof. Siegel (2016)

- Siegel (2016) strongly advocates for the use of NIPA profits as opposed to Reported Earnings (EPS)
- He finds that by doing so, the market is not as overvalued as CAPE suggests...

Figure 5 from Siegel (2016): Total Return CAPE Ratio relative to Long-Term Mean, 1881 – 2014



UPDATED: Total Return CAPE Ratio relative to Long-Term Mean, 1881 – 2017



Source: Siegel (2016)

3. Alternative CAPEs: Replicating Prof. Siegel (2016)

- We also confirm Table 3 in Siegel (2016) and update the results
 - TR CAPE – EPS is the highest of the three methods above its mean, with the lowest projected 10Y equity returns

Table 3 from Siegel (2016): CAPE Ratio Summary Statistics, 1881 - 2014

Variable	Reported Earnings	Operating Earnings	NIPA Profits
	Total Return CAPE	Total Return CAPE	Total Return CAPE
R^2 of forecasting equation	33.71%	34.57%	35.83%
Average CAPE	19.84	19.26	16.14
January 2015 CAPE	27.78	24.46	17.28
Above mean	40.03	26.95	7.07
January 2015 projected stock return	2.81	3.66	5.25

Source: Siegel (2016)

Updated CAPE Ratio Summary Statistics, 1881 - 2017

TR CAPE version	EPS	OPS	NIPA
R^2 of forecasting equation	32.83%	33.90%	36.65%
Above mean	61.93%	43.79%	27.18%
10Y real annualised total return forecast	1.73%	2.60%	3.97%

Source: Barclays, Bloomberg, Standard and Poor's

3. Alternative CAPEs: However...the devil in “CAPEs” details...

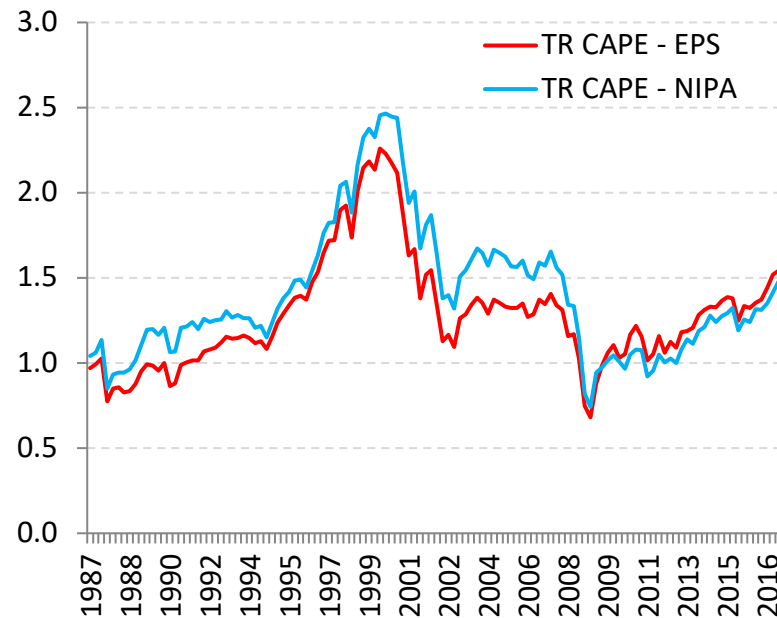
- The methodology adopted in Siegel (2016) is to splice the earlier history of Reported Earnings to that of Operating Earnings or NIPA per share profits when they become respectively available – this is fully detailed in Footnote 16 of his paper:

16. The actual S&P divisor (published on the Standard & Poor’s website) is used for 1964–2013 to deflate real NIPA profits. The average change in the divisor is 1.36% a year, and this change is extended back to the beginning of the NIPA series in 1928. The cumulative change in the divisor reduces real NIPA profits in 2013 by a factor of 3.13. This NIPA per share profit series is then spliced to the S&P 500 reported earnings series by equating the 10-year averages for 1929–1939 for both series.

3. Alternative CAPEs: However...the devil in “CAPEs” details...

- Instead of using econometric techniques to splice two difference histories together, we simply re-evaluation Siegel (2016) conclusions using **only actual reported observations** for the respective variables:

Total Return CAPE Ratio relative to Long-Term Mean from 1940 - 2017



Source: Bloomberg, BEA and Standard & Poor's.

CAPE Ratio Summary Statistics, 1940 - 2017

TR CAPE version	EPS	NIPA
R ² of forecasting equation	41.02%	40.09%
Above mean	53.95%	47.66%
10Y real annualised total return forecast	1.92%	3.06%

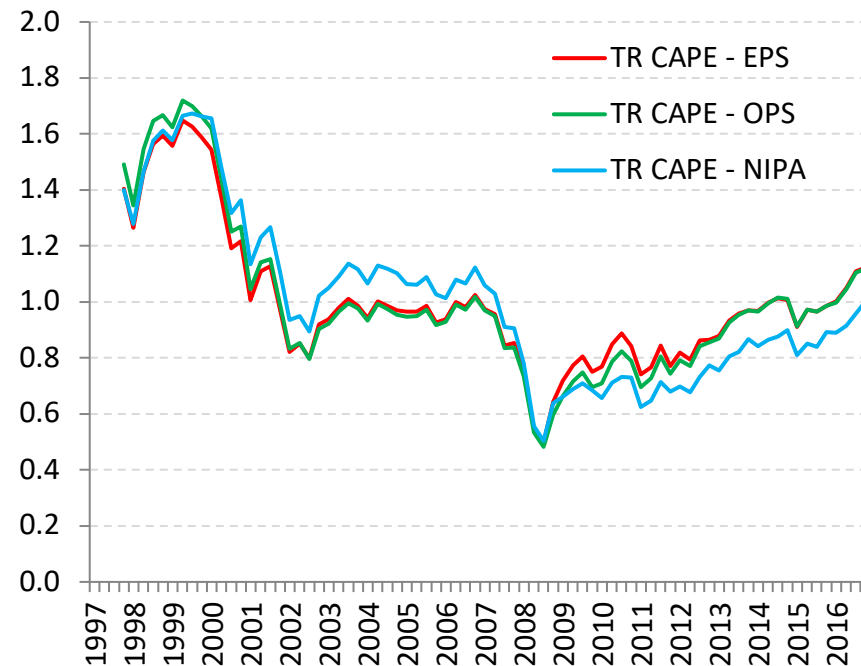
Source: Barclays, Bloomberg, Standard and Poor's

25% lower than the previously reported estimate (slide 18)

3. Alternative CAPEs: However...the devil in “CAPEs” details...

- Siegel (2016) also proposed Operating Earnings as another alternative to Reported Earnings
- But when we again only use actual reported observations for Operating Earnings:

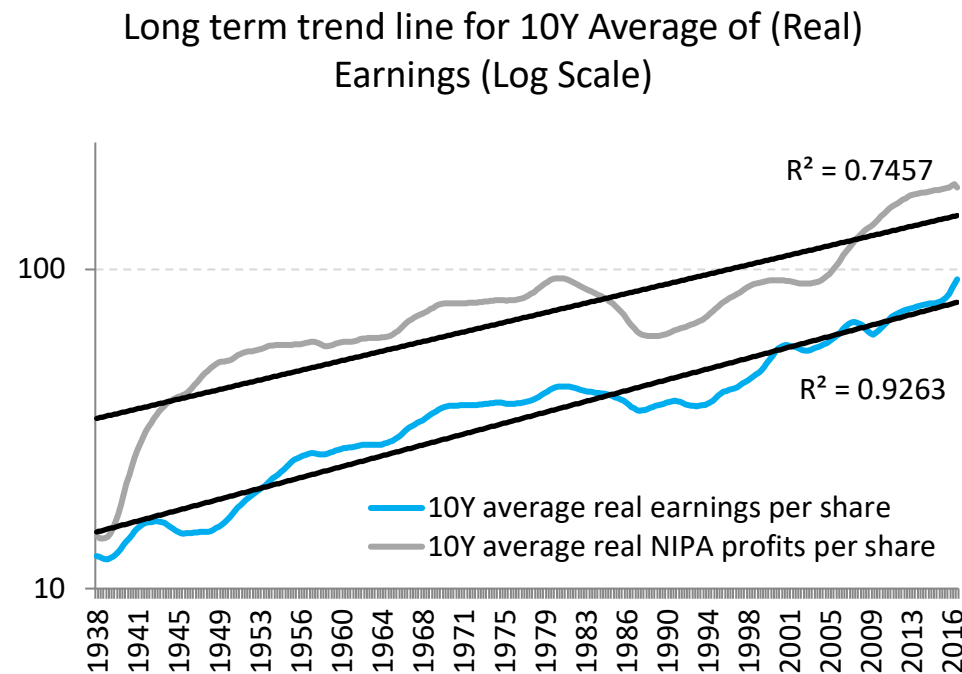
Total Return CAPE Ratio relative to Long-Term Mean from 1998 - 2017



Source: Barclays, Bloomberg, BEA and Standard & Poor's.

3. Alternative CAPEs: The Long-Term Trend in Earnings

- Are reported earnings below trend by historical standards as claimed by Prof. Siegel?
 - From the data, it is actually slightly higher than the long-term trend...
 - Whereas **real NIPA per share seems to be above trend by historical standards** resulting in downwards pressure on CAPE-NIPA



Source: Barclays, Bloomberg, BEA and Standard & Poor's.

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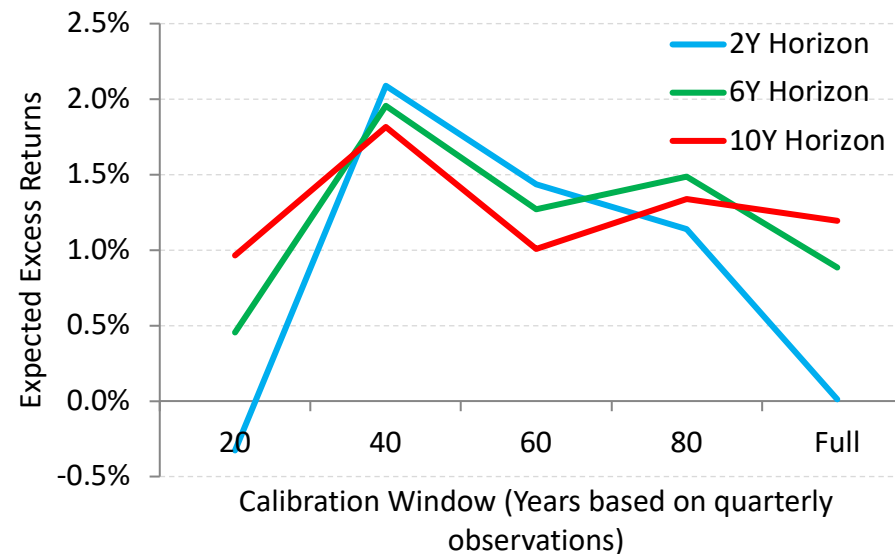
4. Uses of CAPE

- Whilst the exercise of demonstrating that CAPE with respect to its peers and alternative construction approaches appears not only statistically robust but also more intuitive, such an exercise is academic...
- Thus, how investors can use the information contained by CAPE is more relevant for practitioners
- We therefore demonstrate the efficacy of the use of CAPE in two contexts:
 - a) Asset Allocation
 - b) Relative Valuation

4. Uses of CAPE: Asset Allocation

- As of the beginning of September 2018, CAPE for the US equity market is 33: how to best utilize this information?
- Perform robust regressions to estimate slope and intercept and then evaluate the regression equation at the current value of CAPE:

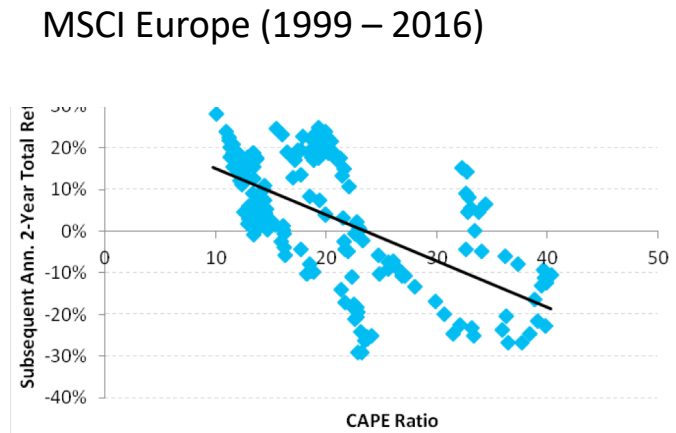
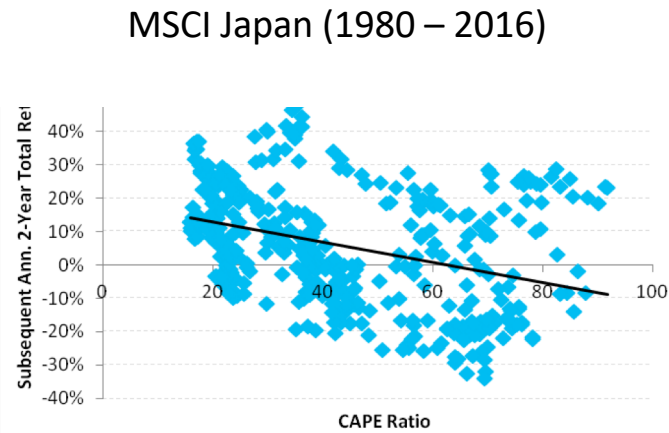
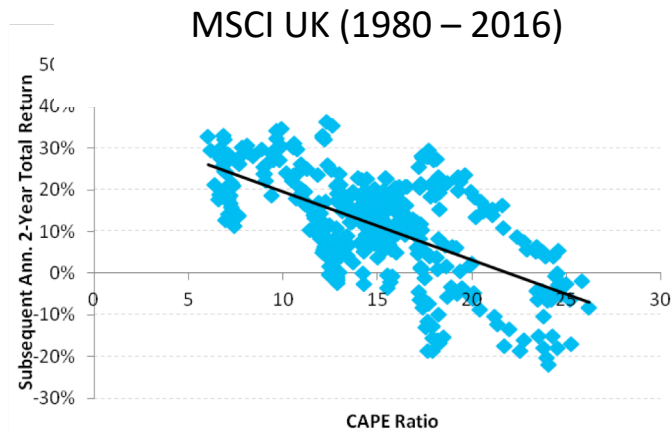
Expected real excess returns of the S&P500 as of Sept 2018



Source: Shiller website (<http://www.econ.yale.edu/~shiller/data.htm>) and Barclays from Q1 1926 to Q3 2018.

4. Uses of CAPE: Relative Valuation – Country Rotation

- The negative relationship of CAPE with subsequent returns is also evident internationally

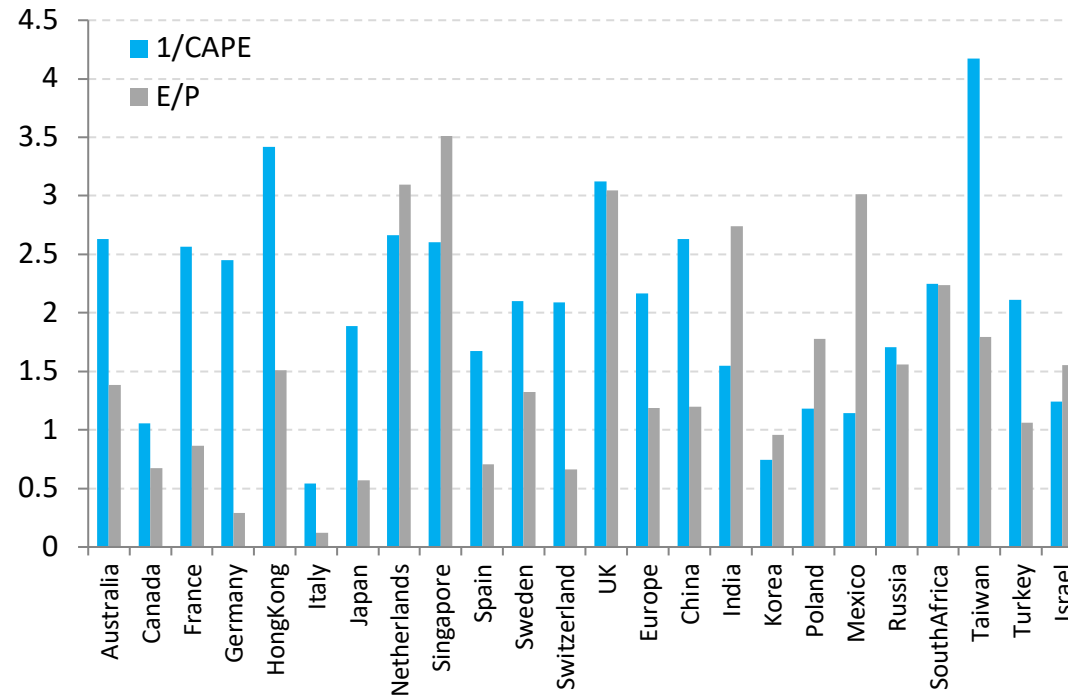


Source: Barclays and Bloomberg from January 1980 to December 2016.

4. Uses of CAPE: Relative Valuation – Country Rotation

- We also find $1/\text{CAPE}$ is statistically more pervasive than E/P for predictability...
- When conditioning on if the regression is statistically significant, $1/\text{CAPE}$ performs better than E/P in 86% of the cases, even at a one year horizon...

HH-1980 t-stats for $1/\text{CAPE}$ and E/P across countries, various start dates – Q2 2017



Source: Barclays, Bloomberg and MSCI

Source: Barclays and Bloomberg from January 1980 to December 2016.

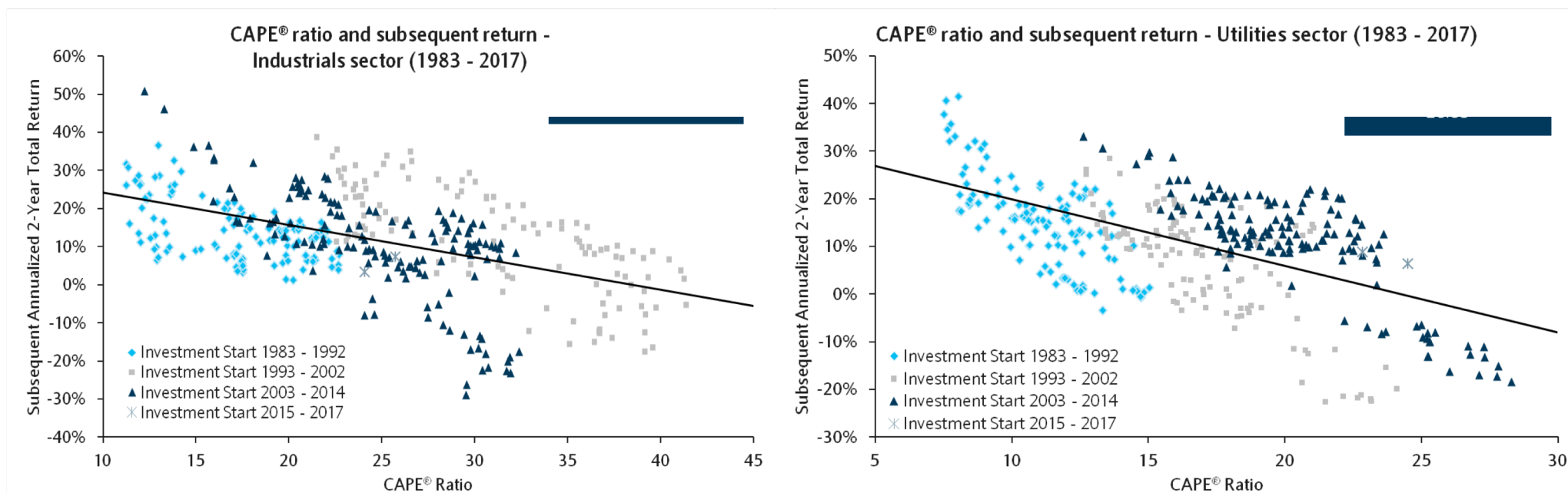
4. Uses of CAPE: Relative Valuation – Country Rotation

Such evidence naturally leads to the question: **Can CAPE be used for country rotation?**

- The answer is yes and no – depending on how you do it!
- In the form of a systematic rotation model – it's difficult as there are important considerations:
 - FX hedging considerations
 - Accounting rules can be different within different countries
 - Differences in sector composition across different countries leads to difficulties in comparing CAPE across countries
 - Sector & Cyclically Adjusted PR Ratio (SCAPE) tries to correct for this [Galvin (2014)] with limited success

5. Uses of CAPE: Relative Valuation – Sector Rotation

- Applying CAPE to equity sectors shows the same negative relationship as with the S&P 500 Index – this is shown below for the Industrials and Utilities sectors
- This is also documented for the other sectors in Ural et al. (2012) and in the long-run (1872-2012) by Bunn & Shiller (2012)



Source: Barclays and Bloomberg from January 1974 to March 2017.

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5. Conclusions

- Our analysis shows that CAPE continues to be a powerful predictor of long-term real (and nominal) stock returns
- Jeremy Siegel's (2016) arguments of changes in accounting rules, the rise of "mark-to-market" accounting and asset write-down rules having biased earnings downwards and thus CAPE upwards, is not reflected in the data when comparing the current 10 year average of real earnings with the long-term earnings trend...
- The same cannot be said for NIPA earnings which appears higher versus the long term trend!
- This all being said, given the connotation with market valuation, CAPE is often understandably discussed in the context of market timing – we explore its use in different dimensions: relative valuation and asset allocation

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Definitions

- CAPE: Cyclically-Adjusted-Price Earnings Ratio
- P/E: Price to Earnings Ratio
- P/D: Price to Dividends Ratio
- P/B: Price to Book value
- P/S: Price to Sales Ratio
- NIPA-CAPE: Reconstruction CAPE based on NIPA per Share

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