Are Stocks Too High? A Historical Perspective

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1. Introduction: S&P Prices & Earnings Since 1871
1. Introduction: The CAPE® Ratio

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

\[
\text{CAPE}^\circ = \frac{\text{Inflation Adjusted Index Price}}{10\text{Y Average of Inflation Adjusted Index Earnings}}
\]

- 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 critics\(^1\)

- 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:

Critics being:
- “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

<table>
<thead>
<tr>
<th>Starting CAPE ratio</th>
<th>Real 10-year S&amp;P 500® Ann. Returns</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Average</td>
</tr>
<tr>
<td>8.6</td>
<td>9.8%</td>
</tr>
<tr>
<td>10.3</td>
<td>10.6%</td>
</tr>
<tr>
<td>11.5</td>
<td>10.0%</td>
</tr>
<tr>
<td>13.0</td>
<td>8.7%</td>
</tr>
<tr>
<td>15.0</td>
<td>7.8%</td>
</tr>
<tr>
<td>17.0</td>
<td>5.4%</td>
</tr>
<tr>
<td>18.7</td>
<td>5.0%</td>
</tr>
<tr>
<td>21.0</td>
<td>2.7%</td>
</tr>
<tr>
<td>24.1</td>
<td>2.5%</td>
</tr>
<tr>
<td>33.2</td>
<td>0.9%</td>
</tr>
</tbody>
</table>

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.
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.

<table>
<thead>
<tr>
<th>Predictor variable</th>
<th>Data Source</th>
<th>Academic References</th>
</tr>
</thead>
<tbody>
<tr>
<td>Reported Earnings / Price (E/P)</td>
<td>Shiller website</td>
<td>Campbell &amp; Shiller (1988)</td>
</tr>
<tr>
<td>National Income and Production</td>
<td>Bureau of Economic</td>
<td>Siegel (2016)</td>
</tr>
<tr>
<td>Account profits / Price (NIPA / P)</td>
<td>Analysis (BEA)</td>
<td></td>
</tr>
<tr>
<td>Operating Earnings / Price (O/P)</td>
<td>S&amp;P</td>
<td>Siegel (2016)</td>
</tr>
<tr>
<td>Book Value / Price (B/P)</td>
<td>S&amp;P</td>
<td>Kothari &amp; Shanken (1997)</td>
</tr>
<tr>
<td>Cash Flow / Price (CF / P)</td>
<td>S&amp;P</td>
<td>None</td>
</tr>
<tr>
<td>Sales / Price (S/P)</td>
<td>S&amp;P</td>
<td>None</td>
</tr>
</tbody>
</table>
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
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.
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**

Source: Siegel (2016)

**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

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

<table>
<thead>
<tr>
<th>Variable</th>
<th>Reported Earnings</th>
<th>Operating Earnings</th>
<th>NIPA Profits</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Total Return CAPE</td>
<td>Total Return CAPE</td>
<td>Total Return CAPE</td>
</tr>
<tr>
<td>$R^2$ of forecasting equation</td>
<td>33.71%</td>
<td>34.57%</td>
<td>35.83%</td>
</tr>
<tr>
<td>Average CAPE</td>
<td>19.84</td>
<td>19.26</td>
<td>16.14</td>
</tr>
<tr>
<td>January 2015 CAPE</td>
<td>27.78</td>
<td>24.46</td>
<td>17.28</td>
</tr>
<tr>
<td>Above mean</td>
<td>40.03</td>
<td>26.95</td>
<td>7.07</td>
</tr>
<tr>
<td>January 2015 projected stock return</td>
<td>2.81</td>
<td>3.66</td>
<td>5.25</td>
</tr>
</tbody>
</table>

Source: Siegel (2016)

### Updated CAPE Ratio Summary Statistics, 1881 - 2017

<table>
<thead>
<tr>
<th>Variable</th>
<th>TR CAPE version</th>
<th>EPS</th>
<th>OPS</th>
<th>NIPA</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>$R^2$ of forecasting equation</td>
<td>32.83%</td>
<td>33.90%</td>
<td>36.65%</td>
</tr>
<tr>
<td></td>
<td>Above mean</td>
<td>61.93%</td>
<td>43.79%</td>
<td>27.18%</td>
</tr>
<tr>
<td>10Y real annualised total return forecast</td>
<td>1.73%</td>
<td>2.60%</td>
<td>3.97%</td>
<td></td>
</tr>
</tbody>
</table>

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:

![Graph showing Total Return CAPE Ratio relative to Long-Term Mean from 1940 - 2017]

### CAPE Ratio Summary Statistics, 1940 - 2017

<table>
<thead>
<tr>
<th>TR CAPE version</th>
<th>EPS</th>
<th>NIPA</th>
</tr>
</thead>
<tbody>
<tr>
<td>R² of forecasting equation</td>
<td>41.02%</td>
<td>40.09%</td>
</tr>
<tr>
<td>Above mean</td>
<td>53.95%</td>
<td>47.66%</td>
</tr>
<tr>
<td>10Y real annualised total return forecast</td>
<td>1.92%</td>
<td>3.06%</td>
</tr>
</tbody>
</table>

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](image)

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

![Chart showing long-term trend line for 10Y Average of (Real) Earnings (Log Scale)]

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:

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
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).

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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
References


