Smart Beta Modelling: The Case for Cyclically Adjusted Price/Earnings Ratios
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• Study Purpose
  • Determine if portfolio weights, based on Cyclically Adjusted Price/Earnings Ratios (CAPE), can generate excess returns (Alpha) over the market

• Research Design
  • Weighting Factor: CAPE Ratios
  • Weighting Strategy: Higher weights given to stocks with higher CAPE ratios
  • Test Universe: Top ten stocks by markets value for the following sectors: XLY, XLS, XLI, XLH, XLK
  • Performance Period: 2010-2016

• Model Construction:
  1. $\text{CMEPS}_i = \frac{\text{EPS}_i(t-4)}{\text{CPI}} + \frac{\text{EPS}_i(t-3)}{\text{CPI}} + \frac{\text{EPS}_i(t-2)}{\text{CPI}} + \frac{\text{EPS}_i(t-1)}{\text{CPI}} + \frac{\text{EPS}_i(t)}{\text{CPI}} / N = 5$
  2. $\text{CAPE}_i(t) = \frac{\text{P}_i(t)}{\text{CMEPS}_i(t)}$
  3. $\text{W}_i(t) = \text{CAPE}_i(t) / \sum \text{CAPE}_i(t)$
  4. $\text{D}_i(t) = \text{W}_i(t) \times 1,000,000$
  5. $\text{SHR}_i(t) = \text{D}_i(t) / \text{P}_i(t)$
  6. $\text{MV}_i(t+1) = \text{SHR}_i(t) \times \text{P}_i(t+1)$
  7. $\text{PV}(t+1) = \sum \text{MV}_i(t+1)$
  8. Second Iteration

• Terms:
  1. MEPS= 5Yr ma
  2. EPS= Earnings Per Share
  3. CPI=Consumer Price Index
  4. WI=Portfolio Weight
  5. Di=Dollars Invested
  6. MV=Market Value
  7. PV=Portfolio Value
  8. i=ith stock (1-20)
  9. t=Time in Years
  10. CAPE= Cyclically Adjusted P/E Ratio

• Conclusion:
  • Cumulative Returns: CAPE Model Outperforms SPY For All Sectors
  • Annual Returns: CAPE Model Outperforms SPY in majority of years for sectors XLY, XLI, XLV, and XLK

<table>
<thead>
<tr>
<th>Year</th>
<th>XLY</th>
<th>XLP</th>
<th>XLI</th>
<th>XLV</th>
<th>XLK</th>
<th>SPY</th>
</tr>
</thead>
<tbody>
<tr>
<td>2012</td>
<td>28.79%</td>
<td>7.16%</td>
<td>8.35%</td>
<td>19.09%</td>
<td>6.80%</td>
<td>13.40%</td>
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<tr>
<td>2013</td>
<td>66.69%</td>
<td>28.74%</td>
<td>38.90%</td>
<td>57.52%</td>
<td>44.93%</td>
<td>29.69%</td>
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<td>2014</td>
<td>9.67%</td>
<td>22.83%</td>
<td>15.26%</td>
<td>24.80%</td>
<td>27.68%</td>
<td>11.29%</td>
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<tr>
<td>2015</td>
<td>45.24%</td>
<td>18.48%</td>
<td>-2.08%</td>
<td>9.59%</td>
<td>21.64%</td>
<td>-0.81%</td>
</tr>
<tr>
<td>2016</td>
<td>10.45%</td>
<td>3.41%</td>
<td>18.13%</td>
<td>-8.09%</td>
<td>11.03%</td>
<td>9.64%</td>
</tr>
</tbody>
</table>

Green = Model Outperformance
Green = Sector Outperformance