Are Valuations Irrelevant?

Rob Arnott
Partner and Chairman
Most Investors Are Trend Chasers!


<table>
<thead>
<tr>
<th>Fund Type</th>
<th>Dollar-Weighted Return</th>
<th>Buy &amp; Hold Return</th>
<th>S&amp;P 500 Index</th>
</tr>
</thead>
<tbody>
<tr>
<td>All U.S. Equity Funds</td>
<td>6.87%</td>
<td>8.81%</td>
<td>8.97%</td>
</tr>
<tr>
<td>Growth Funds</td>
<td>5.22%</td>
<td>8.38%</td>
<td></td>
</tr>
<tr>
<td>Value Funds</td>
<td>8.05%</td>
<td>9.36%</td>
<td></td>
</tr>
<tr>
<td>Small-Cap Funds</td>
<td>8.23%</td>
<td>9.78%</td>
<td></td>
</tr>
<tr>
<td>Large-Cap Funds</td>
<td>6.76%</td>
<td>8.66%</td>
<td></td>
</tr>
</tbody>
</table>
Actively Managed Mutual Funds
...A Naïve Contrarian Strategy Can Work

Average Mutual Fund Subsequent Three-Year Performance, Sorted by Prior Three-Year Returns, US Long-Only Equity Funds (Jan 1990–Dec 2016)

Subsequent Three-Year Average Annualized Return

11.7% 11.0% 10.6% 10.3% 10.2% 10.1% 9.9% 10.0% 9.8% 9.7%

Decile Portfolios, Based On Prior Three-Year Returns

1 = Lowest Decile
10 = Top Decile

Average 10.3%

This result is arguably created by our industry’s favorite decision rule: Three bad years and out!

Source: Research Affiliates, LLC, based on data from Morningstar Direct.
What Style Are Investors Chasing Today? Growth!

Current Equity Factor Return Forecasts: The Highest Return Potential Is Available from the Value Factor

Source: Research Affiliates, LLC, using data from CRSP/Compustat and Datascope/Worldstream. Please see important information at the end of this presentation regarding simulated data. Return expectations as of December 31, 2018.
Equity Forecasts: Past Is Not Prologue... Again
What Were the Sources of Historical Returns?

Equity Forecasts: A Function of Dividend Yield, Earnings Growth, and Valuation Changes


US Large Cap Equity Return Building Blocks

- Dividend Yield: 2.1%
- Real Fundamental Growth: 1.3%
- Inflation: 2.1%
- Valuation Change: -2.6%
- Expected Return: 2.8%

CAPE Is Powerful at Forecasting Long-Horizon Returns, but Almost Useless for Market Timing

Correlation of CAPE Ratio with S&P 500 Index Real Return at 1-Year Horizons, 1881–Oct 2017

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Correlation of CAPE Ratio with S&P 500 Index Real Return at 1-, and 5-Year Horizons, 1881–Oct 2017

CAPE Is Powerful at Forecasting Long-Horizon Returns, but Almost Useless for Market Timing

Correlation of CAPE Ratio with S&P 500 Index Real Return at 1-, 5-, and 10-Year Horizons, 1881–Oct 2017

Panel A

Panel B

Panel C

CAPE Is Powerful at Forecasting Long-Horizon Returns, but Almost Useless for Market Timing

Correlation of CAPE Ratio with S&P 500 Index Real Return at 1-, 5-, 10-, and 20-Year Horizons, 1881–Oct 2017

The Link Between Starting Valuations and Subsequent Returns Is Robust Across Equity Markets

Source: Research Affiliates, LLC, using data from Robert Shiller database, Bloomberg, and MSCI. Note: Each country is measured over the time span for which earnings data are available through October 2007 in order to calculate 10-year returns ending in 2017. The start date for earnings data in the United States is 1871; in Australia, Canada, Germany, Sweden, Switzerland, and the United Kingdom is 1969; in France is 1971; in Hong Kong and Spain is 1980; and in Italy is 1984. Using a beginning date of 1969 in the United States yields results consistent with the results when the start date is 1871.
US Equities Are Poised for Lackluster Future Returns

Earnings Yield and Subsequent Returns — US (1926–2018)

Starting CAPE

10-Year Subsequent Return

Other Useful Metrics Corroborate High US Valuations

Current Levels of US Valuation Metrics vs. Their Long-Term Averages

Source: Research Affiliates, LLC, based on data from Robert Shiller database and the Federal Reserve Economic Data (FRED). US Valuation Metrics referenced above are presented as of the first date that data is available. As of December 31, 2018.
Low Macro Volatility Helps Explain High CAPE Ratios

Aked, Mazzoleni, and Shakernia (2017) find that today’s low volatility levels support an equilibrium CAPE of 23, nearly 30% below the current level of 32.

Source: Research Affiliates, LLC, using data from FRED at the Federal Reserve Bank of St. Louis, Robert Shiller’s database, and Ray C. Fair’s quarterly historical GDP Data (https://fairmodel.econ.yale.edu/rayfair/pdf/2002dtb.htm). For quarterly real GDP growth, we use FRED data from 1947 to present, backfilled with data from Ray Fair’s website. Macro volatility is defined as the arithmetic average of the rolling three-year volatility of real GDP growth and the rolling three-year volatility of inflation.
Even After Making Multiple Adjustments, US Equities Face Headwinds from Valuation Contraction

What’s “Fair” Value?

1. Simple Average: 1926–2018
   - 18.1x
2. Simple Average: 1977–2018
   - 21.2x
3. Adjusted for Business Cycle & Macro Vol
   - 22.3x
4. CAPE excluding highest & lowest earnings years
   - 27.1x (93rd percentile)
5. CAPE excluding lowest 12 months of earnings
   - 28.8x

Today's CAPE: S&P 500

Valuation differential still implies -2.5% annual return headwind over 10 years!

Source: Research Affiliates, LLC. As of December 31, 2018.
High Earnings Are Not Enough to Portend a High CAPE Ratio!

For returns to remain elevated with a high CAPE, **EPS growth** must be high as well

- EPS growth arguments\(^1\) for elevated CAPE explain high *past* EPS growth, not high future EPS growth.
- EPS growth rates are cyclical.

- Indeed, real earnings of the S&P 500 crested in 2014. We are skeptical that earnings can grow much, relative to GDP, in the years ahead.


High EPS Growth Often Precedes Low EPS Growth


\[ y = -0.23x + 0.02 \]

Correl. = -21%

Past vs. Future 10-Year US Real EPS Trend Growth, 1871–Oct 2017

Equities: Long-Term Return Expectations

Source: Research Affiliates, LLC, based on data from Ibbotson, Shiller, Bloomberg, MSCI, and FactSet. The bolded country indices are represented by the S&P 500, MSCI Germany, MSCI Japan, and MSCI UK. For more information, please visit http://www.researchaffiliates.com/en_us/asset-allocation.html. Please see important information at the end of this presentation regarding simulated data. As of December 31, 2018.
Equities: Long-Term Return Expectations

*60/40 portfolios are represented as 60% core equity index and 40% Treasury 5-7 Year bond index for each specific country. For the United States, the Barclays Aggregate is used in lieu of the 5-7 Year Treasury. Source: Research Affiliates, LLC, based on data from Ibbotson, Shiller, Bloomberg, FactSet, MSCI, and Barclays. Please see important information at the end of this presentation regarding simulated data. As of December 31, 2018.
How Do the Largest Holdings of Index Funds Impact Performance?
How Expensive Are FANMAG (Facebook, Apple, Netflix, Microsoft, Amazon, & Google)?

Aggregate Market Cap of Countries

<table>
<thead>
<tr>
<th>Country</th>
<th>Aggregate Market Cap ($Bn)</th>
</tr>
</thead>
<tbody>
<tr>
<td>United States*</td>
<td>$21,025</td>
</tr>
<tr>
<td>Japan</td>
<td>$0</td>
</tr>
<tr>
<td>China</td>
<td>$1,000</td>
</tr>
<tr>
<td>United Kingdom</td>
<td>$2,000</td>
</tr>
<tr>
<td>France</td>
<td>$3,000</td>
</tr>
<tr>
<td>Germany</td>
<td>$4,000</td>
</tr>
<tr>
<td>India</td>
<td>$5,000</td>
</tr>
<tr>
<td>Canada</td>
<td>$6,000</td>
</tr>
<tr>
<td>Switzerland</td>
<td>$4,000</td>
</tr>
<tr>
<td>Australia</td>
<td>$3,000</td>
</tr>
<tr>
<td>South Korea</td>
<td>$2,000</td>
</tr>
<tr>
<td>Hong Kong</td>
<td>$1,000</td>
</tr>
</tbody>
</table>

$3.4T in combined market cap places these 6 companies above all but 2 of the 47 countries in Russell Global Index

*US Market Cap extends beyond the scale of the graph.

Source: Research Affiliates, LLC, based on data from FactSet as of 12/31/2018. Market cap for countries represents the sum of the market caps for their constituents in the 10,000+ security Russell Global Index. Market caps for Facebook, Apple, Netflix, Microsoft, Amazon, & Google are excluded from the US category.
How Expensive Are FANMAG (Facebook, Apple, Netflix, Microsoft, Amazon, & Google)?

Comparing these six firms to entire sectors of the Russell 3000

Source: Research Affiliates, LLC, based on data from FactSet as of 12/31/2018. Market cap for sectors represents the sum of the market caps for their constituents in the Russell US 3000 Index. Market caps for Facebook, Apple, Netflix, Microsoft, Amazon, & Google are excluded from the technology sector.
The “Top Dogs” in an All-World Cap-Weighted Portfolio are Remarkably Inconsistent!

Since 1980, a decade-by-decade analysis shows that typically only 2 of the top 10 companies in the market remain among the largest companies 10 years later.

<table>
<thead>
<tr>
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<tbody>
<tr>
<td></td>
<td>Apple Inc.</td>
<td>Alphabet Inc.</td>
<td>Alphabet Inc.</td>
<td>Google</td>
<td>Exxon Mobil</td>
<td>Exxon Mobil</td>
<td>Exxon Mobil</td>
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<tr>
<td></td>
<td>Amazon.com</td>
<td>Microsoft</td>
<td>Microsoft</td>
<td>Microsoft</td>
<td>Berkshire Hathaway</td>
<td>Berkshire Hathaway</td>
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</tr>
<tr>
<td></td>
<td>Alphabet Inc.</td>
<td>Amazon.com</td>
<td>Berkshire Hathaway</td>
<td>ExxonMobil</td>
<td>ExxonMobil</td>
<td>ExxonMobil</td>
<td>ExxonMobil</td>
</tr>
<tr>
<td></td>
<td>Berkshire Hathaway</td>
<td>Facebook</td>
<td>Amazon.com</td>
<td>Johnson &amp; Johnson</td>
<td>PetroChina</td>
<td>General Electric</td>
<td>China Mobile</td>
</tr>
<tr>
<td></td>
<td>Facebook</td>
<td>Tencent</td>
<td>Tencent</td>
<td>Alibaba Group</td>
<td>ICBC</td>
<td>Wells Fargo</td>
<td>Google</td>
</tr>
<tr>
<td></td>
<td>Tencent</td>
<td>Alibaba Group</td>
<td>Alibaba Group</td>
<td>JPMorgan Chase</td>
<td>China Mobile</td>
<td>Novartis</td>
<td>Microsoft</td>
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<tr>
<td></td>
<td>Johnson &amp; Johnson</td>
<td>Johnson &amp; Johnson</td>
<td>General Electric</td>
<td>JPMorgan Chase</td>
<td>Wal-Mart</td>
<td>Chevron Corporation</td>
<td>Royal Dutch Shell</td>
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<tr>
<td></td>
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<td>JPMorgan Chase</td>
<td>General Electric</td>
<td>JPMorgan Chase</td>
<td>ICBC</td>
<td>Hoffmann-La Roche</td>
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<tr>
<td></td>
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<td>Exxon Mobil</td>
<td>PetroChina</td>
<td>Exxon Mobil</td>
<td>Microsoft</td>
<td>NTT</td>
<td>IBM</td>
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<tr>
<td></td>
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<td>PetroChina</td>
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<td>PetroChina</td>
<td>General Electric</td>
<td>AT&amp;T</td>
<td>Bank of Tokyo-Mitsubishi</td>
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<tr>
<td></td>
<td>PetroChina</td>
<td>Apple Inc.</td>
<td>Microsoft</td>
<td>ICBC</td>
<td>Wal-Mart</td>
<td>NTT DoCoMo</td>
<td>Industrial Bank of Japan</td>
</tr>
<tr>
<td></td>
<td>IBM</td>
<td>BHP Billiton</td>
<td>ICBC</td>
<td>China Mobile</td>
<td>Procter &amp; Gamble</td>
<td>Cisco Sytems</td>
<td>Standard Oil</td>
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<td>ICBC</td>
<td>Intel</td>
<td>Wal-Mart</td>
<td>Toyota Motors</td>
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<tr>
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<td>ICBC</td>
<td>China Mobile</td>
<td>Microsoft</td>
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<tr>
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<td>BHP Billiton</td>
<td>Microsoft</td>
<td>NTT</td>
<td>Dai-Ichi Kangyo Bank</td>
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<td>IBM</td>
<td>Atlantic Richfield</td>
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<tr>
<td></td>
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<td>Royal Dutch Shell</td>
<td>Petrobras</td>
<td>Johnson &amp; Johnson</td>
<td>Lucent Technologies</td>
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<td>General Electric</td>
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<tr>
<td></td>
<td>Chevron Corporation</td>
<td>Nestlé</td>
<td>Apple Inc.</td>
<td>General Electric</td>
<td>Deutsche Telekom</td>
<td>Exxon</td>
<td>Eastman Kodak</td>
</tr>
</tbody>
</table>

Legend:
- **Black text**: US Company
- **Red Bold Text**: Emerging Markets Company
- **Blue Bold Text**: European Company
- **Brown Bold Text**: Japan / Australia

Source: Research Affiliates, LLC, using data from Financial Times and Wikipedia. Rankings shown represent start-of-year rankings.
“Top Dogs” Vanish Because They *Underperform*!

- The global top dog outpaced the global cap-weighted stock market only 5% of the time in the last 30 years.
- It delivered an annual shortfall of 10.5% per year, roughly equivalent to losing 2/3 of its value!

<table>
<thead>
<tr>
<th>Type of Top Dog</th>
<th>Horizon</th>
<th>Relative Return vs. Sector, Avg Across Countries</th>
<th>Frequency of Win vs. Sector, Avg Across Countries</th>
</tr>
</thead>
<tbody>
<tr>
<td>Average, Largest stocks in each sector across G-8 countries</td>
<td>1yr</td>
<td>-5.3%</td>
<td>44%</td>
</tr>
<tr>
<td></td>
<td>5yrs</td>
<td>-4.8%</td>
<td>39%</td>
</tr>
<tr>
<td></td>
<td>10yrs</td>
<td>-5.1%</td>
<td>34%</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Horizon</th>
<th>Relative Return vs. Developed World</th>
<th>Frequency of Win vs. Developed World</th>
</tr>
</thead>
<tbody>
<tr>
<td>1yr</td>
<td>-12.5%</td>
<td>33%</td>
</tr>
<tr>
<td>5yrs</td>
<td>-11.2%</td>
<td>15%</td>
</tr>
<tr>
<td>10yrs</td>
<td>-10.5%</td>
<td>5%</td>
</tr>
</tbody>
</table>

How Do “Top Dogs” Impact Index Performance?

Do I want to own a portfolio in which my largest holding has a 95% likelihood of underperforming over the next 10 years? **No!**

We compared the performance of five different portfolios

- Developed World Portfolio, Cap-Weighted (“World”)
- World, excluding the single largest market-cap stock in the world
- World, excluding the ten largest market-cap stocks in the world
- World, excluding the largest market-cap stock in each country
Portfolios of “Top Dogs” Underperform the Market

Growth of $100 (log scale)

Performance of Top Dog Portfolios

- Developed World
- Global Top Dog
- Global Top Ten
- Country Top Dogs

<table>
<thead>
<tr>
<th>Year</th>
<th>Developed World</th>
<th>Global Top Dog</th>
<th>Global Top Ten</th>
<th>Country Top Dogs</th>
</tr>
</thead>
<tbody>
<tr>
<td>1980</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>1987</td>
<td></td>
<td></td>
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<td>1994</td>
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<tr>
<td>2001</td>
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<tr>
<td>2008</td>
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<tr>
<td>2015</td>
<td></td>
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</tr>
</tbody>
</table>

- Return: 9.72%
- Std Dev: 14.79%
- Value Added: 8.70%
- Avg of World Index: 2.15%
- Tracking Error: 22.38%
- Information Ratio: -38.85%

Performance Relative to Developed World

- Global Top Dog
- Global Top Ten
- Country Top Dogs

<table>
<thead>
<tr>
<th>Year</th>
<th>Global Top Dog</th>
<th>Global Top Ten</th>
<th>Country Top Dogs</th>
</tr>
</thead>
<tbody>
<tr>
<td>1980</td>
<td></td>
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<tr>
<td>1987</td>
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<tr>
<td>1994</td>
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<td>2001</td>
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<td>2008</td>
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<td>2015</td>
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</tbody>
</table>

- Value Added: 8.40%
- Avg of World Index: 11.27%
- Tracking Error: 8.99%
- Information Ratio: -37.78%

Performance Improves With Each Exclusion... But Investors Must Be Willing To Accept Higher TE

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<thead>
<tr>
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<tbody>
<tr>
<td>Return</td>
<td>9.72%</td>
<td>9.94%</td>
<td>10.18%</td>
</tr>
<tr>
<td>Std Dev</td>
<td>14.79%</td>
<td>14.80%</td>
<td>14.87%</td>
</tr>
</tbody>
</table>

Unconventional Assets Mostly Priced to Offer Better Returns

Source: Research Affiliates, LLC, based on data from Ibbotson, Shiller, Bloomberg, FactSet, MSCI, and Barclays. Please see important information at the end of this presentation regarding simulated data. As of December 31, 2018.
Key Takeaways

The link between starting valuations and subsequent returns is powerful

- Valuation levels are not useful for timing market tops and bottoms.
- Chasing returns can be very costly. High valuations can go higher, but not indefinitely.
- “Over-rebalance” into laggards — averaging in — as a long-term performance-enhancing strategy.

Across asset classes, higher return potential exists in international and diversifying markets

- Investors should balance return maximization goals with risk relative to peer groups or conventional benchmarks.

Within equities, the value factor offers the highest return potential today

- A dynamic multi-factor approach may also balance alpha and tracking error goals.

The largest stocks in the market are often expensive and have historically underperformed after reaching the top 10
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