Is "Indexing" Facing an Existential Crisis?

ROB ARNOTT
Chairman & Chief Executive Officer
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Lessons From the Past, Thoughts About the Future

» A low-yield environment
  » What do lower future returns mean for your portfolio?

» “Smart beta” applications across asset classes
  » An improved core equity application
  » Systematic rebalancing is a key driver of returns

» Where are the opportunities today?
  » Where are the near-term opportunities and headwinds
  » Our recommendations
### Expected Return Model for a 60% Equity/40% Bond Portfolio

<table>
<thead>
<tr>
<th>Decades</th>
<th>Beginning Dividend Yield</th>
<th>Real Long-Term EPS Growth*</th>
<th>Implied Inflation</th>
<th>Expected Equity Return</th>
<th>Beginning Bond Yield</th>
<th>Expected 60/40 Return</th>
<th>Realized 60/40 Return</th>
<th>Realized Minus Expected Return</th>
</tr>
</thead>
<tbody>
<tr>
<td>1871-1880</td>
<td>5.9%</td>
<td>-0.5%</td>
<td>2.4%</td>
<td>7.9%</td>
<td>5.3%</td>
<td>6.9%</td>
<td>8.3%</td>
<td>1.4%</td>
</tr>
<tr>
<td>1881-1890</td>
<td>4.5%</td>
<td>1.0%</td>
<td>0.8%</td>
<td>6.3%</td>
<td>3.7%</td>
<td>5.3%</td>
<td>3.1%</td>
<td>-2.2%</td>
</tr>
<tr>
<td>1891-1900</td>
<td>4.8%</td>
<td>2.4%</td>
<td>0.5%</td>
<td>7.8%</td>
<td>3.4%</td>
<td>6.0%</td>
<td>6.9%</td>
<td>0.9%</td>
</tr>
<tr>
<td>1901-1910</td>
<td>4.4%</td>
<td>1.8%</td>
<td>0.0%</td>
<td>6.2%</td>
<td>2.9%</td>
<td>4.9%</td>
<td>5.7%</td>
<td>0.9%</td>
</tr>
<tr>
<td>1911-1920</td>
<td>5.2%</td>
<td>2.0%</td>
<td>0.4%</td>
<td>7.8%</td>
<td>3.3%</td>
<td>6.0%</td>
<td>2.9%</td>
<td>-3.1%</td>
</tr>
<tr>
<td>1921-1930</td>
<td>7.5%</td>
<td>2.4%</td>
<td>2.8%</td>
<td>13.2%</td>
<td>5.7%</td>
<td>10.2%</td>
<td>11.6%</td>
<td>1.4%</td>
</tr>
<tr>
<td>1931-1940</td>
<td>6.3%</td>
<td>1.7%</td>
<td>0.1%</td>
<td>8.3%</td>
<td>3.0%</td>
<td>6.2%</td>
<td>3.9%</td>
<td>-2.2%</td>
</tr>
<tr>
<td>1941-1950</td>
<td>6.4%</td>
<td>-1.0%</td>
<td>-1.3%</td>
<td>3.8%</td>
<td>1.6%</td>
<td>2.9%</td>
<td>8.6%</td>
<td>5.6%</td>
</tr>
<tr>
<td>1951-1960</td>
<td>7.4%</td>
<td>0.1%</td>
<td>-0.7%</td>
<td>6.8%</td>
<td>2.2%</td>
<td>5.0%</td>
<td>10.6%</td>
<td>5.6%</td>
</tr>
<tr>
<td>1961-1970</td>
<td>3.4%</td>
<td>2.5%</td>
<td>0.9%</td>
<td>7.0%</td>
<td>3.8%</td>
<td>5.8%</td>
<td>6.3%</td>
<td>0.5%</td>
</tr>
<tr>
<td>1971-1980</td>
<td>3.5%</td>
<td>4.1%</td>
<td>3.5%</td>
<td>11.4%</td>
<td>6.4%</td>
<td>9.4%</td>
<td>6.9%</td>
<td>-2.6%</td>
</tr>
<tr>
<td>1981-1990</td>
<td>4.6%</td>
<td>3.0%</td>
<td>9.9%</td>
<td>18.4%</td>
<td>12.8%</td>
<td>16.2%</td>
<td>14.3%</td>
<td>-1.9%</td>
</tr>
<tr>
<td>1991-2000</td>
<td>3.7%</td>
<td>1.3%</td>
<td>5.2%</td>
<td>10.4%</td>
<td>8.1%</td>
<td>9.5%</td>
<td>14.4%</td>
<td>4.9%</td>
</tr>
<tr>
<td>2001-2010</td>
<td>1.2%</td>
<td>1.1%</td>
<td>2.3%</td>
<td>4.7%</td>
<td>5.2%</td>
<td>4.9%</td>
<td>3.8%</td>
<td>-1.2%</td>
</tr>
<tr>
<td><strong>Average</strong></td>
<td><strong>4.9%</strong></td>
<td><strong>1.6%</strong></td>
<td><strong>1.9%</strong></td>
<td><strong>8.6%</strong></td>
<td><strong>4.8%</strong></td>
<td><strong>7.1%</strong></td>
<td><strong>7.6%</strong></td>
<td><strong>0.6%</strong></td>
</tr>
<tr>
<td><strong>Current</strong></td>
<td><strong>1.8%</strong></td>
<td><strong>1.3%</strong></td>
<td><strong>2.0%</strong></td>
<td><strong>5.1%</strong></td>
<td><strong>2.3%</strong></td>
<td><strong>4.0%</strong></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

*Trailing 40-year Real Dividend Growth Rate for the first four samples, 40-year Real Earnings Growth Rate for the rest.
Smart Beta
An Improved Core Equity Application
The Advantages of Passive Investing

» Index funds are a compelling choice for investors

› Broad market exposures
› Diversification
› Large investment capacity
› Low fees and expenses
› Low due diligence and monitoring costs
› Superior performance over time relative to most active managers¹

¹Based on Vanguard Investment Counseling & Research, The Case For Indexing, April 2010.
2% Excess Returns are Difficult to Achieve

Excess Returns of Surviving U.S. Large Cap Mutual Funds, 2004–2013

<table>
<thead>
<tr>
<th>Range</th>
<th># of Funds</th>
</tr>
</thead>
<tbody>
<tr>
<td>-3% or less</td>
<td>28</td>
</tr>
<tr>
<td>-2% to -3%</td>
<td>71</td>
</tr>
<tr>
<td>-1% to -2%</td>
<td>237</td>
</tr>
<tr>
<td>0 to -1%</td>
<td>374</td>
</tr>
<tr>
<td>0 to 1%</td>
<td>264</td>
</tr>
<tr>
<td>1% to 2%</td>
<td>98</td>
</tr>
<tr>
<td>2% to 3%</td>
<td>36</td>
</tr>
<tr>
<td>3% or more</td>
<td>12</td>
</tr>
</tbody>
</table>

The “Error in Price” View of Price Dynamics

Cap Weighting
› Based on the belief that markets are efficient and prices reflect true valuations
› Invest in companies proportional to market valuation; favors popularity and comfort

Economy-Centric View
› Markets are constantly seeking fair value, but prices are rarely right
› Cap-weighted index overweights the overpriced and underweights the underpriced
Market Overpays for Existing Growth

» At a market cap of $61B, Priceline costs as much as Marriott, Hertz, Jet Blue, and Southwest Airlines combined

» Priceline is a 30 bps weight in the Russell 1000, but a 4 bps weight in the FTSE RAFI US 1000

Source: Research Affiliates. based on data from Factset.
What Smart Beta Means to Us

» Smart beta for equities is a category of valuation-indifferent strategies that:

› Consciously and deliberately break the link between the price of an asset and its weight in the portfolio

› Seeks to earn excess returns over the cap-weighted benchmark by no longer weighting assets proportional to their popularity

› Retain most of the positive attributes of passive indexing
Popular Smart Beta Equity Strategies

» **Smart beta strategies come in a variety of flavors**
  
  › Equal Weighting—assign the same weight to each security (transparent, rules-based, heuristic strategy)
  
  › Fundamentals Weighting—select and weight by fundamental measures of size (transparent, rules-based, heuristic strategy)
  
  › Low Volatility—weight stocks by the inverse of volatility (transparent, rules-based, heuristic strategy)
  
  › Minimum Variance—optimized to minimize volatility (optimized, constrained approach)

» **Indices which are not smart beta strategies**
  
  › Cap-weighted factor strategies (i.e., value/small-cap indices)
  
  › Quant-active strategies
Equity Smart Beta Strategies

» Many offerings, many marketing claims, so…
  › How much better are these strategies than market cap?
  › What similarities can we identify?
  › What are critical differences?
  › How do we use smart beta strategies?
The Inverse Strategies Also Outperform!

Simulated U.S. Strategies, 1964–2012

- Return
- Sharpe Ratio

Cap Weight¹
Equal Weighting²
Fundamental Weighting³
Low Volatility⁴
Minimum Variance⁵

Inverse: Equal Weighting²
Inverse: Fundamental Weighting³
Inverse: Low Volatility⁴
Inverse: Minimum Variance⁵

See notes slide for disclosures regarding individual strategies.

Source: Research Affiliates based on Arnott, Hsu, Kalesnik and Tindall (2013).
Malkiel’s Monkey

“A blindfolded monkey throwing darts at a newspaper’s financial pages could select a portfolio that would do just as well as one carefully selected by experts.”

-Burton G. Malkiel, A Random Walk Down Wall Street
# Malkiel’s Monkey Throwing Darts Outperforms Cap

Simulation of Random Selection, Repeated 100 Times, 1964–2012

<table>
<thead>
<tr>
<th>Strategy</th>
<th>Return</th>
<th>Standard Deviation</th>
<th>Sharpe Ratio</th>
</tr>
</thead>
<tbody>
<tr>
<td>Average of 100 Monkey Portfolios⁹</td>
<td>11.3%</td>
<td>18.3%</td>
<td>0.33</td>
</tr>
<tr>
<td>U.S. Cap Weight¹</td>
<td>9.7%</td>
<td>15.3%</td>
<td>0.29</td>
</tr>
</tbody>
</table>

Only 2 *(very unlucky)* monkeys underperformed the cap-weighted benchmark!

See notes slide for disclosures regarding individual strategies.

Source: Research Affiliates, based on Arnott, Hsu, Kalesnik, and Tindall (2013).
All Price Indifferent Strategies Outperform

<table>
<thead>
<tr>
<th>Investment Strategy</th>
<th>Break the Link Between Price and Weight</th>
<th>Rebalance</th>
</tr>
</thead>
<tbody>
<tr>
<td>Fundamentals Weight</td>
<td>✓</td>
<td>✓</td>
</tr>
<tr>
<td>Equal Weight</td>
<td>✓</td>
<td>✓</td>
</tr>
<tr>
<td>Low Volatility</td>
<td>✓</td>
<td>✓</td>
</tr>
<tr>
<td>Minimum Variance</td>
<td>✓</td>
<td>✓</td>
</tr>
<tr>
<td>Inverse Strategies</td>
<td>✓</td>
<td>✓</td>
</tr>
<tr>
<td>Random Monkey Portfolios</td>
<td>✓</td>
<td>✓</td>
</tr>
<tr>
<td>Cap-Weight</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>
Implementation is the Primary Differentiator

» Many smart beta strategies suffer from high implementation costs

› Investors should seek to:

<table>
<thead>
<tr>
<th>Maximize</th>
<th>Minimize</th>
</tr>
</thead>
<tbody>
<tr>
<td>Capacity/Liquidity</td>
<td>Turnover</td>
</tr>
<tr>
<td>Economic Representation</td>
<td>Trading Costs</td>
</tr>
</tbody>
</table>
Fundamentals Weight Has the Greatest Liquidity and Lowest Turnover of the “Smart Beta” Strategies

Market Cap in USD Billions—Jan 2012

Average Annual Turnover*

What’s Your Objective? Sharpe Ratio or Information Ratio

Fundamental Index strategy is the average return of the FTSE RAFI US 1000 Index and Russell Fundamental US Large Company Index for the period 8/1/1996 through 12/31/2013, based on data from FactSet. Equal Weighting is the S&P 500 Equal Weight Index for the period 8/1/1996 through 12/31/2013, based on data from FactSet. Source: Research Affiliates. RAFI Low Volatility, 1/Volatility, Minimum Variance, and Cap weighted strategies are simulated for the period 8/1/1996 through 12/31/2013 using CRSP/Compustat.
Where are the Opportunities Today?
Current Long-Term Real Return Estimates

Source: Research Affiliates based on data building blocks, mean reversion and business cycle models. As of December 31, 2014

The asset classes shown above are represented by the following indexes: U.S. Equities represented by S&P 500; Developed ex U.S. Equities represented by MSCI EAFE; Long U.S. Treasuries represented by Barclays U.S. Treasury Long; U.S. Core Fixed Income represented by Barclays U.S. Aggregate; U.S. Investment Grade Credit represented by Barclays U.S. Intermediate Credit; U.S High Yield represented by Barclays U.S. Corporate High Yield; U.S. TIPS represented by Barclays U.S. Treasury U.S. TIPS, U.S. REITs represented by FTSE NAREIT; EM local bonds represented by JPM GBI-EM; EM equities represented by MSCI EM; and Commodities represented by the Bloomberg Commodity Index.
# EM vs. Developed Sovereign Bonds
Who Has the Debt Servicing Capacity?

<table>
<thead>
<tr>
<th>Countries</th>
<th>Debt/GDP*</th>
<th>Yield to Maturity</th>
<th>5 Year CDS Spread</th>
<th>Credit Rating</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Country Groups</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>High Debt Countries</td>
<td>110.9%</td>
<td>1.3%</td>
<td>0.7%</td>
<td>AA-/A+</td>
</tr>
<tr>
<td>Moderate Debt Countries</td>
<td>54.3%</td>
<td>2.9%</td>
<td>0.8%</td>
<td>AA-/A+</td>
</tr>
<tr>
<td>Low Debt Countries</td>
<td>27.0%</td>
<td>5.3%</td>
<td>1.4%</td>
<td>A+/A</td>
</tr>
<tr>
<td><strong>Developed vs. Emerging</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>G5</td>
<td>122.0%</td>
<td>0.9%</td>
<td>0.3%</td>
<td>AA+</td>
</tr>
<tr>
<td>Developed Markets (ex Greece)</td>
<td>80.0%</td>
<td>1.1%</td>
<td>0.4%</td>
<td>AA</td>
</tr>
<tr>
<td>Emerging Markets</td>
<td>41.1%</td>
<td>6.1%</td>
<td>1.6%</td>
<td>A-/BBB+</td>
</tr>
</tbody>
</table>

*Include 23 DM and 14 EM bond issuers, where data are available; countries are defined by the IMF. High debt countries is defined by >70% debt-to-GDP; low debt defined by <40% debt-to-GDP. **Country groups are determined by ranking all countries by Debt/GDP. G5 countries include France, Germany, Japan, United Kingdom, and United States. Note: Debt/GDP figures are as of December 31, 2013. All other data as of December 31, 2014. Source: Research Affiliates, based on data from Bloomberg, the Yield Book, and the IMF.
EM Equities Better Positioned For Long-term Returns

Shiller P/E in Growth and Slowdown Regimes

Median Annualized Forward Five-Year Returns*

<table>
<thead>
<tr>
<th>Starting Shiller PE</th>
<th>US</th>
<th>International</th>
<th>EM</th>
<th>Pooled</th>
</tr>
</thead>
<tbody>
<tr>
<td>&lt;10x</td>
<td>17.5%</td>
<td>35.6%</td>
<td>N/A</td>
<td>17.5%</td>
</tr>
<tr>
<td>10-15x</td>
<td>10.9%</td>
<td>34.0%</td>
<td>15.5%</td>
<td>11.9%</td>
</tr>
<tr>
<td>15-20x</td>
<td>9.5%</td>
<td>19.6%</td>
<td>8.5%</td>
<td>9.6%</td>
</tr>
<tr>
<td>20-25x</td>
<td>6.9%</td>
<td>12.7%</td>
<td>10.0%</td>
<td>7.9%</td>
</tr>
<tr>
<td>&gt;25x</td>
<td>0.4%</td>
<td>2.8%</td>
<td>1.1%</td>
<td>1.6%</td>
</tr>
</tbody>
</table>

Starting Date         | Jan-1900 | Dec-1982 | Sep-2005 | Jan-1900|

» U.S. equity valuation does not support sustained performance, even in a sustained economic expansion

» Historical data supports that international and EM equities are better positioned for long-term returns

Fundamental Index Strategies: Eliminating the Performance Drag of Cap-Weight


*First live FTSE RAFI Indices were launched on 11/28/2005.
Source: Research Affiliates based on data from MSCI and Bloomberg. Launch date returns are calculated using the first full month of returns following index inception. All indices are gross of dividends. The index version of the RAFI methodology, or the FTSE RAFI Indexes, is licensed globally by our partner the FTSE Group.
The Value Premium for each asset class is calculated by taking the cap-weighted value index and subtracting the cap-weighted core index. For example, for the Global Value Premium, the formula is the MSCI ACWI Value Gross Index minus the MSCI ACWI Gross Index.
The Evolving Landscape of Smart Beta
Evolution of Smart Beta: Win from Rebalancing

» Smart beta for equities
  › Takes advantage of long-term mean reversion in prices
  › Periodically rebalancing to target weights that are unrelated to price

» Smart beta for bonds
  › Using fundamentals results in weighting by debt service capacity rather than amount of debt outstanding
  › Seeks to provide improved risk/return exposures

» Smart beta in commodities
  › Break the unintended link with price, inherent in weighting by recent dollar volume, open interest, or production
  › Introduce systematic rebalancing as a key driver of returns (some indices already do this)
So… Is “Indexing” Facing an Existential Crisis?

Hardly!! Things are just starting to get really interesting, at last!!
Thank You

For additional information visit www.researchaffiliates.com
Notes: Strategy Simulation Descriptions

1. Cap-Weighted: Weighted using the market capitalization computed using December close of the year prior to index construction.

2. Volatility weighted: Weighted based on the standard deviation of monthly returns over the five year window prior to index construction.

3. Market- Beta-Weighted: Weighted based on CAPM betas using market factor kindly provided by Kenneth French on his website. The market beta loading is estimated using monthly returns data over five years window prior to index construction.

4. Book-Weighted: Weighted using the book value from the fiscal year two years prior to index construction.

5. Five-year Average Earnings Weighted: Weighted based on the average of the five-year earnings. The averaging period covers the five fiscal years ending with the fiscal year two years prior to index construction.

6. Equal Weighting: Equally weighted portfolio of 1,000 largest stocks by market capitalization.

7. Fundamentals Weighted: Weighted based on the five-year averages of cash flows, dividends, sales, and the most recent book value of equity. We introduce two-year delay to avoid forward-looking bias. Following the original method, we select top stocks with the largest fundamental weight. For details see Arnott, Hsu, and Moore (2005).

8. Minimum Variance: To construct the minimum variance strategy we use the method of Clarke, de Silva, and Thorley (2006).

9. Malkiel’s Monkey: Average of 100 portfolios, where each of the individual portfolios is rebalanced annually by randomly selecting 30 stocks out of the universe of the largest 1,000 stocks by market capitalization.

10. RAFI™ Low Volatility: Fundamentally weighted selection of stocks that have low systematic risk relative to country and industry peers.
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