The Benchmark Inclusion Subsidy

<table>
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<tr>
<td>Chicago Booth</td>
<td>Arizona State University</td>
<td>University of Chicago</td>
<td>London Business School</td>
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<td>and Bank of England</td>
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*The views here are those of the authors only and not necessarily of the Bank of England*
Global Assets Under Management

$trillion

Source: PWC, Asset and Wealth Management Revolution, 2017
Benchmarking in Asset Management

- Money managed against leading benchmarks
  1. S&P 500 ≈ $10 trillion
  2. FTSE-Russell (multiple indices) ≈ $8.6 trillion
  3. MSCI All Country World Index ≈ $3.2 trillion
  4. MSCI EAFE ≈ $1.9 trillion
  5. CRSP ≈ $1.3 trillion

- Existing research: asset pricing implications of benchmarking

- No analysis of implications of benchmarking for corporate decisions
This Paper

- Performance evaluation relative to a benchmark creates incentives for portfolio managers to hold the benchmark portfolio
  - Inelastic demand, independent of variance

- Firms inside the benchmark end up effectively subsidized by portfolio managers

- The value of a project differs for firms inside and outside the benchmark
  - Higher for a firm inside the benchmark
  - The difference is the “benchmark inclusion subsidy”
This Paper (cont.)

- Firms inside and outside the benchmark have different decision rules for M&A, spinoffs & IPOs.

- The “benchmark inclusion subsidy” varies with a host of firm/investor characteristics:
  - Gives novel cross-sectional predictions.

All of this is in contrast to what we teach in Corporate Finance.
Simplified Model: Environment

- Two periods, \( t = 0, 1 \)

- Three risky assets, 1, 2, and \( y \), with **uncorrelated** cash flows \( D_i \)

\[
D_i \sim N(\mu_i, \sigma_i^2), \quad i = 1, 2, y
\]

- Asset price denoted by \( S_i \)

- Riskless asset, with interest rate \( r = 0 \)
Simplified Model: Investors

- Two types of investors
  - Direct investors (fraction $\lambda_D$)
  - Portfolio (fund) managers (fraction $\lambda_M$)

- All investors have CARA utility:

$$U(W) = -E e^{-\gamma W}$$

$W$ is terminal wealth (compensation for portfolio managers)
$\gamma$ is absolute risk aversion

- Absent portfolio managers, this is a standard model and the CAPM holds
Compensation of Portfolio Managers

- Portfolio managers’ compensation: \( w = a r_x + b(r_x - r_b) + c \)

- \( r_x \) – performance of portfolio manager’s portfolio
- \( r_b \) – performance of benchmark
- \( a \) – sensitivity to absolute performance
- \( b \) – sensitivity to relative performance
- \( c \) – independent of performance (e.g., based on AUM)

See Ma, Tang, and Gómez (2019) for evidence
Optimal Portfolios

- Direct investors’ optimal portfolio:
  \[ x_i^D = \frac{\mu_i - S_i}{\gamma \sigma_i^2} \] (standard mean-variance)

- Portfolio managers’ optimal portfolio:
  Suppose firm 1 is \textit{inside} the benchmark
  \[ x_1^M = \frac{1}{a+b} \frac{\mu_1 - S_1}{\gamma \sigma_1^2} + \frac{b}{a+b} \]
  Suppose firm 2 is \textit{outside} the benchmark
  \[ x_2^M = \frac{1}{a+b} \frac{\mu_2 - S_2}{\gamma \sigma_2^2} \]

- Inelastic demand for \[ \frac{b}{a+b} \] shares of firm 1 (or whatever is in the benchmark)
Asset Prices

- Market clearing: \[ \lambda_M x_i^M + \lambda_D x_i^D = 1 \]

- Asset prices:

  \[ S_1 = \mu_1 - \gamma \Lambda \sigma_1^2 \left( 1 - \lambda_M \frac{b}{a+b} \right) \] (benchmark)

  \[ S_2 = \mu_2 - \gamma \Lambda \sigma_2^2 \] (non-benchmark)

  \[ S_y = \mu_y - \gamma \Lambda \sigma_y^2 \] (non-benchmark)

where \( \Lambda = \left[ \frac{\lambda_M}{a+b} + \lambda_D \right]^{-1} \) modifies the market’s effective risk aversion
Suppose y is Acquired by Firm 2

- This merger leaves y outside of the benchmark

- New optimal portfolios:
  \[ x_{2D}' = \frac{\mu_2 + \mu_y - S_2'}{\gamma (\sigma_2^2 + \sigma_y^2)} \]  
  (Direct investors)

  \[ x_{2M}' = \frac{1}{a+b} \frac{\mu_2 + \mu_y - S_2'}{\gamma (\sigma_2^2 + \sigma_y^2)} \]  
  (Portfolio managers)

- New price of non-benchmark stock 2:
  \[ S_2' = \mu_2 + \mu_y - \gamma \Lambda (\sigma_2^2 + \sigma_y^2) = S_2 + S_y \]
Suppose y is Acquired by Firm 1

- This merger moves y inside the benchmark

- New optimal portfolios:
  \[ x'_1 \]
  \[
  x'_1 D = \frac{\mu_1 + \mu_y - S'_1}{\gamma (\sigma_1^2 + \sigma_y^2)}
  \]
  (Direct investors)

  \[ x'_1 M = \frac{1}{a+b} \frac{\mu_1 + \mu_y - S'_1}{\gamma (\sigma_1^2 + \sigma_y^2)} + \frac{b}{a+b}
  \]
  (Portfolio managers)

- New price of stock 1
  \[ S'_1 = \mu_1 + \mu_y - \gamma \Lambda (\sigma_1^2 + \sigma_y^2) \left( 1 - \lambda_M \frac{b}{a+b} \right) \]

  \[ = S_1 + S_y + \gamma \Lambda \sigma_y^2 \lambda_M \frac{b}{a+b} > S_1 + S_y \]

  benchmark inclusion subsidy (increasing in \( \sigma_y^2 \))
More General Model

- Assume $N$ assets, with $K$ inside the benchmark
- Allow correlation among all assets

- Compare investments in $y$ by firms $in$ and $out$. Assume $\sigma_{in} = \sigma_{out} = \sigma$ and $\rho_{in,y} = \rho_{out,y} = \rho_y$.
- Then the benchmark inclusion subsidy is

$$\Delta S_{in} - \Delta S_{out} = \gamma \Lambda \left( \sigma_y^2 + \rho_y \sigma \sigma_y \right) \lambda_M \frac{b}{a + b}$$
Additional Implications

- Benchmark inclusion subsidy: \( \gamma \Lambda (\sigma^2_y + \rho_y \sigma \sigma_y) \lambda_M \frac{b}{a+b} \)

- No subsidy for riskless projects

- Subsidy larger if project is
  - more correlated with cash flows from existing assets (high \( \rho_y \))
  - if risk aversion is big (high \( \gamma \))

- Subsidy larger with more AUM (\( \lambda_M \))
  or for large “b” (= passive management)
Suppose twin firms that are just inside and outside the benchmark are contemplating the same project

\[ \Delta S_{in} = -I + \frac{\mu_y}{1+r_{in}} \quad \text{and} \quad \Delta S_{out} = -I + \frac{\mu_y}{1+r_{out}} \]

Seek to quantify \( r_{out} - r_{in} \)

Infer the inelastic demand from institutional ownership data

- benchmark = S&P 500 is 83%
- all stocks in the market 67%

Source: FactSet/LionShares, 2017
Quantifying the Subsidy (cont.)

- **Size of the subsidy**, $r_{out} - r_{in}$, in basis points

<table>
<thead>
<tr>
<th>Institutional Ownership of Benchmark</th>
<th>Institutional Ownership of Market</th>
<th>59%</th>
<th>67%</th>
<th>75%</th>
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<tbody>
<tr>
<td>75%</td>
<td>67</td>
<td>35</td>
<td>0</td>
<td></td>
</tr>
<tr>
<td>83%</td>
<td>133</td>
<td>94</td>
<td>51</td>
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<tr>
<td>91%</td>
<td>260</td>
<td>215</td>
<td>159</td>
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Related Empirical Evidence

- Consistent with the index effect – though also brings many additional cross-sectional predictions

- Benchmark ≠ Index, benchmark matters
  - Sin stocks, Hong and Kacperczyk (2009)

- Benchmark firms invest more, employ more people, and accept riskier projects
  - Bena, Ferreira, Matos, and Pires (2017)

- Bigger subsidy, when $\lambda_M$ is larger
  - Chang, Hong, and Liskovich (2015)
Conclusions

- Benchmark inclusion subsidy matters for a host of corporate actions
  - Investment, M&A, spinoffs, IPOs

- We project it to grow
  - projected growth in assets under management
  - shifting demand from active equity to passive

- Benchmark construction determines which firms get a subsidy