The Benchmark Inclusion Subsidy

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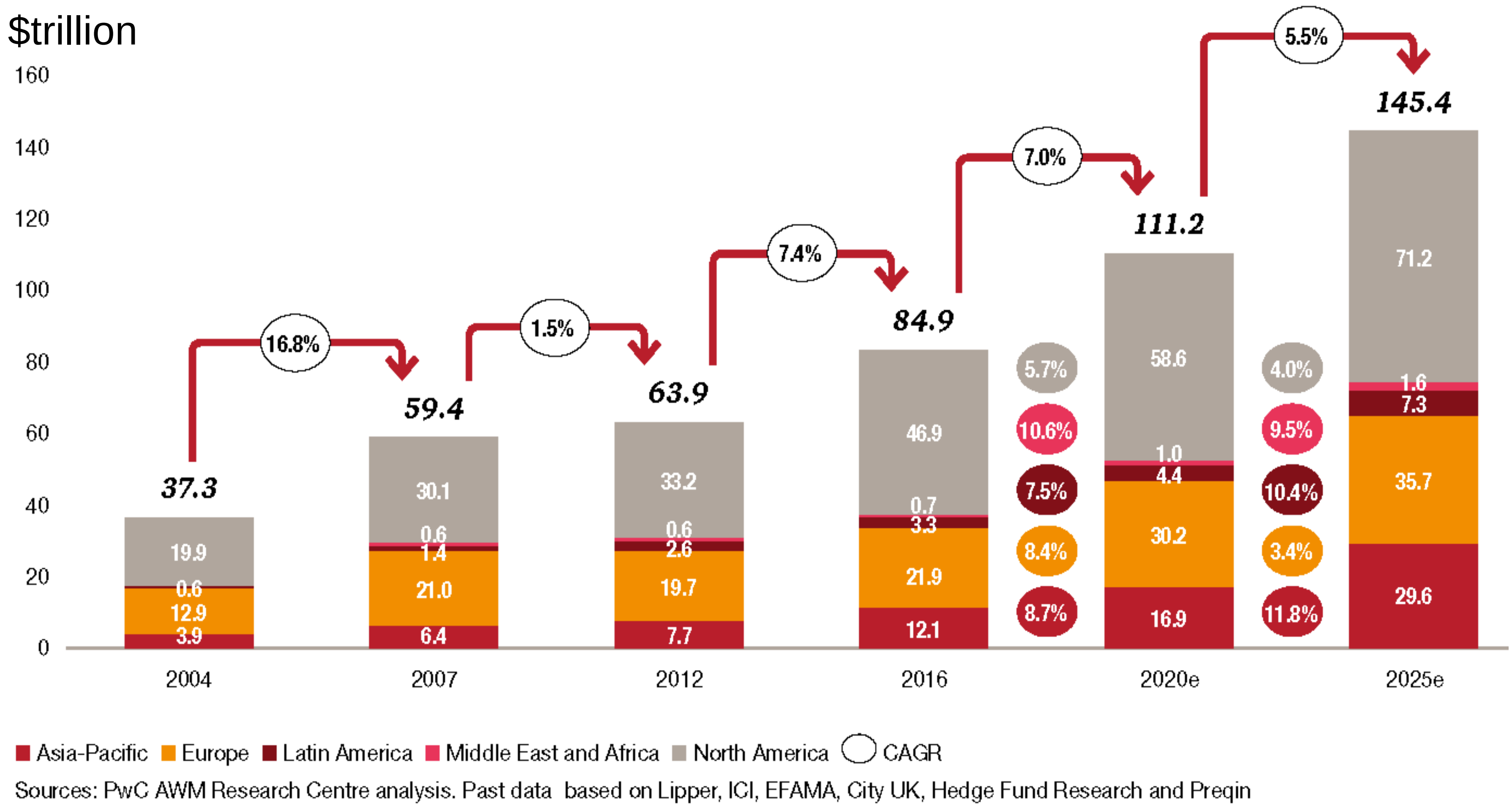
*The views here are those of the authors only and not necessarily of the Bank of England

Global Assets Under Management



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

$$D_i \sim N\left(\mu_i, \sigma_i^2\right), \quad i = 1, 2, y$$

- Asset price denoted by S_i

- Riskless asset, with interest rate *r =0*

Simplified Model: Investors

- Two types of investors
  - Direct investors (fraction λ_D)
  - Portfolio (fund) managers (fraction λ_M)

- All investors have CARA utility:

$$U(\mathrm{W}) = -Ee^{-\gamma W}$$

W is terminal wealth (compensation for portfolio managers)
γ is absolute risk aversion

- Absent portfolio managers, this is a standard model and the CAPM holds

Compensation of Portfolio Managers

- Portfolio managers' compensation: $w = a\, r_x + \boldsymbol{b}(r_x - r_{\boldsymbol{b}}) + c$

r_x – performance of portfolio manager's portfolio
$r_{\boldsymbol{b}}$ – 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:

$$x_i^D = \frac{\mu_i - S_i}{\gamma\, \sigma_i^2} \quad \text{(standard mean-variance)}$$

- Portfolio managers' optimal portfolio:

Suppose firm 1 is **inside** the benchmark

$$x_1^M = \frac{1}{a+b}\frac{\mu_1 - S_1}{\gamma\, \sigma_1^2} + \boldsymbol{\frac{b}{a+b}}$$

Suppose firm 2 is **outside** the benchmark

$$x_2^M = \frac{1}{a+b}\frac{\mu_2 - S_2}{\gamma\, \sigma_2^2}$$

- Inelastic demand for $\boldsymbol{\frac{b}{a+b}}$ 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:

$$S_1 = \mu_1 - \gamma \Lambda \sigma_1^2 \left(1 - \boldsymbol{\lambda_M \frac{b}{a+b}}\right) \quad \text{(benchmark)}$$

$$S_2 = \mu_2 - \gamma \Lambda \sigma_2^2 \quad \text{(non-benchmark)}$$

$$S_y = \mu_y - \gamma \Lambda \sigma_y^2 \quad \text{(non-benchmark)}$$

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:

$$x_2^{D\prime} = \frac{\mu_2+\mu_y - S_2'}{\gamma(\sigma_2^2+\sigma_y^2)} \qquad \text{(Direct investors)}$$

$$x_2^{M\prime} = \frac{1}{a+b}\frac{\mu_2+\mu_y - S_2'}{\gamma(\sigma_2^2+\sigma_y^2)} \qquad \text{(Portfolio managers)}$$

- New price of non-benchmark stock 2:

$$S_2' = \mu_2 + \mu_y - \gamma\Lambda\,(\sigma_2^2+\sigma_y^2) = \boldsymbol{S_2 + S_y}$$

Suppose y is Acquired by Firm 1

- This merger moves y **inside** the benchmark

- New optimal portfolios:

$$x_1^{D'} = \frac{\mu_1 + \mu_y - S_1'}{\gamma\,(\sigma_1^2 + \sigma_y^2)} \qquad \text{(Direct investors)}$$

$$x_1^{M'} = \frac{1}{a+b}\frac{\mu_1 + \mu_y - S_1'}{\gamma\,(\sigma_1^2 + \sigma_y^2)} + \boldsymbol{\frac{b}{a+b}} \qquad \text{(Portfolio managers)}$$

- New price of stock 1

$$S_1' = \mu_1 + \mu_y - \gamma\Lambda\,(\sigma_1^2 + \sigma_y^2)\left(1 - \lambda_M \frac{b}{a+b}\right)$$

$$= S_1 + S_y + \underbrace{\boldsymbol{\gamma\Lambda\,\sigma_y^2\,\lambda_M \frac{b}{a+b}}}_{\text{benchmark inclusion subsidy (increasing in } \boldsymbol{\sigma_y^2}\text{)}} > S_1 + S_y$$

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: $\gamma\Lambda\left(\sigma_y^2 + \rho_y \sigma \sigma_y\right)\lambda_M \frac{b}{a+b}$
- No subsidy for riskless projects
- Subsidy larger if project is
  - more correlated with cash flows from existing assets (high ρ_y)
  - if risk aversion is big (high γ)
- Subsidy larger with more AUM (λ_M)

  or for large "b" (= passive management)

Quantifying the Subsidy

- Suppose twin firms that are **just inside** and **outside** the benchmark are contemplating the same project

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

- 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

		Institutional Ownership of Market		
Institutional Ownership of Benchmark		59%	67%	75%
	75%	67	35	0
	83%	133	94	51
	91%	260	215	159

Consistent with Calomiris et al. (2019)

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 λ_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