EFFICIENTLY INEFFICIENT MARKETS FOR ASSETS AND ASSET MANAGEMENT

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### SECURITY MARKETS VS. ASSET MANAGEMENT MARKETS

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#### Definition: Efficiently inefficient markets
- Inefficient enough that active investors are compensated for their costs
- Efficient enough to discourage additional active investing

#### Related literature:
- Grossman and Stiglitz (1980)
- Garleanu and Pedersen (2015)

Source: AQR, Efficiently Inefficient (Pedersen 2015).
OVERVIEW OF TALK

- Efficiently inefficient:
  How smart money invests & market prices are determined

  Book by Princeton University Press

- Efficiently Inefficient Markets for Assets and Asset Management

  Academic paper – focus of the talk
HOW DO YOU BEAT THE MARKET? LIQUIDITY AND INFORMATION

- Discretionary Long-Short Equity
  - Ainslie
  - Chanos
  - Asness
  - information on shorting over-bought stocks
  - systematic use of information and supply/demand imbalances
  - information on out-of-favor stocks

- Short Bias
  - information on policy changes and macro imbalances

- Quant Equity
  - Global Macro
  - Soros
  - information on trends vs. hedgers

- Managed Futures
  - Harding
  - information on flows due to institutional frictions in fixed income

- Fixed Income Arb.
  - Scholes
  - information about illiquid convertible bonds

- Convertible Bond Arb.
  - Griffin

- Event-Driven Arb.
  - Paulson
  - information on how to provide liquidity to sellers of merger target
Efficiently inefficient:
How smart money invests & market prices are determined

Book by Princeton University Press

Efficiently Inefficient Markets for Assets and Asset Management

Academic paper – focus of the talk
PREDICTIONS AND EVIDENCE: SECURITY MARKETS

Good investors

Bad investors

search

Good asset managers

Bad asset managers

information

Good securities

Bad securities

Source: AQR. For illustrative purposes only. Past performance is not a guarantee of future performance.
Several strategies have historically outperformed
   - Value, momentum, quality, carry, low-risk

Failure of the Law of One Price:
   - Stocks: Siamese twin stock spreads
   - Bonds: Off-the-run vs. on-the-run bonds
   - FX: Covered interest-rate parity violations
   - Credit: CDS-bond basis

Bigger anomalies when
   - Information costs for managers are high
   - Search costs for investors are high

Conclusion: Security markets are
   - not fully efficient
   - efficiently inefficient
“Old consensus” in the academic literature:

Active mutual funds have no skill:
looks only at average manager, Jensen (1968), Fama (1970)

“New consensus” in the academic literature

Skill exists among mutual funds and can be predicted:

“we find that a sizable minority of managers pick stocks well enough to more than cover their costs. Moreover, the superior alphas of these managers persist”

Skill exists among hedge funds:

“top hedge fund performance cannot be explained by luck”

Skill exists in private equity and VC: Kaplan and Schoar (2005)

“we document substantial persistence in LBO and VC fund performance”

Conclusion: asset management market is efficiently inefficient
– Good managers exist, but picking them is difficult (requires recourses, manager selection team, due diligence, etc.)

Source: AQR. For illustrative purposes only. Past performance is not a guarantee of future performance.
Institutional investors outperform retail investors
Gerakos, Linnainmaa, and Morse (2015)

“institutional funds earned annual market-adjusted returns of 108 basis points before fees and 61 basis points after fees”

Larger institutional investors outperform smaller ones
Dyck and Pomorski (2015)

Follow the smart money
Evans and Fahlenbrach (2012)

“retail funds with an institutional twin outperform other retail funds by 1.5% per year”

Conclusion: efficiently inefficient investors
- Evidence that more sophisticated investors can perform better
- These educate themselves and spend resources picking managers

SEARCHING INVESTORS:
\[ \tilde{A} - A \text{ passive} \]

ACTIVE SEARCHING INVESTORS:
\[ A \text{ active} \]

NOISE ALLOCATORS:
\[ N \]

NOISE TRADERS:

Asset managers:
\[ M \text{ informed} \]

Asset managers:
\[ \tilde{M} - M \text{ uninformed} \]

Security market:

Price \( p \)
Payoff \( v \sim N(m, \sigma_v) \)
Supply \( q \sim N(Q, \sigma_q) \)

Signal \( s = v + \varepsilon \)
Noise \( \varepsilon \sim N(0, \sigma_\varepsilon) \)
Cost \( k \)

Random allocations

Search for informed managers cost \( c(M, A) \)

Fee \( f \)
MODEL: DEFINITIONS

Searching investors: $\tilde{A} - A$ passive

Searching investors: $A$ active

Noise Allocators $N$

Noise Traders

Asset managers: $M$ informed

Asset managers: $\bar{M} - M$ uninformed

uninformed trading $x_u(p)$

informed trading $x_i(p, s)$

fee $f$

random allocations

security market

Price $p$

Payoff $v \sim N(m, \sigma_v)$

Supply $q \sim N(Q, \sigma_q)$

Signal $s = v + \varepsilon$

Noise $\varepsilon \sim N(0, \sigma_{\varepsilon})$

Cost $k$

Profit sources:
- information
- liquidity
MODEL: EQUILIBRIUM CONCEPT

General equilibrium for assets and asset management \((p, A, M, f)\)

\[ q = I x_i(p, s) + (\bar{A} + N - I) x_u(p) \]

\[ I = A + N \frac{M}{M} \]

(A) Investors’ active/passive decision is optimal

(M) Managers informed/uninformed decision is optimal

(f) Asset management fee \(f\) outcome of Nash bargaining
**Proposition.** For a given $I$:

(i) A linear asset-market equilibrium exists, $p = \theta_0 + \theta_s s + \theta_q q$

(ii) The *price inefficiency* $\eta := \frac{1}{2} \log \left( \frac{\text{var}(v|p)}{\text{var}(v|s)} \right)$ is related to the *utility gain from information*, $u_i - u_u$:

$$\eta = \gamma (u_i - u_u)$$

(iii) $\eta$ is decreasing in $I$ and given by

$$\eta = -\frac{1}{2} \log \left( 1 - \frac{\gamma^2 \sigma_q^2 \sigma^2}{I^2 + \gamma^2 \sigma_q^2 \sigma_w^2} \frac{\sigma^2}{\sigma^2 + \sigma_v^2} \right) \in (0, \infty)$$

**What’s next/new:**
- Deriving $A$ and $M$, which gives $I = A + N \frac{M}{M}$
- Deriving the fee $f$
- New testable implications
Proposition

- **Informed asset managers**: outperform passive investing before and after fees
- **Uninformed managers**: underperform after fees
- **Searching investors**: outperform net of fees, i.e. “return predictability”
  - outperformance just compensates their search costs in an interior equilibrium
  - larger search frictions means higher net outperformance, i.e., more predictability
- **Noise allocators**: outperform or underperform after fees
- **Average manager (= average investor), value-weighted**: outperforms after fees if the number $N$ of noise allocators is small relative to $A$
  - underperforms otherwise

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Asset managers: informed + Asset managers: uninformed = Searching investors: active + Noise Allocators
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Proposition

i. Lower search costs $c$:
   - More active investors $A$, more informed investors $I$, smaller price inefficiency $\eta$, lower fee $f$
   - Higher/lower $M$ and total fee revenue

ii. Vanishing search costs, $c \to 0$:
   - when $c$ sufficiently low: $A = \bar{A}$ (constrained efficiency)
   - If $\bar{A} \to \infty$, then $\eta \to 0$, $f \to 0$, $M \to 0$, and the total fee revenue $f(A + N) \to 0$ (full efficiency)
MODEL: SMALL AND LARGE INVESTORS AND MANAGERS

Investors differ in their
- size (wealth, risk tolerance)
- sophistication (search cost)

Managers may differ in their
- information cost

Searching investors: passive

Searching investors: active

Noise Allocators

Noise Traders

Asset managers: informed

Asset managers: uninformed

uninformed trading

informed trading

uninformed trading

random trading

random allocations

Security market

EFFICIENTLY INEFFICIENT
MODEL: SMALL AND LARGE INVESTORS AND MANAGERS

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random trading
Proposition (who should be active vs. passive?)

i. An investors should be
   – active if wealthy and sophisticated enough (i.e., large $W_a$ and low $c_a$)
   – passive if small or unsophisticated

ii. An asset manager should acquire information
   – if his information cost is low enough
   – otherwise rely on noise allocators
Proposition (which investors are expected to perform well?)

Investors who are more wealthy or sophisticated have higher expected returns with active managers before and after fees.

Proposition (which managers are expected to perform well?)

i. Across asset managers, returns covary positively with
   - average investor size
   - average investor sophistication

ii. Asset managers with advantage in collecting information (low $k$) earn higher expected returns
   - Asset managers with good educations from good universities and relevant experience
   - Funds that are part of fund families
Larger pension funds outperform smaller ones, e.g. in private equity

- Dyck and Pomorski (2015): "A one standard deviation increase in PE holdings is associated with 4% greater returns per year"
ECONOMIC MAGNITUDE

Proposition.
The market inefficiency $\eta$ is linked to the proportional fee $f\% = f/W$:

$$\eta = 2f\% \gamma^R$$

and squared gross Sharpe ratios:

$$\eta \approx \frac{1}{2} \left( E(SR_i^2) - E(SR_u^2) \right)$$

Example.

- Inefficiency
  $$\eta = 2 \cdot 1\% \cdot 3 = 6\%$$

- corresponding to
  $$6\% \approx \frac{1}{2} \left( 0.53^2 - 0.4^2 \right)$$
Markets are efficiently inefficient
- Security markets
- Asset management markets

Understanding efficiently inefficient markets shows
- *why* some investors and managers can outperform vs. underperform
- *who* should be active vs. passive
- *who* can be expected to outperform or underperform

Security market efficiency depends on
- Information costs
- Costs of finding good manager

Industrial organization of asset management
CONCLUSION: THE WORLD IS EFFICIENTLY INEFFICIENT

**Investing**
- Passive investing
- Active investing
  - Transaction costs and liquidity risk
  - Value investing and liquidity provision
  - Momentum investing
  - Quantitative investment

Efficiently inefficient markets:
*Active investing generates profits that compensate its costs/risks*

**Driving**
- Stay in the lane
- Switch lanes
  - Lane-switching costs, toll, and collision risk
  - Use the less-traveled road
  - Speed is picking up
  - GPS and the right app

Efficiently inefficient traffic:
*“Active driving” saves time that compensate its costs/risks*
it must be the case that
(1) before costs: \( \text{average active return} = \text{passive return} \)
(2) after costs: \( \text{average active return} < \text{passive return} \)

These assertions … depend only on the laws of addition, subtraction, multiplication and division. Nothing else is required.
Focus first on returns before fees
- Results for net returns follow from higher fees for active

Sharpe’s starting point:

\[ \text{market} = \text{passive investors} + \text{active investors} \]

\[ \text{market return} = \text{average( passive return , active return)} \]

Passive investing defined as holding market-cap weights

\[ \text{market return} = \text{passive return} \]

Conclusion: the average cannot beat the average

\[ \text{market return} = \text{passive return} = \text{average active return} \]
SHARPE’S HIDDEN ASSUMPTION

- Key implicit assumption:
  - Passive investors trade to their market-cap weights for free

- This assumption does **not** hold in the real world:
  - the market portfolio changes
    - IPOs, SEOs, share repurchases, etc.
    - index inclusions, deletions
  - investors rebalance

- Relaxing this assumption breaks Sharpe’s equality
SHARPENING THE ARITHMETIC OF ACTIVE MANAGEMENT

- IPOs, SEOs, rebalancing, etc. → passive investors must trade
  - When they do, they are likely to lose to active
  - Active informed, passive not informed

- So active worth positive fees

- Empirically, the aggregate value of active
  - Non-trivial
  - But may be lower than average active fees

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Sharpe’s (1991) famous “arithmetic of active management” states that

"it must be the case that
1. before costs, the return on the average actively managed dollar will equal the return on the average passively managed dollar, and
2. after costs, the return on the average actively managed dollar will be less..."

These assertions will hold for any time period. Moreover, they depend only on the laws of addition, subtraction, multiplication and division. Nothing else is required. [Sharpe and Morgenstern]

Sharpe’s arithmetic is often stated as incontrovertible fact by speakers at conferences followed by a triumphant “QED!” and is cited as proof that active management is “doomed” in aggregate (French 2008).

If active management is doomed, then so is our market-based financial system because we need someone to make prices informative. However, I show that Sharpe’s equality does not hold in general. His arithmetic is based on the implicit assumption that the market portfolio never changes. When we relax this assumption, which does not hold in the real world, Sharpe’s arithmetic is no longer a mathematical identity.

Sharpe’s argument ignores a key aspect of addition and subtraction; namely the addition of new firms and shares and the subtraction of disappearing ones. Although seemingly minor, the market portfolio changes importantly over time such that even “passive” investors must trade regularly, for instance to buy newly issued shares and sell those being repurchased. Whenever passive investors trade in order to maintain their market-weighted portfolios, they may trade at less favorable prices than active managers, which breaks Sharpe’s equality.

This turnover of the market portfolio is important for two reasons. First, the changes of the market portfolio are large enough that active managers can potentially add noticeable returns relative to passive investors. Second, the issuance of securities is at the heart of a market-based economy. When we put these reasons together, we see that active management can be worth positive fees, which in turn allows active managers to provide an important, beneficial role in the economy — helping to allocate resources efficiently.

Sharpe (1991 and 2013) is fighting a good and important fight in pointing out the importance of fees and the flaws of many arguments in favor of active management. I think that low-cost index funds is one

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The fraction of the market owned by an investor who starts off with the market portfolio but never trades after that (i.e., no participation in IPOs, SEOs, or share repurchases). Each line is a different starting date.

Source: Sharpening the Arithmetic of Active Management (Pedersen 2016). Shows path of an investor starting in a given year (1926, 1946, 1966, 1986, 2006) with the market portfolio and not trading thereafter. Market portfolio is all stocks included in the Center for Research in Security Prices (CRSP) database. For illustrative purposes only. Past performance is not a guarantee of future performance. Please read important disclosures in the Appendix.
Implications of Sharpe’s zero-sum arithmetic:
– Active loses to passive after fees
– Money flows passive → markets less efficient
– Surprisingly active still loses
– Eventually all money leaves active, sector is doomed

What happens if everyone is passive?

➢ All IPOs successful regardless of price
  – Everyone asks for their fraction of shares

➢ Initial result: boom in IPOs

➢ Eventual result: doom
  – Opportunistic firms fail
  – Equity market collapses
  – People lose trust in financial system
  – No firms can get funded
  – Real economy falters
THE FUTURE OF ASSET MANAGEMENT

- **My arithmetic:**
  - Suppose active loses to passive after fees
  - Money flows to passive → markets less efficient
  - Active becomes more profitable → new equilibrium, no doom

- **The future of asset management**
  - Passive will continue to grow, but towards a level < 100%
  - Systematic investing and FinTech will continue to grow
  - Active management will survive, pressure on performance and fees

- **Capital market is a positive-sum game**
  - Issuers can finance useful projects
  - Passive investors get low-cost access to equity
  - Active managers compensated for their information costs

For illustrative purposes only.
TRADING BY A “PASSIVE” INVESTOR: STOCKS AND BONDS

Source: Sharpening the Arithmetic of Active Management (Pedersen 2016). Turnover from 1926-2015 for all US listed stocks included in CRSP and the US municipal bonds, Treasury bonds, mortgage-related bonds, corporate debt, federal agency securities, and asset-backed securities, and turnover is computed as sum of absolute changes in shares outstanding as a percentage of total market value in the previous month. “Other” includes mergers that may not require trading. For illustrative purposes only. Past performance is not a guarantee of future performance. Please read important disclosures in Appendix.
TRADING BY A “PASSIVE” INVESTOR: INDICES

Source: Sharpening the Arithmetic of Active Management (Pedersen 2016). Turnover from 1926-2015 for equity indices (S&P500 and Russell 2000) and corporate bond indices (BAML investment grade and high yield indices), and turnover is computed as sum of absolute changes in shares outstanding as a percentage of total market value in the previous month. “Other” includes mergers that may not require trading. For illustrative purposes only. Past performance is not a guarantee of future performance. Please read important disclosures in Appendix.
COST OF PASSIVE AND BENEFIT OF ACTIVE

➢ Turnover of publicly traded equities
  – IPOs underpriced by 10-20% on average in the U.S. and other countries (Ljungqvist 2005)
    – 1.2% times 15% is 18bps
  – SEOs underpriced about 2%
    – 3% times 2% is 6bps
  – Other rebalancing costs

➢ Index reconstitution effects, Petajisto (2011):

  “additions to the S&P 500 and Russell 2000, we find that the price impact from announcement to effective day has averaged +8.8% and +4.7%, respectively, and −15.1% and −4.6% for deletions.”

  the lower bound of “the index turnover cost” to be “21–28 bp annually for the S&P 500 and 38–77 bp annually for the Russell 2000.”

Why can active managers outperform in aggregate?

- Example 0: non-informational investors lose to informed active managers
  - Behavioral biases
  - Leverage constrained investors
  - Pension plans hedging liabilities
  - Central banks intervening

- Example 1: IPOs, SEOs, and repurchases

- Example 2: Index additions and deletions

- Example 3: Changes in the “market” and private assets

- Example 4: Rebalancing
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