Should Passive Investors Actively Manage Their Trades?

Sida Li
University of Illinois at Urbana-Champaign
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Passively Investing in an Index, but How?

- Efficient market hypothesis supports passive investing
  - In the past decades, investors shifted toward passive investment funds for lower management fees
  - Passive mutual funds and ETFs managed 7 trillion dollars, or 14% of U.S. stock market as of 2020

- Passive funds also need to trade
  - The indexes often adjust their constituents due to market cap changes, IPOs, M&A and delists.
  - The funds need to rebalance accordingly, which generate predictable patterns of trading

- This paper: How do passive funds trade? How should they trade?
  - Use a daily holding dataset to analysis index ETFs
  - Transaction costs generate NAV return heterogeneity of ~30 bps per trade or 9.6 bps per year
    - For a $2 million retirement account accrued over 30 years, fail to save 9.6 bps per year translates to $29 thousand less assets at retirement
  - How to lower the trading costs?
Publicity of Trades

- Should uninformed traders pre-announce their trades?

- Sunshine trading (Admati and Pfleiderer 1991):
  - Uninformed traders pre-announce their trades to lower their price impact
  - Liquidity providers can estimate the informed flow better, so the market becomes more liquid

- Other factors affect the trading costs of uninformed traders
  - Predatory trading (Brunnermeier and Pedersen 2005): Predictable order flow attracts “front-runners”
    - They sell before uninformed traders sell, push price to a temporarily lower level
    - Slice-and-dice a large order can lower its market impact

- Identification challenge: given a sunshine trade, it is hard to answer “what if” the trader had conducted the trade in a camouflaged way
  - This paper compares the execution costs of sunshine trading ETFs and two types of camouflagers
    - The ETFs face exogenous rebalancing problems but take different approach in trading
### Three Types of ETFs

**Daily Portfolio Disclosure**
- **Track a public index (from S&P, MSCI, Russell, etc.)**
  - 56% of ETFs use public indexes from index companies, and mechanically follow the index reconstitution ("Sunshine ETFs")
  - Fully rebalance **on the reconstitution date at the closing auction price**
    - The index reconstitution is pre-announced at least 5 business days in advance
    - Highly transparent & predictable order flow

**Monthly Portfolio Disclosure**
- **Track a private index (from an affiliated firm)**
  - 37% of ETFs follow private indexes ("Self-indexers")
    - Do not pre-announce reconstitutions
    - Less transparent on *what* will they trade
    - Example: Schwab 1000 ETF

- **7% of ETFs use public indexes, but they do not follow the rebalance schedule of the index ("Opaque ETFs")**
  - Less transparent on *when* do they trade
  - I match them with sunshine ETFs that track the same indices
  - The fund pairs have NAV correlation of 0.9999 in non-rebalancing periods
  - Opaque ETFs outperform in rebalance periods

- **Forbidden**
  - SEC requires all self-indexers to disclose daily holdings
  - Otherwise, they are not considered passive
Sunshine ETFs Pay Largest Transaction Costs

• Predictable large trades are associated with high transaction costs

• For sunshine ETFs that mechanically follow public indexes:
  • Execution shortfall between T-5 and T0: 67 bps [t=14.49] per trade
  • Price reversal in 20 days: 19 bps [t=3.56]

• Is there any way to lower the costs?
Vanguard: Opaque in the Rebalance Schedule

“Daily reporting can encourage so-called front-running and free-riding by opportunistic traders, [which] reduce the investment performance earned by shareholders.” -- Doug Yones, head of Vanguard’s domestic equity indexing

- Unlike other major ETF providers, Vanguard doesn’t divulge the daily holdings of its stock ETFs. Instead, Vanguard reports month-end portfolio data with a 15-day lag.

“We’re not afraid of the transparency. Our daily holdings disclosure does not necessarily provide actionable information.” -- Paul Lohrey, head of U.S. iShares product design and quality.

I identify 16 pairs of funds that track the same index, managed by Vanguard and Blackrock
- Correlation of their NAVs are at least 0.9999 during non-rebalancing periods
- Do they have return differences?
Opaque (Vanguard) vs. Sunshine (Blackrock)

- Opaque ETFs’ NAV outperforms 1.8 bps around the quarterly rebalancing dates
  - 0 around placebo dates
- Translates to a 7.3 bps execution cost saving per year, or 34 bps per trade
Self-Indexing: Avoid Pre-Announcing the Trade

- Public index companies include S&P Dow Jones, FTSE Russell, MSCI, NYSE, and NASDAQ
  - These companies simultaneously sell the index to ETFs and other users
  - Hard for the ETF to eliminate order flow predictability

- 37% of ETFs track proprietary indexes
  - For example, Schwab 1000 ETF tracks the proprietary Schwab 1000 Index
  - The index is not available for subscription, much harder for outsiders to predict the reconstitution
  - I find the execution shortfall for these ETFs is only 24 bps from by T-5 to T0
  - No price reversals after the rebalancing day
Contribution: Institutional Traders’ Execution Costs

• Index reconstitutions are not driven by private information
  • A clean laboratory to separate the managers’ trade skills and stock-picking skills
  • ETFs should have been able to get better execution costs than potentially informed traders

• I document 67 bps of execution shortfall for ETF rebalance trades
  • Anand et al. (2012) uses the Ancerno data estimates the execution shortfall of 24 bps for orders sized 2.4% Average Daily Volume (ADV)
  • Di Maggio et al. (2017): 0.5% ADV, costs 10.5 bps
  • Frazzini, Israel, and Moskowitz (2012): 1.2% ADV, costs 13 bps

• The average ETF rebalance size is 1.14% ADV, so 67 bps is huge!
  • Indicates a lot of room for optimization

• Uninformed traders pay higher cost than potentially informed traders, why?
Uninformed Traders Pay Higher Cost Than Potentially Informed Traders, Why?

- ETFs pay higher execution costs because they concentrate the trade, mechanically follow the index rebalance timing, and pre-announce their trades.

- Collin-Dufresne and Fos (2015) identify activists as large informed traders.
  - They find informed traders pay lower execution costs because they spread out the trades, time the liquidity, and rush to trade before announcing their trades (13D filings).

- This paper identifies ETF rebalance flows as large uninformed traders.
  - Clean identification because:
    1. The trading decisions are exogenous, not affected by the underlying investment decisions.
    2. Answers “what if” the trader had conducted the trade in a camouflaged way.
Contribution: Impact of the Rise of ETFs

• With detailed daily holding data of ETFs, I reverse-engineer the intraday trading pattern of ETFs and show that most ETFs trade at the closing prices

• Ben-David et al. (2018): Higher ETF ownership leads to higher return volatility
  • Their conjecture: short-horizon liquidity traders on ETFs propagate to the underlying stocks
  • A higher ETF ownership increase the nonfundamental volatility of the stocks

• Bogousslavsky and Muravyev (2021), Jiang and Yao (2021): Stocks with higher ETF ownership has larger distortion in closing prices

• My paper provides a micro foundation: ETFs indeed dump the portfolio at the close
  • Large orders from ETFs distort prices (which push the price worse for themselves)
  • The abnormal trading volume is much larger than ETFs’ own rebalance size
Roadmap

• Rebalancing pace for daily-reporting ETFs

• Sunshine vs. Self-indexers (hide \textit{what} to trade)

• Sunshine vs. Opaque ETFs (hide \textit{when} to trade)

• Implications
Data

- ETF Global data with daily holdings of all U.S. listed ETFs (monthly for Vanguard), 2012 – 2020
  - Other information: full name, issuer, inception date, benchmark index, AUM, leverage ratio, listing exchange, sector exposures, put and call options volume, short interest, management fee, and total/net expenses

- I focus on the unlevered ETFs that invest in the U.S. equity market
  - Merge with CRSP, CRSP mutual fund, TAQ

<table>
<thead>
<tr>
<th></th>
<th>Mean</th>
<th>Min</th>
<th>Q1</th>
<th>Median</th>
<th>Q3</th>
<th>Max</th>
<th>Std.Dev</th>
<th>N</th>
</tr>
</thead>
<tbody>
<tr>
<td>AUM ($bn)</td>
<td>4.6408</td>
<td>0.0003</td>
<td>0.0246</td>
<td>0.2344</td>
<td>1.3246</td>
<td>327.7875</td>
<td>21.5146</td>
<td>732</td>
</tr>
<tr>
<td>Daily Trading Volume (Million)</td>
<td>0.8894</td>
<td>0.0000</td>
<td>0.0084</td>
<td>0.0372</td>
<td>0.2138</td>
<td>76.6160</td>
<td>5.1118</td>
<td>732</td>
</tr>
<tr>
<td>Inception Date</td>
<td>19930100</td>
<td>20060900</td>
<td>20131000</td>
<td>20170600</td>
<td>20201100</td>
<td>732</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Net Expenses (bps)</td>
<td>38.2575</td>
<td>3.0000</td>
<td>20.0000</td>
<td>35.0000</td>
<td>57.5000</td>
<td>106.1000</td>
<td>21.9935</td>
<td>732</td>
</tr>
</tbody>
</table>

- I categorize the benchmark indexes by S&P, FTSE, Russell, Dow Jones, MSCI, NYSE, NASDAQ as public, and those by the ETF issuer (e.g. Schwab) as private (“self-indexer”)
Rebalance Paces for Sunshine ETFs

Green bar(s) are the trades conducted by the rebalancing ETF
- Green bar(s) are not visible except on date $T$
- All daily reporting ETFs trade abruptly in 1 day

Yellow bars are the abnormal trading volume relative to $[T - 30, T - 60]$
- Much larger than the ETF’s direct trade size

Who can be in these yellow bars?
- Opaque ETFs/similar index mutual funds
- Closet indexers (active-funds-in-name-only, Cremers and Petajisto 2009)
- ETF rebalance arbitragers?
Rebalance Paces for Self-Indexing ETFs

Green bar(s) are the trades conducted by the rebalancing ETF
- Green bar(s) are not visible except on date $T$
- All daily reporting ETFs trade abruptly in 1 day

Yellow bars are the abnormal trading volume relative to $[T - 30, T - 60]$
- *Much* larger than the ETF’s direct trade size

Self-indexing ETFs also trade within 1 day

The trades are much less crowded for self-indexing ETFs
Trade within 1 Day, but When?

• The ETF holding data is in daily granularity, which provides a unique opportunity to reverse-engineer the ETFs’ intraday trading pattern.

• Trade in the open auction/continuous trading (9:30 AM – 3:59 PM)/close auction ⇒ different end-of-day NAVs for the ETF.

• Given the portfolios of the ETFs, I construct their hypothetical returns if they:
  • Rebalanced at OPEN auction prices
  • Rebalanced at VWAP (Volume Weighted Average Price in 9:30 AM – 3:59 PM)
  • Rebalanced at CLOSE auction prices

• Compare with the realized NAV returns gross of management fees charged
  • Null hypothesis: 100% of the non-Vanguard ETFs traded at the CLOSE auction prices
  • Regress the realized return on three hypothetical returns, the best hypothesis should prevail.
Both Sunshine and Self-Indexing ETFs Trade at the Closing Auction

\[ GrossRet_{i,t} = \alpha \cdot HypRet_{i,t,OPEN} + \beta \cdot HypRet_{i,t,VWAP} + \gamma \cdot HypRet_{i,t,CLOSE} + \varepsilon \]

<table>
<thead>
<tr>
<th>Sample</th>
<th>(1)</th>
<th>(2)</th>
<th>(3)</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Full non-Vanguard sample</td>
<td>Public indexers</td>
<td>Self-indexers</td>
</tr>
<tr>
<td>HypRet_{i,t,OPEN}</td>
<td>0.016</td>
<td>0.110*</td>
<td>0.004</td>
</tr>
<tr>
<td></td>
<td>(0.013)</td>
<td>(0.061)</td>
<td>(0.004)</td>
</tr>
<tr>
<td>HypRet_{i,t,VWAP}</td>
<td>-0.039</td>
<td>-0.271*</td>
<td>0.003</td>
</tr>
<tr>
<td></td>
<td>(0.033)</td>
<td>(0.150)</td>
<td>(0.009)</td>
</tr>
<tr>
<td>HypRet_{i,t,CLOSE}</td>
<td>1.028</td>
<td>1.167*</td>
<td>0.996</td>
</tr>
<tr>
<td></td>
<td>(0.020)</td>
<td>(0.089)</td>
<td>(0.009)</td>
</tr>
<tr>
<td>Obs.</td>
<td>748,039</td>
<td>555,197</td>
<td>192,842</td>
</tr>
<tr>
<td>Adj. R^2</td>
<td>0.9992</td>
<td>0.9993</td>
<td>0.9992</td>
</tr>
</tbody>
</table>

- Null hypothesis: \( \alpha = \beta = 0 \), and \( \gamma = 1 \) is not rejected
  - On average, 100% of rebalance trades happen at the closing prices

- Collinearity is modest because we have abundant observations
  - Estimated standard errors in brackets are much smaller than 1 (the effect size)
Two Measures of Execution Cost of ETFs at Stock-Level

- Define $P_t$ as the closing auction price at date $t$
  - Most (if not all) rebalances happen at close

- Execution shortfall: the price difference between the execution and the initial rebalance decision was made
  $$ES = (P_0 - P_{-5}) \times \text{Direction}$$

- Price impact: price difference between the execution and the subsequent prices
  $$PI = (P_20 - P_0) \times \text{Direction}$$

- A negative price impact means price reversal
Roadmap

• Rebalancing pace for daily-reporting ETFs

• Sunshine vs. Self-indexers (hide *what* to trade)

• Sunshine vs. Opaque ETFs (hide *when* to trade)

• Implications
Public Index Users vs. Self-Indexers

• ETF benchmarks with larger index brands are able to attract more capital from investors. (Kostovetsky and Warner 2021)

• Yet there’s a drawback: everyone can subscribe to a large branded index, and their rebalances are public information

• In July 2013, SEC eases self-indexing rules
  • No longer requires the underlying index methodology and index components to be made publicly available
  • No longer requires that changes to the index methodology be disclosed at least 60 days prior to implementation
  • Only requires daily holding disclosures (i.e., post-trade transparency)
    • Probably that’s why self-indexers still chooses to rebalance abruptly (within 1 day)
    • Impossible to simultaneously hide when and what to trade
Proliferation of Self-indexing ETFs
Execution Costs

- Execution shortfall between T-5 and T0: 67 bps \([t=14.49]\) per trade
  - I use T-5 as the rebalance decision date to provide a conservative estimation
  - Yet some index compilers pre-announce the rebalance even earlier, e.g., FTSE Russell publishes preliminary revisions 3 weeks before the rebalance day (Chang, Hong, and Liskovich 2015).
  - Smart traders can further pre-position to trade the index membership change

- Price reversal in 20 days: 19 bps \([t=3.56]\)
Public Index Users vs. Self-Indexers

Rebalance Cost\(_{i,j,t} = \beta Public_{i,j} + Controls_{i,j,t} + \eta_i + \xi_t + \varepsilon_{i,j,t}\)

- \(i\) is the index of the stock and \(j\) is the index of the ETF, \(\eta_i\) is the stock fixed effect. \(\xi_t\) is the year fixed effect. Standard errors are clustered at the stock level and year level.

<table>
<thead>
<tr>
<th>Dependent Variable</th>
<th>(1) Execution Shortfall (T-5 to T)</th>
<th>(2) Negative Price Impact (T to T+20)</th>
<th>(3) Negative Price Impact (T to T+60)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Public</td>
<td>25.72*** (5.30)</td>
<td>14.69*** (5.17)</td>
<td>30.59*** (7.95)</td>
</tr>
<tr>
<td>Log(Trade Size)</td>
<td>1.75** (0.75)</td>
<td>7.54*** (1.28)</td>
<td>8.43*** (2.42)</td>
</tr>
<tr>
<td>Log(MKTCAP)</td>
<td>-91.8*** (34.45)</td>
<td>17.07 (37.96)</td>
<td>56.85 (70.05)</td>
</tr>
<tr>
<td>Log(Price)</td>
<td>-43.84 (33.79)</td>
<td>10.78 (41.69)</td>
<td>143.66* (79.38)</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Stock FE</th>
<th>N</th>
<th>Y</th>
<th>N</th>
<th>Y</th>
<th>N</th>
<th>Y</th>
</tr>
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<tr>
<td>Year FE</td>
<td>N</td>
<td>Y</td>
<td>N</td>
<td>Y</td>
<td>N</td>
<td>Y</td>
</tr>
</tbody>
</table>

| Obs.      | 122,492 | 122,492 | 115,659 | 115,441 | 111,815 | 111,603 |
| Adj. R\(^2\) | 0.0004  | 0.1355  | 0.0002  | 0.0890  | 0.0001  | 0.1072  |
Explain the Proliferations of Self-Indexing

• Kostovetsky and Warner (2021): ETF benchmarks with larger index brands are able to attract more capital from investors.

• Industry reports usually cite the hefty fees charged by large index compilers as the reason of the proliferation of self-indexing
  • Index licensing revenue of S&P Dow Jones Indices LLC: $647 million or 3.2 bps per year for the $2 Trillion passive funds tracking the S&P indices

• I find the transaction cost saving is much larger than the licensing fees
  • Saving in transaction costs is about 30 bps per trade or 9.6 bps per year
  • The average turnover rate of self-indexing ETFs is approximately the same to sunshine ETFs
Roadmap

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• Sunshine vs. Opaque ETFs (hide *when* to trade)

• Implications
16 Pairs of ETFs that Track the Same Index

<table>
<thead>
<tr>
<th>Ticker</th>
<th>Name</th>
<th>Benchmark Index</th>
<th>Ticker</th>
<th>Name</th>
<th>Benchmark Index</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>IJS iShares S&amp;P Small-Cap 600 Value ETF</td>
<td>S&amp;P Smallcap 600 Value Index</td>
<td>9</td>
<td>IVW iShares S&amp;P 500 Growth ETF</td>
<td>S&amp;P 500 Growth Index</td>
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<tr>
<td></td>
<td>VWOV Vanguard S&amp;P Small-Cap 600 Value ETF</td>
<td>S&amp;P Smallcap 600 Value Index</td>
<td></td>
<td>VOOG Vanguard S&amp;P 500 Growth ETF</td>
<td>S&amp;P 500 Growth Index</td>
</tr>
<tr>
<td>2</td>
<td>IJR iShares S&amp;P SmallCap 600 ETF</td>
<td>S&amp;P SmallCap 600 Index</td>
<td>10</td>
<td>JWV iShares Russell 3000 ETF</td>
<td>Russell 3000 Index</td>
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<tr>
<td></td>
<td>VIOO Vanguard S&amp;P Small-Cap 600 ETF</td>
<td>S&amp;P SmallCap 600 Index</td>
<td></td>
<td>VTHR Vanguard Russell 3000 ETF</td>
<td>Russell 3000 Index</td>
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<tr>
<td>3</td>
<td>IJT iShares S&amp;P Small-Cap 600 Growth ETF</td>
<td>S&amp;P Smallcap 600 Growth Index</td>
<td>11</td>
<td>IWN iShares Russell 2000 Value ETF</td>
<td>Russell 2000 Pure Value Index</td>
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<tr>
<td>4</td>
<td>IJJ iShares S&amp;P Mid-Cap 400 Value ETF</td>
<td>S&amp;P Midcap 400 Pure Value Index</td>
<td>12</td>
<td>IWM iShares Russell 2000 ETF</td>
<td>Russell 2000 Index</td>
</tr>
<tr>
<td></td>
<td>IVOV Vanguard S&amp;P Mid-Cap 400 Value ETF</td>
<td>S&amp;P Midcap 400 Pure Value Index</td>
<td></td>
<td>VTWO Vanguard Russell 2000 ETF</td>
<td>Russell 2000 Index</td>
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<td>5</td>
<td>IJK iShares S&amp;P Mid-Cap 400 Growth ETF</td>
<td>S&amp;P Midcap 400 Growth Index</td>
<td>13</td>
<td>IWO iShares Russell 2000 Growth ETF</td>
<td>Russell 2000 Growth Index</td>
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<tr>
<td></td>
<td>IVOG Vanguard S&amp;P Mid-Cap 400 Growth ETF</td>
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<td>VTWG Vanguard Russell 2000 Growth ETF</td>
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<td>6</td>
<td>IJH iShares S&amp;P 400 MidCap ETF</td>
<td>S&amp;P Midcap 400 Index</td>
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<td>IWD iShares Russell 1000 Value ETF</td>
<td>Russell 1000 Value Index</td>
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<tr>
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<td>IVOO Vanguard S&amp;P Mid-Cap 400 ETF</td>
<td>S&amp;P Midcap 400 Index</td>
<td></td>
<td>VONV Vanguard Russell 1000 Value ETF</td>
<td>Russell 1000 Value Index</td>
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<tr>
<td>7</td>
<td>IVE iShares S&amp;P 500 Value ETF</td>
<td>S&amp;P 500 Value Index</td>
<td>15</td>
<td>JWBI iShares Russell 1000 ETF</td>
<td>Russell 1000 Index</td>
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<td>S&amp;P 500 Value Index</td>
<td></td>
<td>VONE Vanguard Russell 1000</td>
<td>Russell 1000 Index</td>
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<td>8</td>
<td>IVV iShares S&amp;P 500 ETF</td>
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<td>IWF iShares Russell 1000 Growth ETF</td>
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<td></td>
<td>VOOO Vanguard S&amp;P 500 ETF</td>
<td>S&amp;P 500 Index</td>
<td></td>
<td>VONG Vanguard Russell 1000 Growth ETF</td>
<td>Russell 1000 Growth Index</td>
</tr>
</tbody>
</table>

- Their NAV correlations on non-rebalancing periods are more than 0.9999
  - Identical holdings: They are full replicators of indexes
  - During rebalancing periods: correlation is only 0.97
NAV Divergence of Opaque and Sunshine ETFs

- Opaque ETFs disclose monthly holdings, so I can’t analysis they at stock-day level
  - Compare fund-level NAVs

- I calculate the pairwise gross-fee NAV return differences between the funds
  - $\text{ReturnDiff}_{i,t} = \text{GrossRetOpaque}_{i,t} - \text{GrossRetSunshine}_{i,t}$

- Then, I accumulate $\text{Return\_diff}$ around:
  - Quarterly rebalance dates of the underlying indexes
  - Placebo dates (rebalance dates + 1 month)

NAV divergence appears only during rebalance dates ±5 days, indicating alternative rebalance schedules
NAV Divergence of Opaque and Sunshine ETFs

- Vanguard funds outperform BlackRock funds by 1.8 bps per quarter
  - 7.3 bps annually

- Risk-return tradeoff
  - The annualized standard deviation of Vanguard funds’ excess return is 10.6 bps
  - Information ratio: $\frac{\text{Portfolio Return} - \text{Benchmark Return}}{\sigma_{\text{Tracking Error}}} = \frac{7.3}{10.6} = 0.69$
  - Represent a very good return-risk trade-off (the lifetime information ratio for Warren Buffett is 0.64)
Roadmap

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• Implications
Why do Most ETFs Still Follow the Index Mechanically?

• Risk-return tradeoff
  • Yet the information ratio of 0.69 seems too high – a typical ETF investor shouldn’t refuse it

• Agency Issue #1: A high tracking error may indicate low ability of managers
  • Some ETF managers are even explicitly compensated for low tracking errors
  • Therefore, ETF managers have high execution risk aversion, while their investors do not
  • A false signal: when it comes to rebalance, opaque ETFs has higher tracking error and higher ability

• Agency Issue #2: No incentive for the ETF manager to beat the benchmark
  • When active funds beat the benchmark, managers are awarded
  • Also, the passive manager has limited attention because they manage multiple ETFs
    • A passive ETF manager, on average, overlooks ~7 ETFs (Active ETF managers: 1.4 ETFs)
Rebalance Costs Substantially Affect the Performance of ETFs

• Predictable rebalancing strategies cost ETFs about 30 bps per trade
  • A 30 bps of one-way saving combined with 16% average turnover rate of passive funds translate to 9.6 bps of round-trip savings per year
  • For the $7 Trillion passive investment business, assuming 56% of them are not rebalancing optimally, $3.9 billions of rebalancing cost can be saved with smarter rebalancing strategies

• Comparable numbers:
  • AUM weighted average expense ratio of ETFs: 15.1 bps per year
  • Index licensing revenue of S&P Dow Jones Indices LLC: $647 million or 3.2 bps per year for the $2 Trillion passive funds tracking the S&P indices
    • Cost of developing the indices is only 1 bps per year
    • "We don’t require them [ETFs] to trade in a certain way, that’s their business not ours." -- David Blitzer, chairman of the index committee, S&P Dow Jones Indices
Long-Short Portfolio Betting Against ETF Rebalances

• I construct the long-short portfolio that rides the returns in \([T - 5, T]\)
  - Enters at the \(T - 4\) market open price and exits at the date \(T\) market close price
  - “Provides liquidity” to the ETFs on date \(T\)

• At each day’s opening, check the rebalance schedule of the public-indexing ETFs that are trading in the future 4 days

  \[ \text{Rebalance}_{\text{pct}} = \frac{\sum \text{Signed Rebalance Trades}}{\text{Market Cap}} \]
  - Allows ETF flows to cancel out on some stocks
  - Requires at least 100 stocks in the cross-section (with a non-zero \(\text{Rebalance}_{\text{pct}}\))

• Long the top 20% stocks with large anticipated ETF flow to buy, and short the bottom 20%
Portfolio Returns Controlling for FF3/Carhart4

<table>
<thead>
<tr>
<th></th>
<th>(1)</th>
<th>(2)</th>
<th>(3)</th>
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<tbody>
<tr>
<td><strong>Dependent Variable</strong></td>
<td><strong>Betting Against ETF Rebalance</strong></td>
<td><strong>Daily Returns (bps)</strong></td>
<td></td>
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<td><strong>Alpha</strong></td>
<td>1.37***</td>
<td>1.38***</td>
<td>1.38***</td>
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<td></td>
<td>[3.35]</td>
<td>[3.36]</td>
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<tr>
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<tr>
<td><strong>Adj. R²</strong></td>
<td>-</td>
<td>0.13%</td>
<td>0.13%</td>
</tr>
</tbody>
</table>

- The portfolio yields 3.45% per year
  - Can survive transaction costs because it trades only ~10 times per year

- No significant SMB and MOM loadings
Conclusion

• Index rebalances create predictable order flows from passive investing funds
  • 56% of ETFs pre-announce the rebalance ("sunshine ETFs")
    • Predictability leads to higher transaction costs
    • As uninformed traders, they pay much more than potentially informed traders!
  • Abnormal trading volume around the rebalance day is 10x larger than the ETF’s own rebalance size

• Hiding when or what to trade can help lower the execution cost
  • 7% of ETFs ("opaque ETFs") make rebalances less predictable
    • Outperform sunshine ETFs by 7.3 bps per year
  • 37% of self-indexing ETFs track indexes that do not pre-announce rebalances
    • Saves 30 bps per trade or 9.6 bps per year
    • Estimated total saving for passive investors: $3.9 billion, or ~60% of the management fees charged

• When it comes to trading, don’t be passive!