Does Search Engine Visibility Help ETFs Attract Flows?

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Motivation

- Competition among exchange-traded funds (ETFs) led to a noticeable reduction in their fees (Investment Company Institute (2024)).
- When price and quality competitions are limited, other forms of competition may intensify (Scitovsky(1950)).
- Online space is important:
  - Consumers search for products online, for example, using Google.
  - Companies market and sell their products using online channels.

My main question: How online activities affect capital formation process in the asset management industry?

Main steps

1. Propose a novel methodology to calculate a set of descriptive metrics of search engine visibility using the web analytics data.
2. Apply the methodology to the U.S. ETFs.
3. Design empirical tests to deal with various econometrics issues (endogeneity, unobservability of consumers' characteristics, etc)
4. Study whether better visibility on the search engine helps ETFs to attract more capital?

Three datasets merged

I download and scrape data for the period of September 2019 through February 2021 from three sources:

1. ETFDB database.
    - ETFs' webpages URLs.
2. Bloomberg.
    - ETFs market data: performance, NAV, shares outstanding, contract.
3. SEMRush Web Analytics (main dataset).
    - Web analytics, 20B+ organic keywords, 1B+ ads, backlinks.

SEMRush web analytics data

SEMRush collects historical data on Google's Search Engine Reporting Pages (SERP).

- Provides database of keywords that exceeds 20 billion keywords and covers 142 geographical regions.
- Scrapes top 100 URLs on the Google SERP for each keyword in its database on a monthly basis.
- Records information on paid and organic search results, $\Omega_{i,t} = \{\Omega_{i,t}^{paid}, \Omega_{i,t}^{org}\}$, for which the webpage i appears on the Google SERP in month t.

Web analytics variables

For every keyword $\omega \in \Omega_{i,t}$ of the webpage i in month t:

- $\text{Rank}_{i,t}(\omega)$ is the rank of the webpage i on Google's SERP for the keyword ω;
- $PPC_t(\omega)$, is the Google ads auction-determined price-per-click (PPC) for the keyword ω;
- $SVol_t(\omega)$ is the estimated search volume for the keyword ω;
- $\#\text{Clicks}_{i,t}(\omega)$ is the estimated number of clicks on the webpage i from the keyword search ω.

Illustrative example

ETF i has webpage URL "ETF URL".

Organic keywords

$$\Omega^{org}_{i,t} = \{\text{Keyword } 1, \text{Keyword } 2\}$$

$$\text{Rank}_{i,t}(\text{Keyword } 1) = 5$$
$$\text{Rank}_{i,t}(\text{Keyword } 2) = 2$$

Paid keywords

$$\Omega^{paid}_{i,t} = \{\text{Keyword } 3\}$$

$$\text{Rank}_{i,t}(\text{Keyword } 3) = 1$$

Wordcloud of keywords

Subsamples of keywords

Summary Statistics

- No ad auctions ($PPC = 0$)
- Buy intentions ($\Omega^1 = \{$buy, invest$\}$)
- Sell intentions ($\Omega^2 = \{$sell$\}$)
- Fund types ($\Omega^3 = \{$index funds, mutual funds,...$\}$)
- Asset classes and popular indices ($\Omega^4 = \{$stocks, bonds,...$\}$)
- Names of ETF issuers ($\Omega^5 = \{$Blackrock,ishares...$\}$)

Search engine marketing

I construct the proxy for whether ETF i uses the search engine marketing (SEM) in month t:

$$\text{SEM}_{i,t} = \begin{cases} 1, & \text{if ETF engages in SEM} \\ 0, & \text{otherwise.} \end{cases}$$

Search engine marketing cost

I use the price-per-click (PPC) and the estimated number of clicks on the webpage across all paid keywords $\Omega_{i,t}^{paid}$ of the ETF i in month t to calculate the fund's expenses on search engine marketing:

$$\text{SEMCost}_{i,t} = \begin{cases} \sum_{\omega \in \Omega_{i,t}^{paid}} \text{PPC}_t(\omega) \cdot \#\text{Clicks}_{i,t}(\omega), & \text{if ETF engages in SEM} \\ 0, & \text{otherwise.} \end{cases}$$

Effects of Search Engine Visibility

The expected benefits for a fund from having its webpage on the search engine results page (SERP) depend on the two components:

$$\Big[\text{Number of Clicks}\Big] \times \Big[\text{Value of Click}\Big].$$

Since a fund appears at results pages for many queries, expected benefits have to be aggregated across all keywords.

Search engine visibility: Average SERP rank

I construct a proxy for the number of clicks as the average SERP rank by aggregating the rank of the ETF i's webpage in month t across all keywords with weights proportional to keyword's overall search volume:

$$\overline{\text{Rank}}_{i,t} = \frac{\sum_{\omega \in \Omega_{i,t}} SVol_t(\omega) \cdot \text{Rank}_{i,t}(\omega)}{\sum_{\omega \in \Omega_{i,t}} SVol_t(\omega)}.$$

The webpages with lower average rank have better online visibility and higher chances to get clicks.

Search engine visibility: Average page

Google (usually) displays 10 URLs on each page of SERP. To capture potential non-linearity in relationships, I construct the dummies:

$$\text{Page}^1_{i,t} = \mathbb{1}[1 \leq \overline{\text{Rank}}_{i,t} \leq 10];$$

$$\text{Page}^2_{i,t} = \mathbb{1}[10 < \overline{\text{Rank}}_{i,t} \leq 20];$$

$$\text{Page}^3_{i,t} = \mathbb{1}[20 < \overline{\text{Rank}}_{i,t} \leq 30];$$

$$\text{Page}^4_{i,t} = \mathbb{1}[30 < \overline{\text{Rank}}_{i,t} \leq 40].$$

$$\text{Page}^5_{i,t} = \mathbb{1}[40 < \overline{\text{Rank}}_{i,t} \leq 50].$$

Search engine visibility: Value of click

I construct a proxy for the value of a click as the average value of a click by aggregating $\mathrm{PPC}_{i,t}(\omega)$ of the ETF i's webpage in month t over all keywords with weights proportional to keyword's overall search volume:

$$\overline{\mathrm{PPC}}_{i,t} = \frac{\sum\limits_{\omega \in \Omega_{i,t}} \mathrm{SVol}_t(\omega) \cdot \mathrm{PPC}_{i,t}(\omega)}{\sum\limits_{\omega \in \Omega_{i,t}} \mathrm{SVol}_t(\omega)}.$$

A higher average PPC signals that advertisers especially value traffic from pages where a fund is shown among search engine results.

Bloomberg data

Sample of 1,784 US ETFs from September 2019 to May 2021.

For ETF i in month t:

- Benchmark index;
- Asset class;
- Net asset value, $P_{i,t}$;
- Shares outstanding, $\text{ShrOut}_{i,t}$;
- Expense ratio, Fee_i.

$$\%\text{Flow}_{i,t} = \frac{(\text{ShrOut}_{i,t} - \text{ShrOut}_{i,t-1}) \cdot P_{i,t}}{\text{ShrOut}_{i,t-1} \cdot P_{i,t-1}}.$$

Summary Statistics

Main Fund Flows Regression

I estimate the relationship between ETF's fund flows and measures of online visibility using the following panel regressions with controls and fixed effects:

$$
\begin{aligned}
\mathrm{Flow}_{i,t+1} = {} & \alpha_0 + \alpha_{rank} \cdot \overline{\mathrm{Rank}}_{i,t} + \alpha_{PPC} \cdot \ln(\overline{\mathrm{PPC}}_{it}) + \alpha_{link} \cdot \ln(\#\mathrm{Links}_{it}) + \\
& + \sum_{n=1}^{4} \alpha_R^n \cdot R_{it}^n + \alpha_{flow} \cdot \mathrm{Flow}_{i,t} + \alpha_{size} \cdot \ln(\mathrm{Size}_{i,t}) + \\
& + \alpha_{age} \cdot \ln(\mathrm{Age}_{i,t}) + \alpha_{fee} \cdot \mathrm{Fee}_i + \alpha_{\%ba} \cdot \%\mathrm{BASpread}_{it} + \\
& + \lambda_{asset} + \lambda_{issuer} + \lambda_t + \epsilon_{i,t+1}.
\end{aligned}
$$

Problem: Ranking endogeneity

In regressions of fund flows on rankings, SERP rankings are endogenous:

- Google employs sophisticated algorithms and use information about users' choices for determining positions.
- Products with higher likelihood of being clicked are likely to be positioned at the top of SERP.

The previous literature suggested a number of solutions: Narayanan and Kalyanam (2015), Ghose et.al.(2009), Ghose et.al.(2014), Rutz et.al.(2012), Blake et.al(2015), and Ursu(2018).

My approach

- Exclude sponsored listings and focus on organic search results.
  - Users search for various purposes, so the correlation should be weaker.
  - Janssen et al. (2023) provide theoretical arguments for why it might be optimal for Google to randomly assign organic search positions.
- Control for variables, such as the number of backlinks, that are known to affect both ranks and flows. Control for time, issuer, asset class fixed effects.
- Perform analysis on subsamples of keywords to better control for customers' characteristics.
- Check results for ETFs tracking the same index.

Fund Flows and SERP Positions: Results

I obtain the following results:

$$
\begin{aligned}
\%\mathrm{Flow}_{i,t+1} = & \underset{(0.012)}{0.051}^{***} \cdot \mathrm{Page}^1_{it} + \underset{(0.009)}{0.045}^{***} \cdot \mathrm{Page}^2_{it} + \underset{(0.008)}{0.028}^{***} \cdot \mathrm{Page}^3_{it} + \\
& + \underset{(0.008)}{0.021}^{**} \cdot \mathrm{Page}^4_{it} + \underset{(0.008)}{0.007} \cdot \mathrm{Page}^5_{it} + \underset{(0.002)}{0.013}^{***} \cdot \ln(\overline{\mathrm{PPC}}) + \\
& + \mathrm{Controls}_{it} + \text{Fixed Effects} + \epsilon_{i,t+1}.
\end{aligned}
$$

These results are robust to various specifications (only organic keywords, subsamples with ad auctions and w/o them, subsamples that exclude Ω_1, Ω_2, Ω_3, Ω_4, and Ω_5).

Results: Sample of ETFs with the Same Benchmark

	(1)	(2)	(3)	(4)	(5)
$\overline{\text{Rank}}$	-0.001***	-0.001***	-0.001***	-0.001**	-0.000
	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)
$\ln(\overline{\text{PPC}})$	0.022***	0.014**	—	0.016**	0.008***
	(0.006)	(0.007)		(0.006)	(0.003)
ln(#Links)	0.003	0.007**	0.008**	0.007**	0.007*
	(0.003)	(0.003)	(0.003)	(0.003)	(0.004)
Controls	Yes	Yes	Yes	Yes	Yes
Time FE	Yes	Yes	Yes	Yes	Yes
Issuer FE	Yes	Yes	Yes	Yes	Yes
Index FE	Yes	Yes	Yes	Yes	Yes
Sample	Ω	Ω^{org}	$\Omega^{org} \mid PPC = 0$	$\Omega^{org} \setminus \Omega^3$	$\Omega^{org} \setminus \bigcup_{i=1}^{5} \Omega^i$
#Obs.	1,798	1,798	1,798	1,798	1,798
Adj.R^2	0.130	0.213	0.212	0.213	0.213

Results are similar even for the smaller sample of funds tracking the same indices with index FE.

SEM Results

	(1)	(2)	(3)
SEM	0.020*	—	0.016
	(0.010)		(0.023)
ln(SEM Expense)	—	0.002	
		(0.002)	—
SEM * Top5%	—	—	0.005
			(0.024)
Controls	Yes	Yes	Yes
Time FE	Yes	Yes	Yes
Issuer FE	Yes	Yes	Yes
Asset class FE	Yes	Yes	Yes
Sample	Ω	Ω	Ω
#Obs.	21,219	21,219	21,219
Adj.R^2	0.122	0.122	0.122

ETF's fund flows: Variance decomposition

I do variance decomposition to analyze how important are measures of online activities for explaining fund flows:

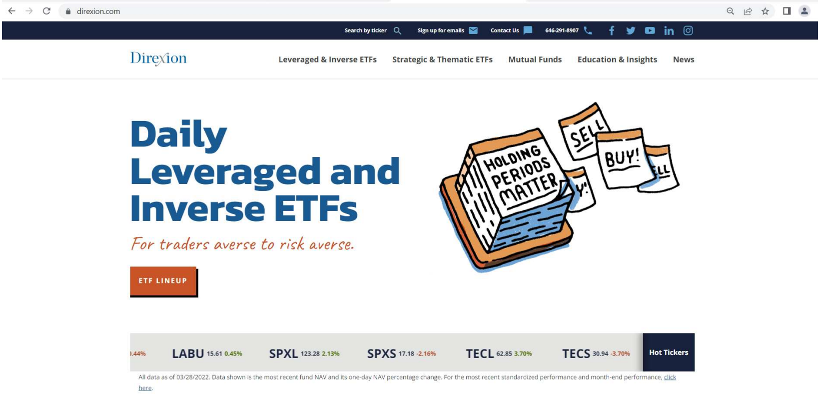
Fixed Effects	Age	Past returns	Size	**Google**	BA spread	**SEM**	Fees	Past flows
45.6%	23.0%	16.3%	11.5%	**1.9%**	0.8%	**0.5%**	0.2%	0.2%

In additional to conventional factors, the fund's visibility on Google explains 1.9% of fund flows; this is more than funds' fees, past flows, and liquidity. SEM explains 0.5%.

Conclusion

1. Financial companies do use online marketing tools to gain advantage in attracting funds.
2. Search engine visibility is important for an ETF's capital formation:
   - ETFs that engage in search engine marketing(SEM) attract more flows in the next quarter.
   - ETFs with web pages that, on average, position higher on Google get higher future fund flows.
   - The quality of traffic proxied by the average pay-per-click is important.
3. The online visibility and SEM of an ETF explains an additional 2.5% of the variation in ETF fund flows (besides age, past performance, and size of the fund).

Paid search: Direxion homepage



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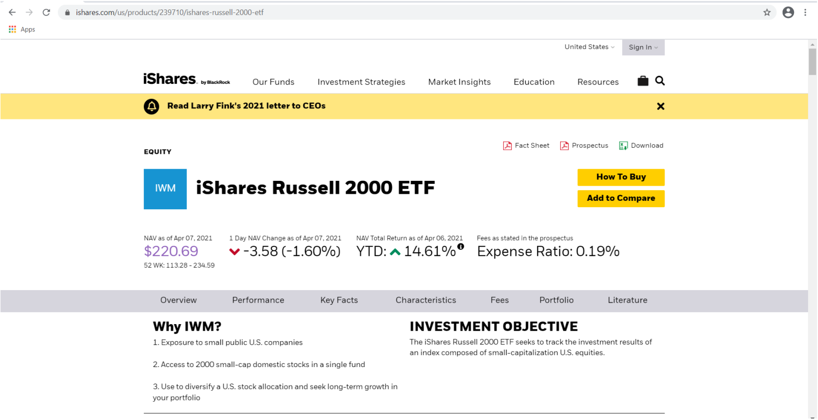
Organic search: iShare IWM webpage



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Summary stats: All keywords

	#Keywords (millions)	PPC=0 (%)	PPC($) | PPC > 0 avg	med
Set Ω	1.674	64%	5.17	3.82
Set with auctions	0.609	0%	5.17	3.82
Set w/o auctions	1.065	100%	0.00	0.00

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Bloomberg: Summary stats

	AuM ($) (billions)	Volume ($) (billions)	Return	Fee (bps)	%BA spread (bps)	Age (years)
All	3.12	0.80	0.002	44	25	8.1
Page 1	11.62	1.49	-0.020	21	9	10.6
Page 2	5.94	2.05	0.019	40	18	11.6
Page 3	3.31	1.30	0.004	43	23	9.2
Page 4	1.97	0.45	0.001	43	27	7.4
Page 5	1.82	0.33	-0.006	46	29	6.5
Pages Below	0.86	0.16	0.005	58	32	6.4

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