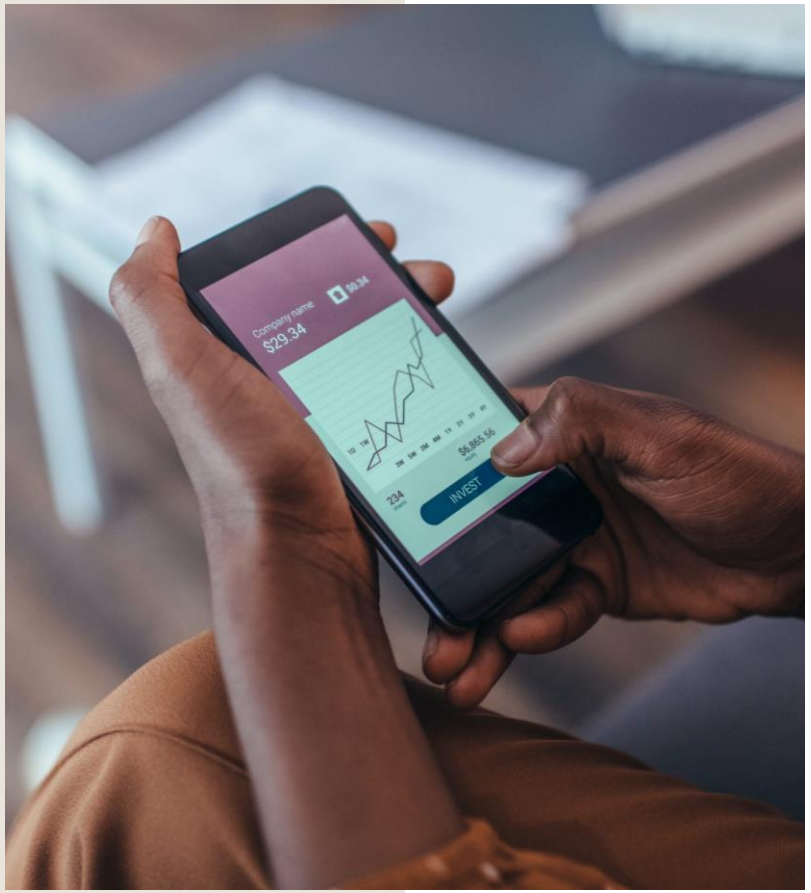
Master Thesis defense
16/06/2022

Core ETFs
Tracking Error & Performance



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Core ETFs

Choice of theme

Exponential growth

AUM in ETFs soared from **$16bn** in 1998 to **$10tn** in Dec. 2021.

In the last decade, ETF providers have developed '**Core**' segments to answer to a division of the ETF market between broad-based and specialized ETFs.

The study of their performance and efficiency therefore demands attention.

Retail investors

The rise of **retail investing** in the post-Covid era led to major changes in the investing world.

If part of those retail investors "YOLO" in investing, this democratization led to a rise in retail investors seeking l**ong-time growth**.

Providing those investors with useful tools can help avoid investing pitfalls.

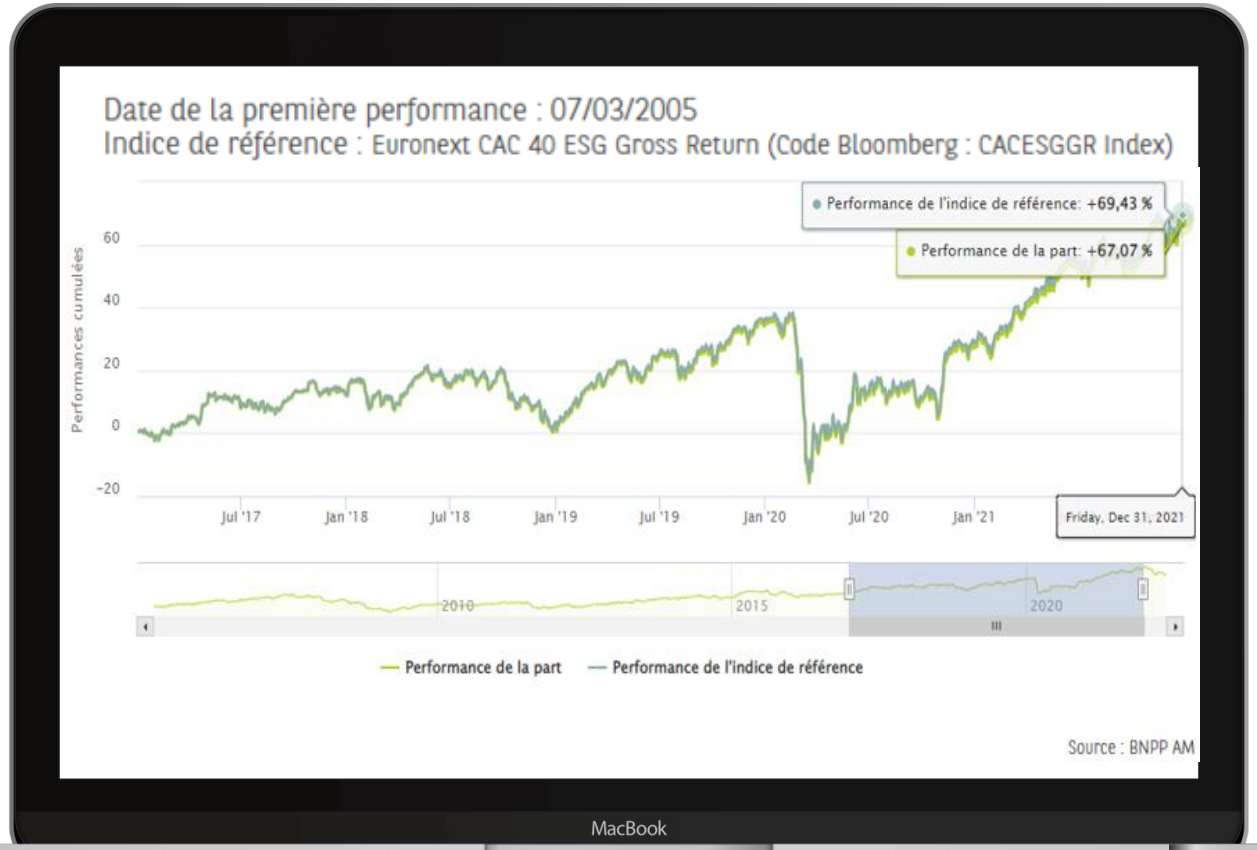
Access to information

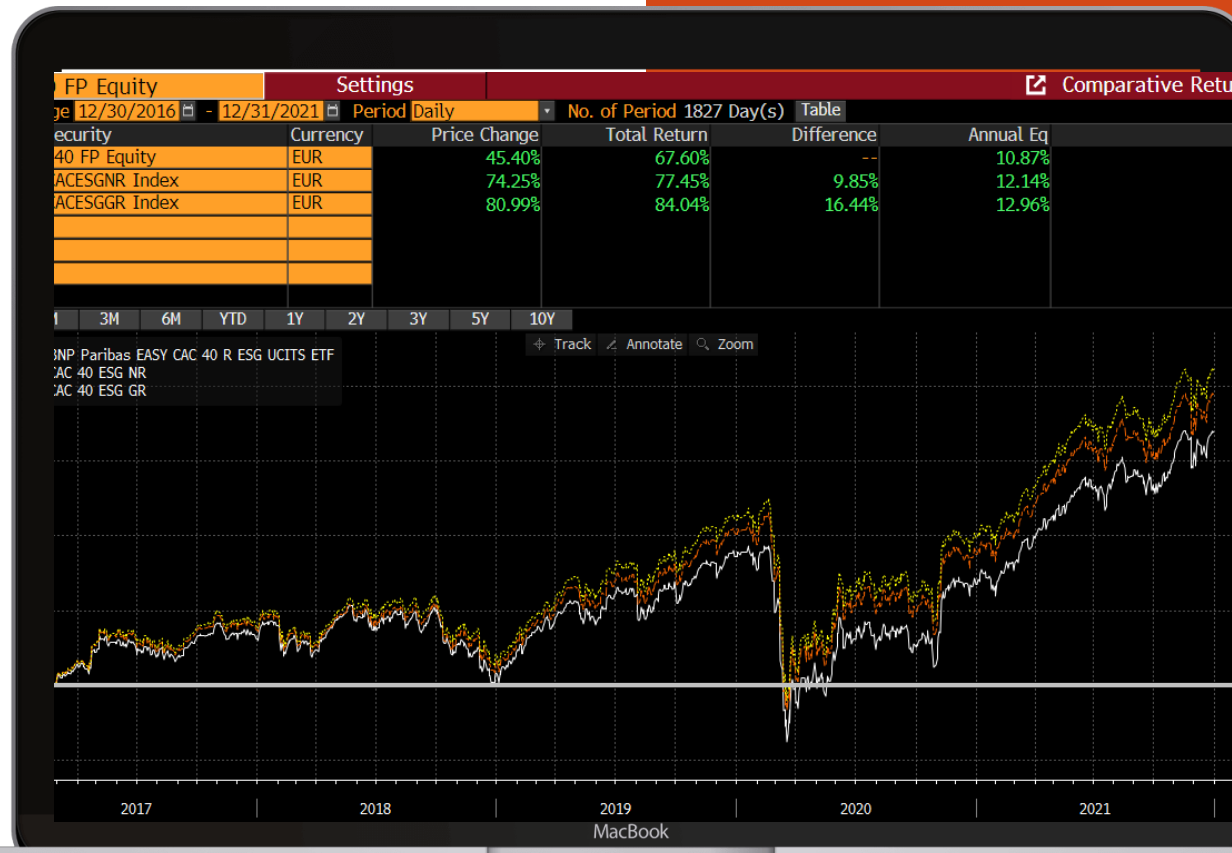
Researching ETFs leads to the conclusion that accessing information and understanding it is not always **accessible** for untrained retail investors.

ETFs providers can publish **misleading** information for the unexperienced and data is often hidden behind **paywalls** or proprietary software.

Focus

Access to information





- Same ETF and same benchmark used in both graphs, first extract from the ETF provider website, second extracted from Bloomberg.
- Striking difference in performance according to the data source, and little to no way to find more precise data from the ETF provider on the computation method used to get the benchmark returns.

Objectives & Hypotheses

01

Efficiency

Study the efficiency of Core ETFs and their evolution over time as well as their determinants.

02

Useful tips

Provide useful tips to retail investors to allocate assets in a world filled with dominated products and provide them with easy to use and to understand measures.

03

Literature

Build on the small amount of literature available with a particular focus on Core ETFs and on the European sector.

European Core ETFs experience Tracking Error and it has decreased over time because of the democratization of the product.

The determinants of this Tracking Error developed in the existing literature are also applicable to Core ETFs.

Core ETFs

Methodology

Desk research

- Have a deep understanding of the ETF market, of the Tracking Error and its determinants as well as of the limits of those measures as performance indicators.
- Take as a theoretical anchor the existing research to develop a relevant methodology.

Data Selection

- Filter a subset of Core ETFs available to European investors representative of the segment.
- Extract sufficient data for the technical analyses to be performed.
- Experience the limits retail investors face upon researching ETFs.

Efficiency measurements

- Compute daily, weekly and monthly Tracking Difference to study the overperformance of the ETFs in the sample.
- Compute the daily, monthly, weekly Tracking Error of the ETFs in the sample according to the methods developed in the existing literature.
- Test the significance of the computed Tracking Error.
- Study the evolution of the Tracking Error over time.

Performance measurements

- Compute the Tracking error through OLS regressions to verify previous findings in the literature.
- Use the alpha computed to study the overperformance of the ETFs in the sample.
- Use the Information Ratio as a simpler risk-adjusted measurement to rank the ETFs in our sample.

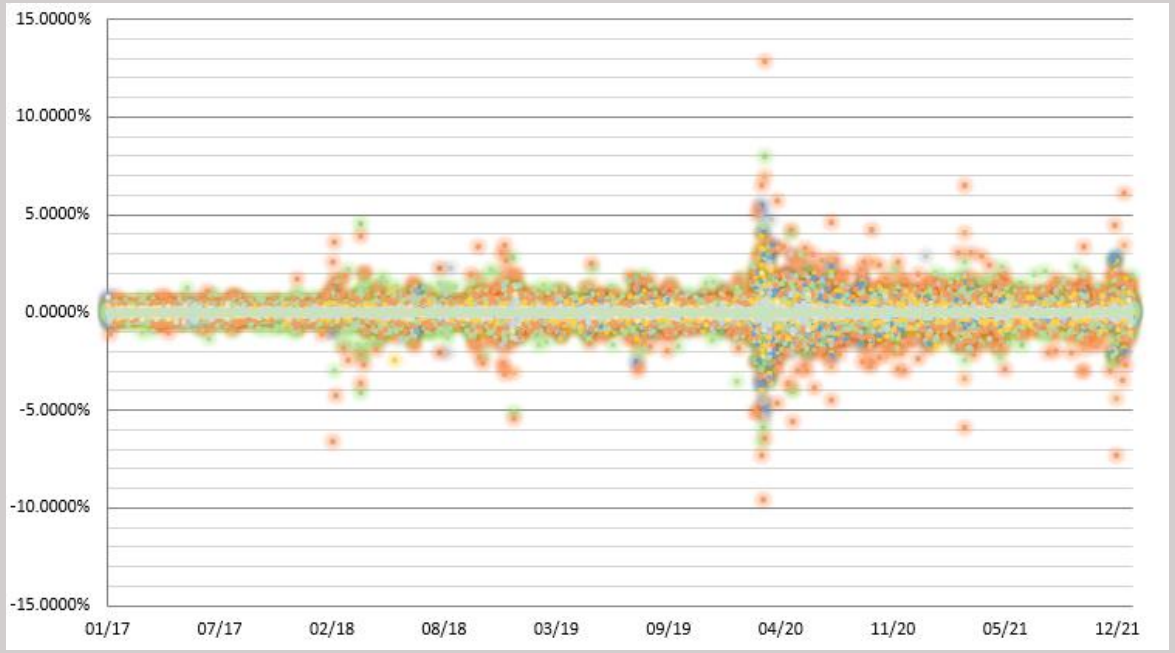
Determinants' Analysis

- Run OLS regressions to control for the most commonly accepted determinants of the TE: size, TER, volatility, replication method, dividend yield.
- Provide tips to retail investors based on the results regarding the determinants.

Core ETFs

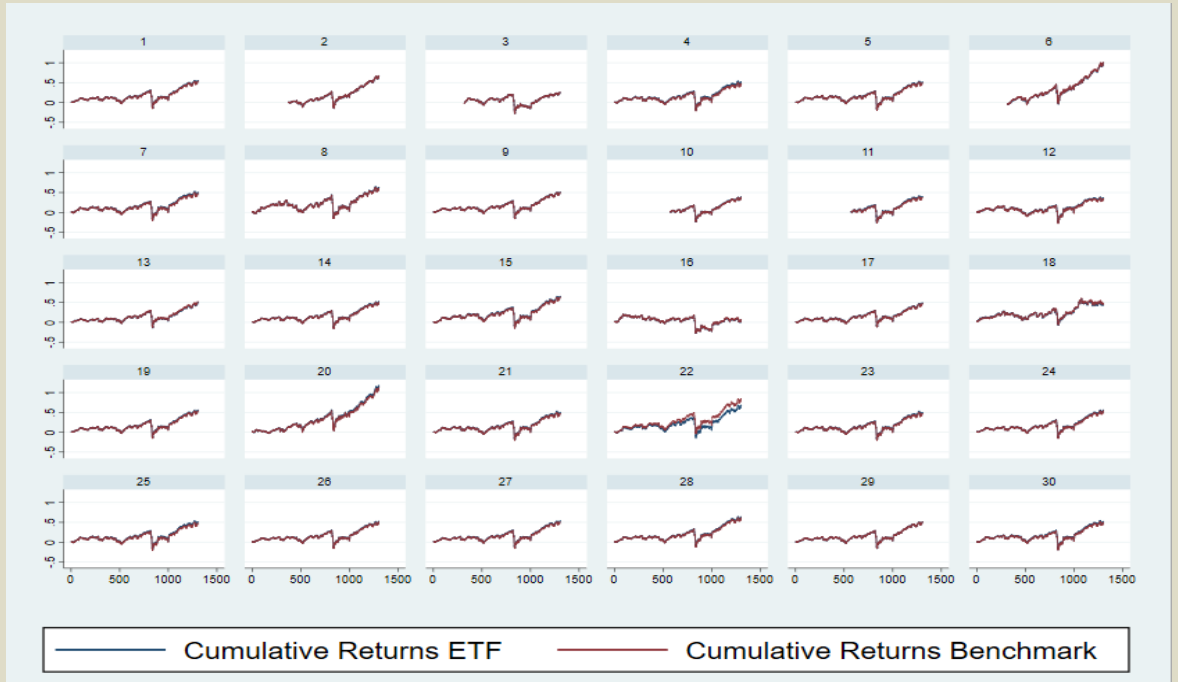
Findings 1

Tracking Difference



- Visible increase of the Tracking Difference over time.
- Clusters of deviations in Feb. 2018, Dec. 2018 and March 2020.
- Low overall Tracking Difference, consistent with broad-based ETFs.

Cumulative returns

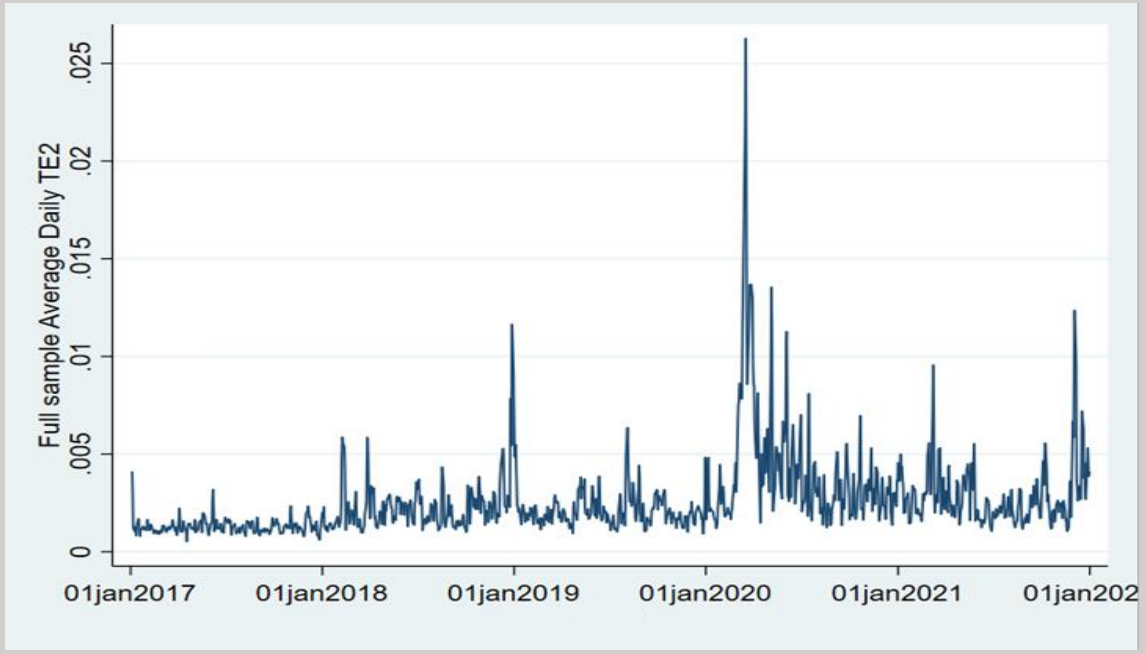


- Meaningful deviations in returns for all ETFs from their benchmarks.
- 26 out of 30 ETFs overperforming their benchmarks.
- Inconsistencies in performance with striking under or overperformers.

Core ETFs

Findings 2

Full sample average TE2



- Visible increase of the Tracking Difference over time.
- Clusters of deviations in Feb. 2018, Dec. 2018 and March 2020.
- Low overall Tracking Difference, consistent with broad-based ETFs

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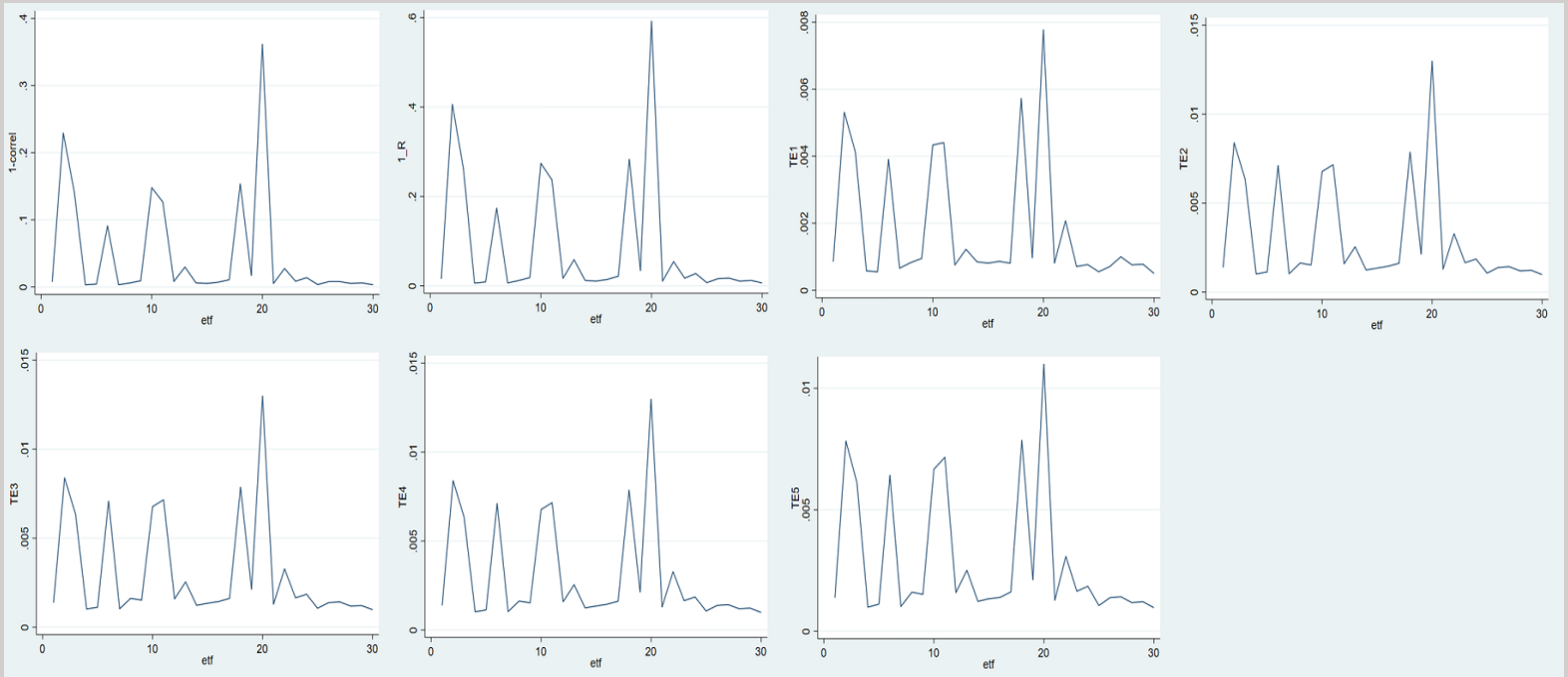
- Visible inconsistency in Tracking efficiencies among ETFs in the sample.
- Clusters of deviations in Feb. 2018, Dec. 2018 and March 2020.
- Average TE very low, consistent with broad-based ETFs.

Core ETFs

Findings 3

Tracking ability measures and proxies



- Potential use of R^2 and correlation as proxies for Tracking Error measurements.
- Visual increase of Tracking Error during period of financial crisis.
- Relative consistency of Tracking Error among the different measurement methods.
- Information Ratio ranking providing a better view of the best performing ETFs and of the best performing providers.

Performance, Tracking ability and Information ratio rankings

Rank	Ranking Perf.	Ranking TE2	Ranking IR
1st	20	30	4
2nd	11	4	25
3rd	4	7	7
4th	25	25	30
5th	10	5	28
6th	7	28	21
7th	30	29	15
8th	23	14	14
9th	28	21	5
10th	21	15	23
11th	15	1	1
12th	14	26	27
13th	24	27	12
14th	19	16	26
15th	12	9	24
16th	27	12	19
17th	1	17	8
18th	5	8	11
19th	26	23	17
20th	8	24	9
21st	17	19	10
22nd	6	13	20
23rd	9	22	3
24th	3	3	6
25th	2	10	2
26th	29	6	29
27th	18	11	18
28th	16	18	13
29th	13	2	16
30th	22	20	22

Core ETFs

Findings 4

Tracking Error evolution

2017-2019 vs 2019-2021

Variable	Difference	t	P-value	Significance
TE1_2 – TE1_1	5.39E-06	0.0968	0.9229	-
TE2_2 – TE2_1	0.0009117	11.9118	0.0000	1%
TE3_2 – TE3_1	0.001413	12.6717	0.0000	1%
TE4_2 – TE4_1	0.0009115	11.911	0.0000	1%

- High significance of the t-tests performed to check the difference in means for all Tracking Error measurements.
- Positive mean of the difference indicates an overall increase of the Tracking Error over the past 2.5 years, contradicting our initial hypothesis.
- Determinants of the Tracking Error found significant at the 1% level except for dividend yield du to insufficient observations.
- Surprising positive coefficient for size and negative coefficient for TER, demanding more research.

Determinants of the Tracking Error : OLS regression results

Determinant	Significance	Expected sign	Regression coefficient sign
Size	1%	Negative	Positive
Synthetic replication	1%	Positive	Positive
TER	1%	Positive	Negative
Volatility	1%	Positive	Positive
Dividend Yield	Not significant	-	-

Core ETFs

Learnings

Conclusion

- Significant Tracking Error for European Core ETFs, mostly positive du to the distinction between Net and Gross Index returns.
- Large deviations between ETFs in the sample in terms of Tracking Efficiencies., amplified in time of market crisis.
- Overall increase of the Tracking Error in our sample over the past 2,5 years.
- Potential use of R^2 and correlation as proxies of the Tracking Error.
- Information ratio found to be an easy to compute and understand measurement for retail investors.
- Size, TER, Volatility and Replication Method found to be explanatory variables of the Tracking Error.

Limitations

Although carried out with great seriousness, rigor and investment, this study remains improvable on certain points :

- Limited existing literature.
- Only focus on European Equity ETFs.
- Net return Indexes vs Gross return indexes.
- Data extraction issues.
- Covid-19 impact.

Developments

Potential research opportunities developed in this study encompass:

- Impact of Covid-19 on the Tracking Error and of financial crisis on tracking efficiency.
- Further research on the apparent growth of the Tracking Error over time.
- Use of ‘quick-and-easy’ measures such as correlation and R^2 as proxies for the Tracking Error for retail investors.
- Study of Core ETFs over a larger sample of not only European ETFs.

Thank you !

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