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Pursuing the aim of Exchange Traded Funds at the time of Covid-19

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Abstract

In this paper an endeavour was made to evaluate the impact of Covid-19 on the achievement of the investment objectives by selected ETFs in developed and emerging markets. For this purpose, the tracking errors calculated for 18 different ETFs operating on the basis of American, Asian and European stock indexes were analyzed.
The time range of the research was selected in such a way as to compare the period before the pandemic(pre-Covid) and the period after the pandemic (post-Covid). The research results show that the outbreak of the coronavirus pandemic has not had a negative impact on the degree of implementation of the investment objective, regardless of the degree of market development. For each of the analyzed markets, the calculated tracking errors were not higher in the post-Covid period as compared to the pre-Covid period. In the vast majority of cases, they were even lower. This means that the management of the ETF has run smoothly in the most turbulent period of the 21st century.

Keywords: ETF; Covid-19; financial market; stock indexes

Introduction

The history of Exchange Traded Funds (ETFs) is relatively short, especially when compared with the history of other similar investment products available on the financial market, such as mutual funds or even index funds.The appearance of the latter in the 1970s gave rise to the operation of the passive funds segment (Bogle, 2016), which include the vast majority of ETFs (Perez, 2012; Zawadzki, 2021). The first ETFs were established successively in Canada, the USA and Japan in the first half of the 1990s (Foucher & Gray, 2014; Zawadzki, 2020). The dynamic development of ETFs over the past years confirms the position of researchers who recognize this type of funds as the largest and most successful financial innovation in the field of investments (Deville, 2008; Antoniewicz & Heinrichs, 2014; Amenc et al., 2017). This is reflected in numerous and constantly growing scientific studies dealing with issues related to the functioning of the ETFs market.

In the world literature, studies can be found referring to three main thematic categories related to ETFs (Charupat & Miu, 2013). The first study examines the degree of implementation of the investment objective by the fund. In the case of passively managed ETFs, it is the most accurate representation of the rate of return obtained by the index on the basis of which the fund operates.The second group of studies refers to the effectiveness of the valuation of ETFs, which consists in determining the differences between the market valuation of ETFs and their net asset value (NAV). The consequence of this works is the determination of the factors influencing the emergence of these differences and the pace at which the arbitrage between different levels of the price of ETF shares and the value of the fund's assets is declining. (Bas & Sarioglu, 2015). Finally, in the third one, researchers are interested in the relationship between ETF's units and the financial instruments (shares, futures, etc.) that are part of the benchmark on the basis of which ETFs are operating. The available studies focus in particular on attempts to determine the impact of ETFs on the trading volume and the exchange rate margin of related financial instruments.
The research presented in this paper refers to the first of the three categories mentioned. The main objective is to investigate how the outbreak of the Covid-19 pandemic influenced the degree of achievement of the investment

objectives by selected ETFs in developed and emerging markets. So far, few studies have been conducted to compare developed and emerging ETF's markets (Zawadzki, 2020), however, they have not focused on the period of the coronavirus pandemic. In 2020 ETFs faced unprecedented market volatility. The management of ETFs in such conditions seems difficult, which should be reflected in the problems with mapping the benchmark rate of return. In this study, it will also be verified whether the level of market development has had an impact on the investment results achieved by ETF managers.

The structure of the paper is as follows: section two describes the current state of knowledge on Exchange-Traded Funds as a form of passive funds. The third section presents the tools for the measurement of ETF performance, called tracking errors. The fourth section deals with the results of the empirical analysis divided into two periods –prior the Covid 19 and at the time of Coronavirus. In the last section, the main conclusions are discussed and suggestions for future research are made.

The tools for the measurement of ETF performance

The basic tools for measuring the effectiveness of the degree of achievement of the investment objective include those related to estimating the tracking difference (TD) and tracking error (TE). Even though ETFs are assumed to follow the movement of the indexes accurately, in practice the returns on investments in ETFs differ from the rates of return of the replicated index (benchmark). The difference between the investment results achieved by an ETF fund and at the same time the results of the replicated index is referred to as the tracking difference. For example, if the return rate of a fund's investment is calculated at 10 % p.a., whereas the return rate of the benchmark equals 11 % p.a., it means that the tracking difference was -1% p.a. The formula for calculating the tracking difference at time t is as follows (Madhavan, 2016):

$$TD_t = (p_t - p_{t-1}) - (I_t - I_{t-1})$$

where:
p_t - ln NAV values of the ETF fund at the end of period t,
p_{t-1} - ln NAV values of the ETF fund at the end of period t-1,
I_t - ln value of the income index (adjusted for dividend payment) at the end of the period t,
I_{t-1} - ln value of the income index (adjusted for dividend payment) at the end of the period t–1.

Even if the return rate on the index differs from the return rate generated by the NAV of the ETF, this ought not to be a significant discrepancy. The tracking difference is utilised to identify potential revenues and costs that determine the occurrence of deviations from the index value.

The tracking difference is frequently confused with the term tracking error. In reality, however, these terms are not the same, as the TE allows the determination of the volatility of differences in the return rates generated by the ETF compared to the index on which the fund operates. That is the reason why it is rather a qualitative measure. Additionaly, the TE may be subject to both ex post and ex ante measurements. The TD applies only to ex-post calculations. In the analysis of historical data, the tracking error is calculated either as the standard deviation of differences in the rates of return achieved by the ETF and a given benchmark, or as the variation of the tracking difference. Usually, calculations are made based on the formula above using daily rates of return (Madhavan, 2016). For TE forecasts, the covariance matrix of a particular risk model is utilised. This is defined as the volatility or standard deviation of the ex ante risk of the difference between the ETF and the benchmark.

It results from the above that the calculation of the TE is a bit more complex. There do not appear a single, universal method of measuring effectiveness in this area. In practice, several different tools of measurement are utilised (Roll, 1992; Pope & Yadav, 1994; Cresson, Cudd & Lipscomb, 2002). In terms of the TEs , these include measures described by the following three formulas:

1. The difference in return rates between the ETF and the benchmark:

   $TE_1 = \frac{\sum_{t=1}^{n} e_i}{n}$

   where:

   e_i – i-th ETF tracking error,

   n – number of observations,

   $e_i = NR_{i,t} - ER_{i,t}$,

   where:

   $NR_{i,t}$ – ln of return rates of i-th ETF at time t,

   $ER_{i,t}$ – ln of return rates of the benchmark (index), on the basis of which i-th ETF at time t operates.

2. The arithmetic average of the absolute values of the daily tracking error levels:

   $TE_2 = \frac{\sum_{t=1}^{n} |e_i|}{n}$

3. The standard deviation of the differences between the rates of return of the i-th ETF and the rates of return of the benchmark:

   $TE_3 = \sqrt{\frac{1}{n-1} \sum_{t=1}^{n} e_i^2}$

From the investor's point of view, the values characterizing both the tracking difference and tracking error should be as low as possible.

Research methodology and results

In this study, the tracking errors were calculated taking into account each of the above three approaches. Table 2 reports the profiles – including: name of the fund, ticker, benchmark (stock market index), inception year, total net assets, gross expense ratio and market type – of the 18 iShares Country Funds, six for each region (Asia-Pacific, Europe and the Americas) regarding the division into developed and emerging markets. This means that for each market type there are 9 ETFs, 3 for each region. The selection criteria was the size of net assets for each location and market development. Only the markets with the largest net assets were selected. It should be mentioned that the expense ratios of both US ETFs are the lowest considering the entire sample. This seems to be reasonable, since they target their own market, hence they are not the subject to the risks of cross border trading.

Table 2. The main characteristic of ETF funds employed in the study

Fund name	Ticker	Benchmark	Incep. year	Net assets[a] [mln USD]	Gross expense ratio [%]	Market
Asia Pacific						
iShares MSCI India ETF	INDA	MSCI India Index	2012	5,622	0.69	emerging

iShares MSCI China ETF	MCHI	MSCI China Index	2011	4,891	0.59	emerging
iShares MSCI S.Korea ETF	EWY	MSCI Korea 25/50	2000	4,728	0.74	emerging
iShares MSCI Japan ETF	EWJ	MSCI Japan Index	1996	13,191	0.49	developed
iShares MSCI H. Kong ETF	EWH	MSCI Hong Kong	1996	2,025	0.49	developed
iShares MSCI Australia ETF	EWA	MSCI Australia Index	1996	1,552	0.5	developed
Europe						
iShares MSCI Russia ETF	ERUS	MSCI Russia 25/50	2010	632	0.59	emerging
iShares MSCI Turkey ETF	TUR	MSCI Turkey Invest.	2008	367	0.59	emerging
iShares MSCI Poland ETF	EPOL	MSCI Poland IMI	2010	295	0.61	emerging
iShares MSCI UK ETF	EWU	MSCI UK Index	1996	2,663	0.5	developed
iShares MSCI Germany ETF	EWG	MSCI Germany Index	1996	2,282	0.49	developed
iShares MSCI Switzerland	EWL	MSCI Switz. 25/50	1996	1,181	0.5	developed
Americas						
iShares MSCI Brazil ETF	EWZ	MSCI Brazil 25/50	2000	10,248	0.59	emerging
iShares MSCI Mexico ETF	EWW	MSCI Mexico IMI	1996	726	0.49	emerging
iShares MSCI Chile ETF	ECH	MSCI Chile IMI	2007	512	0.59	emerging
iShares Core S&P 500 ETF	IVV	S&P 500 Index	2000	219,58	0.04	developed
iShares Russell 1000 Growth	IWF	Russell 1000 Growth	2000	52,535	0.19	developed
iShares MSCI Canada ETF	EWC	MSCI Canada Custom	1996	2,775	0.49	developed

[a] the data as of 31th of March 2020

Source: Author's own.

All data were collected with daily frequency using logarithmic returns of the ETFs in the case of funds, and logarithmic returns of the index value. They range from January 2019 to December 2020. Simultaneously the 2019 was treated as the pre-covid period whereas 2020 as a post-covid period. This division is proposed according to the fact that a novel coronavirus was identified by Chinese authorities at the very beginning of 2020. If the ETF fund replicates the benchmark (index) well, then the average tracking error is expected to be close to zero.

Table 3. The results of Pre-Covid and Post-Covid tracking errors

Ticker	Pre - Covid			Post -Covid		
	TE_1 [%]	TE_2 [%]	TE_3 [%]	TE_1 [%]	TE_2 [%]	TE_3 [%]
			Asia Pacific			
INDA	- 0.052	0.150	0.151	-0.050	0.130	0.148
MCHI	- 0.055	0.265	0.275	-0.052	0.251	0.244
EWY	- 0.041	0.221	0.265	-0.033	0.217	0.232
Emerging total	- 0.045	0.216	0.208	-0.043	0.194	0.203
EWJ	- 0.027	0.087	0.087	-0.022	0.082	0.086
EWH	- 0.022	0.102	0.109	-0.019	0.090	0.080
EWA	- 0.030	0.133	0.164	-0.026	0.123	0.015
Developed total	- 0.026	0.108	0.112	-0.022	0.101	0.062
			Europe			
ERUS	- 0.077	0.201	0.298	-0.070	0.196	0.264
TUR	- 0.044	0.302	0.287	-0.043	0.287	0.267
EPOL	- 0.049	0.222	0.202	-0.044	0.204	0.200
Emerging total	- 0.056	0.266	0.258	-0.055	0.243	0.248
EWU	- 0.041	0.195	0.187	-0.034	0.192	0.167
EWG	- 0.019	0.198	0.166	-0.016	0.187	0.154
EWL	- 0.011	0.142	0.130	-0.010	0.135	0.125

Developed total	- 0.034	0.168	0.149	-0.027	0.161	0.146
			Americas			
EWZ	- 0.032	0.286	0.289	-0.030	0.252	0.288
EWW	- 0.033	0.312	0.332	-0.032	0.302	0.303
ECH	- 0.052	0.211	0.228	-0.050	0.196	0.225
Emerging total	- 0.042	0.268	0.265	-0.040	0.249	0.238
IVV	- 0.024	0.054	0.060	-0.022	0.051	0.055
IWF	- 0.016	0.065	0.070	-0.015	0.063	0.066
EWC	- 0.030	0.098	0.096	-0.030	0.097	0.092
Developed total	- 0.025	0.084	0.086	-0.023	0.082	0.072

Source: Author's own.

Generally, it can be seen that ETFs in the US exhibit the lowest level of tracking errors, since they target their own market, thus not being subject neither to the different trading times nor to the liquidity issues. At the same time, the tracking errors for emerging markets are higher compared to developed markets for each of the three regions. In general, the largest problems with index mimicking occur on European markets. The reason behind the mispricing between developed and emerging markets has been both: higher foreign exchange risk and generally less liquidity for emerging markets.

The results obtained in Table 3 do not confirm that the outbreak of the coronavirus pandemic would have a negative impact on the degree of implementation of the investment objective, regardless of the degree of market development. It may come as a surprise, however, for each of the analyzed markets, the obtained tracking errors results were not higher in the post-Covid period as compared to the pre-Covid period. In the vast majority of cases, they were even lower.

ETF performance throughout the market volatility in the first part of 2020 demonstrated how ETFs can add stability to capital markets. In the face of record volatility, ETFs performed as designed. At the same time, investors did not give up investing in passive funds, which is reflected in the increase in the number and value of ETFs in the world.

Conclusion

Throughout the pandemic and resulting market volatility, investors increasingly turned to ETFs to allocate capital and manage risk in their portfolios. While there are some areas that can be improved to further benefit investors, ETFs generally functioned well and delivered on investor expectations during the COVID-19 crisis despite facing the most turbulent market conditions in over a decade. The conducted research shows that the outbreak of the pandemic has not had a negative impact on the achievement of the investment objective by ETFs.

In most of the analyzed cases, tracking errors were lower in the post-covid period compared to the pre-covid period. In no case happened that the tracking error was higher. At the same time, higher tracking errors appeared in emerging markets. The results show that emerging markets prompt ETF mispricing. From the point of view of geographical coverage, the lowest values were recorded in the case of ETFs on US indexes, and the highest in the case of ETFs on European indexes.

Despite its signs of originality, the work is not free from drawbacks. In this regard, it should be emphasized that the paper indicates the discrepancies between the ETFs and the value of stock indexes, but it does not allow the reasons for these deviations to be determined. To obtain this aim, this study should be expanded by testing an econometric model in which the impact on the tracking error of adopted dependent variables, such as the exchange rate or the liquidity of a given market, would be analyzed.

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