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Article

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Performance Evaluation of Global High-rated ETFs During the Taper Tantrum

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Abstract: This study examines the performance of fifty global exchanged-traded funds (ETFs) traded on US stock exchanges. Specifically, it refers to the period following the end of quantitative easing, which took place in 2014. Therefore, the data, on which the study is based, refer to the period from 24/10/2014 to 24/09/2018 and they are expressed in a weekly frequency. By employing the Capital Asset Pricing Model (CAPM), we evaluate the performance of fifty ETFs according to their rating by the MorningStar. Their performance was measured using Sharpe and Treynor ratios as well as Jensen's alpha and the betas and a/b measures. The results of the study indicate that the examined ETFs show selectivity skills and present bearish behaviour in relation to the market during QE-tapering.

Key words: CAPM, ETFs, selectivity skills, beta, Treynor ratio, Sharpe ratio, QE-tapering

JEL classifications: G11, G15

1. Introduction

Following the global financial crisis of 2008, the major central banks were forced to use a series of non-conventional monetary policies to achieve the balance of the economic system (Sahay et al, 2014). The most widely used measure was quantitative easing (QE) and this is why it constitutes an attraction for many researchers, policy makers and

the general public (Călin, 2015). This has triggered a proliferating bulk of academic research on unconventional monetary policy action taking (Joyce et al, 2011; Joyce and Tong, 2012; Joyce et al, 2012). Thus, central banks purchased predetermined amounts of government bonds or other financial assets to boost the economy and increase liquidity (Aizenman et al, 2014).

The first Quantitative easing Program (QE1) was implemented from November 2008 to March 2009, the second quantitative easing program (QE2) was announced on November 3, 2010 and the third and final quantitative relaxation program (QE3) was announced in 2011. However, on May 22, 2013, the Fed's Bernanke governor announced the intention of gradually lowering its assets by starting a tight monetary policy. This phenomenon which is called tapering (taper tantrum) affected the financial markets, caused sharp falls in exchange rates, in the prices of bonds and shares in emerging financial markets (Avdjiev and Takats, 2014) and its impact on assets is the subject of modern bibliography (Călin, 2015). QE-tapering means normalization of monetary policy that is sweeping up the extra liquidity infused by the extra easing monetary policies implemented during QE eras. This has led to the need to study and measure the efficiency of mutual funds.

Mutual funds are an Investment Company where the primary purpose is to concentrate investor savings and place them on stock and other securities. ETFs (exchange-traded funds), which we will study in this paper, are similar to mutual funds because they both represent professionally managed collections of individual stocks or bonds (Poterba & Shoven, 2002). The ETFs have the advantage of including different titles, so that this diversification contributes to reducing the risk of advanced mutual funds, without meaning that their performance is diminishing. The biggest difference is that ETF transactions are made throughout the day as opposed to mutual funds that are only traded at the end of the day.

Interest in mutual funds has increased since the 1990s as US investors sought funds investing in alternative markets with a low correlation with the US market (Papadamou & Siriopoulos, 2004). It is also widely accepted that the international diversification of a portfolio can significantly reduce systemic risk. In order for investors to achieve such differentiation without, however, investing in costly acquisition of information, capital can be placed in internationally diversified mutual funds (Cumby & Glen, 1990).

Previous studies on fund efficiency are based on the CAPM model and the Sharpe (Sharpe, 1964), Treynor (Papadamou & Siriopoulos, 2004), and Jensen (Koulis et al, 2011). (; The Capital Asset Pricing Model (CAPM) represents a historical

achievement for a better understanding of risk identification and was designed and developed by economists Sharpe (1964), Treynor (Treynor and Mazuy, 1966), Lintner (1965a, b) and Mossin (1966) (Perold, 2004). In this model, we will also rely on this particular research to evaluate advanced funds during the Quantitative Easing Tapering in 2013 by the Maturity Extension Program, and we investigate how this has affected their performance, management capabilities of their managers, and the beta factor. Seminal papers about QE tapering effects on assets include Lim et al (2014), Karolyi and McLaren (2017), Karan et al (2017) and Papadamou et al (2020). We extend research by focusing on performance characteristics of the highly-innovative global ETFs.

Over the years, several fund valuation surveys have been conducted and many models have been applied, but most surveys focus only on the assessment of national funds. In this review, we analyze 50 global ETFs, which were collected by Morningstar and ranked according to the rating agency with five stars, and this means that they are globally important and highly-rated. The data is weekly and refer to time series from 27/10/2014 to 24/09/2018. This specific period was selected to determine the progress of advanced funds after the quantitative easing was terminated in 2014 and the distressed US economy escaped from the Zero Lower Bound (ZLB).

To the best of our knowledge, no academic paper so far combines global ETFs during taper tantrum, thereby this is the innovation of this study. Thus, we hope that our contribution to economic science will be important and trigger further research. The structure of the present study is as follows: initially, in Chapter 2 are presented key past studies comprising the basic relevant literature review. Chapter 3 then presents the data, compiles its descriptive statistics and sets out the investigation model and methodology of the study. Moreover, Chapter 4 analyzes the data, assesses the empirical results and provides the economic implications. Finally, Chapter 5 lays out the conclusions of the study.

2. Literature Review

Kyriazis and Economou (2017, 2019) examine the need for new rounds of quantitative easing in the United Kingdom due to Brexit and yet show its impact on the economy of the Eurozone. Decisions should be made about whether proceeding to new unconventional economic policy is needed. The findings of this research are that a new round of quantitative easing in UK will positively affect the Eurozone and that the proper timing of new rounds of QE will be revealed in the future. Moreover, Kyriazis (2017) argues that Eurozone debt monetization and

perpetuating renewal of debtor-debtor interactions could prove useful only if optimistic expectations turned to be viable. This is related to performance of ETFs that should help in strengthening the investor sentiment of market participants. Unconventional monetary policies have also been the epicenter of research in a number of important academic studies, such as: Papadamou et al (2018; 2019a,b; 2020).

Fabris (2018) divides his research into two parts. The first is a review of traditional monetary policies and states where there is unanimity in findings. Some of them are that the high level of independence of central banks leads to low inflation. Moreover, he argues that there is no link between inflation and unemployment and that fiscal policy is also responsible for price stability. The second part consists of points that are not commonly accepted and reference is made to the role of econometric models. The conclusion is that in order to deal with the global economic crisis, there must be international co-ordination on the monetary policies to be followed.

Additionally, Twinoburyo and Odhambo (2018) present the relationship between monetary policy and economic growth and their effects in the short and long term. In essence, their paper is a chronological review of these two concepts. Their conclusion after studying the existing literature is that there is a positive effect of monetary policy on the economic development of advanced economies with independent central banks.

A significant number of studies have investigated sophisticated mutual funds. Based on Koulis et al. (2011) paper, which examined the performance of fifteen Greek mutual funds and concluded that their managers did not have selectivity skills, we analyzed global ETFs in order to assess their performance and determine the fund mangers' selectivity skills. The data is of great interest as well as highlight the effects of taper tantrum.

Estrada et al (2016) analyzed the impact on emerging markets after the end of quantitative easing in 2013. Using econometric analysis, they concluded that these markets were affected by this event and they need to stay alert, so that they would not be further affected. Another study carried out on the impact of quantitative easing was that of Tillmann (2016), which showed steep changes in humans' attitudes and hence in interest rates and exchange rates.

Pioneers in the analysis of fund performance in relation to risk were Sharpe (1964) and Treynor (1966), who developed standards for measuring risk-adjusted returns (Koulis et al, 2011). Sharpe (1964) examined how the annual returns of 34 mutual funds were affected by risk during the period 1954 – 1963. His results

indicate that only 19 out of 34 mutual funds had a higher return than the market portfolio. Furthermore, he claimed that the market was efficient and that capable managers could diversify their portfolios according to equity risk, thus achieving higher returns. For his part, Jensen (1968) studied a sample of 115 mutual funds for the decade from 1945 to 1964. In his analysis, taking into account transaction costs, he found that only 43 of the 115 portfolios had higher annual yields than market's returns.

Handjnicolaou (1980) evaluated the performance of Greek mutual funds, for the period 1973 – 1976, applying the Treynor, Sharpe and Jensen efficiency measures. According to his findings, these funds performed better than the general index of the Athens Stock Exchange and the Greek stock market was not efficient. Moreover, Sorros (2003) studied the performance of sixteen mutual funds traded on the Greek Stock Exchange, for the period 1/1/1995-31/12/1999. As a benchmark, he used the general index of the Athens Stock Exchange (ASE). His results showed that mutual funds had a lower total risk and a beta coefficient compared to the ASE. In a similar vein, Thanou (2008) analyzed the efficiency of 17 Greek mutual funds for the years 1997-2005. Using the CAPM model and the Sharpe and Treynor ratios, she concluded that the majority of mutual funds followed the market, achieving satisfactory diversification.

Lee and Rahman (1990) examined in their article the selectivity skills of a sample of mutual funds. According to their empirical results, fund managers have superior selectivity skills. Abdel-Kader and Qing (2007) using the Jensen and Treynor measures adopted weekly returns for a sample of 30 Hong Kong mutual funds. Their study indicates that these funds have worse returns than the market and their managers do not have significant abilities to select the appropriate securities. Mansor and Bhatti (2011) evaluated the monthly returns of 128 Islamic funds from 1990 to 2009, using the Sharpe, Treynor and Jensen measures as well as the CAPM model. Their results have shown that these funds have high returns and their managers have superior selectivity skills.

Finally, in their research, Papadamou and Siriopoulos (2004) examined short-term returns of mutual funds that invest in European equities and maintain their managers for more than three years. They noticed that there was a low performance compared to the market index (Eurostoxx). Mutual funds that earned satisfactory returns over a five-month review period continued to make high returns in the remaining four months. Additionally, Christensen (2005) examined the performance of Danish funds by both parametric and non-parametric methodologies. The main conclusion of his research was that Danish mutual funds are characterized by neutral returns, they are not durable and their managers do not present market-timing abilities.

3. Data and Methodology

3.1. Presentation of Data

The data on which this study is based are the closing prices of fifty global mutual funds, which are listed on the US stock exchange and are rated as five-star ETFs by the Morningstar rating agency. The reason for this rating is that they are the best in the corresponding branches therefore they are considered to be more reliable regarding potential investors. Therefore, the analysis includes weekly data that span the period from 27/10/2014 to 24/9/2018, which represents the launch of the taper tantrum. Table 1 lists the 50 ETFs under scrutiny and provides their full names and abbreviations.

Table 1: Names of ETFs under scrutiny

TOP US ETFs *****	
EWW	iShares MSCI Mexico Capped ETF
DOD	ELEMENTS Dogs of Dow DJ HY Sel 10 TR ETN
PUI	Invesco DWA Utilities Momentum ETF
TUR	iShares MSCI Turkey ETF
VPU	Vanguard Utilities ETF
REZ	iShares Residential Real Estate Capd ETF
IDX	VanEck Vectors Indonesia ETF
RHS	Invesco S&P 500 Eql Wt Cnsm Stapl ETF
EMLP	First Trust North Amer Engy InfrasETF
IAU	iShares Gold Trust
DXJS	WisdomTree Japan Hedged SmallCap Eq ETF
ATMP	Barclays ETN+ Select MLP
KBWY	Invesco KBW Premium Yield Eq REIT ETF
PSCU	Invesco S&P SmallCap Utilities ETF
XMLV	Invesco S&P MidCap Low Volatility ETF
CDC	VictoryShares US EQ Inc Enh Vol Wtd ETF
SPHD	Invesco S&P 500 High Div Low Vol ETF
WOOD	iShares Global Timber & Forestry ETF
FMB	First Trust Managed Municipal ETF
FVD	First Trust Value Line Dividend ETF
SYV	SPDR MFS Systematic Value Equity ETF

TOP US ETFs *****	
LDUR	PIMCO Enhanced Low Duration Active ETF
EPU	iShares MSCI All Peru ETF
FPE	First Trust Preferred Sec & Inc ETF
PXLV	Invesco Russell Top 200 Pure Value ETF
VCSH	Vanguard Short-Term Corporate Bond ETF
BSCJ	Invesco BulletShares 2019 Corp Bd ETF
SYE	SPDR MFS Systematic Core Equity ETF
XLE	Energy Select Sector SPDR ETF
MNA	IQ Merger Arbitrage ETF
ENFR	Alerian Energy Infrastructure ETF
RIGS	RiverFront Strategic Income ETF
DON	WisdomTree US MidCap Dividend ETF
VDE	Vanguard Energy ETF
FTHI	First Trust BuyWrite Income ETF
SDY	SPDR S&P Dividend ETF
IFEU	iShares Europe Developed Real Estate ETF
DSUM	Invesco Chinese Yuan Dim Sum Bond ETF
IBDC	iShares iBonds Mar 2020 Term Corp ETF
HYEM	VanEck Vectors EM High Yield Bond ETF
EQWL	Invesco Russell Top 200 Equal Weight ETF
VYM	Vanguard High Dividend Yield ETF
VMBS	Vanguard Mortgage-Backed Secs ETF
PRF	Invesco FTSE RAFI US 1000 ETF
VOE	Vanguard Mid-Cap Value ETF
CN	Xtrackers MSCI All China Equity ETF
CZA	Invesco Zacks Mid-Cap ETF
GQRE	FlexShares Glbl Quality Real Estate ETF
DGRO	iShares Core Dividend Growth ETF
CFA	VictoryShares US 500 Volatility Wtd ETF

We have used 205 observations for the Standard & Poor's 500 (SP500) as well as for each ETF. As a market indicator, the SP500 stock index has been selected in accordance to the majority of relevant studies.

In addition, autocorrelation and heteroskedasticity diagnostic tests have been performed on the data through the Stata15 econometric program. Logarithmic differences of the variables were employed in order to acquire more robust results. The risk-free market rate is set to zero in order not to compare different

short-term interest rates as we use global ETFs. The fund's data from this study were extracted from the Yahoo Finance website.

Table 2 lists the descriptive statistics of mutual funds.

Table 2: Descriptive statistics of ETFs and S&P 500

Variable	Obs	Mean	Std. Dev.	Min	Max	Skewness	Kurtosis
S & P 500	205	0.0018009	0.154888	-0.0614972	0.037311	-1.002178	6.058685
EWW	205	-0.001024	0.0306862	-0.1297491	0.076928	-0.4363751	4.188524
DOD	205	0.0023177	0.0374324	-0.2510099	0.197327	-0.8354252	16.67068
PUI	205	0.0015345	0.0196903	-0.0470896	0.049604	-0.2691655	2.763124
TUR	205	-0.003496	0.0452836	-0.2304001	0.097207	-0.1060312	6.455822
VPU	205	0.0014666	0.019018	-0.0512552	0.047958	-0.2301393	2.695466
REZ	205	0.001195	0.0225216	-0.0590856	0.059169	0.0618981	3.069394
IDX	205	-0.000589	0.0337128	-0.1062369	0.198957	0.6662028	8.791389
RHS	205	0.0015226	0.0159757	-0.0473471	0.040893	-0.3555681	3.277741
EMLP	205	-0.000101	0.0201951	-0.0747056	0.051207	-0.4918143	4.015689
IAU	205	0.0000344	0.0183188	-0.0598783	0.05244	0.0501173	3.382053
DXJS	205	0.0023651	0.0275568	-0.094615	0.084388	-0.8227192	4.816873
ATMP	205	-0.000886	0.0352519	-0.1456554	0.142044	-0.0021735	6.297493
KBWY	205	0.0012561	0.244389	-0.0670481	0.062059	-0.1350771	3.008654
PSCU	205	0.002693	0.0211774	-0.0500679	0.048918	-0.1377527	2.75639
XMLV	205	0.0024162	0.0149368	-0.0464561	0.039747	-0.2972861	3.943683
CDC	205	0.0019147	0.0145229	-0.0454559	0.039382	-0.4843967	4.480916
SPHD	205	0.0019368	0.0153502	-0.0509582	0.039999	-0.2839543	3.798875
WOOD	205	0.0021239	0.0218038	-0.0844612	0.076428	-0.3047947	4.815977
FMB	205	0.005644	0.0042559	-0.015908	0.010038	-0.4312667	3.724917
FVD	205	0.0018599	0.0143134	-0.0471561	0.039453	-0.44121	4.391225
SYV	205	0.0020458	0.0170877	-0.07271	0.057076	-0.5268668	5.539889
LDUR	205	0.003705	0.0026989	-0.0116167	0.009275	-0.191732	5.635208
EPU	205	0.000906	0.0292831	-0.031652	0.132846	0.4852191	5.059514
FPE	205	0.0010906	0.0062181	-0.0380757	0.025544	-0.9900046	10.79162
PXLV	205	0.0016534	0.0170958	-0.0619717	0.050283	-0.0571602	4.931082
VCSH	205	0.0002973	0.0024009	-0.0063467	0.006245	-0.3785524	3.221249
BSCJ	205	0.000347	0.002763	-0.0112848	0.008752	-0.7922366	6.342862
SYE	205	0.0024776	0.0400658	-0.276162	0.322737	1.154839	3.710425
XLE	205	-0.000144	0.0276202	-0.1031814	0.084889	-0.4586771	4.763956
MNA	205	0.0007595	0.0057421	-0.0143785	0.021615	0.0489636	3.685921

Table 2: Descriptive statistics of ETFs and S&P 500

Variable	Obs	Mean	Std. Dev.	Min	Max	Skewness	Kurtosis
ENFR	205	-0.000813	0.0300921	-0.0928099	0.088094	-0.3820083	4.123964
RIGS	205	0.0006966	0.0060679	-0.01759	0.020978	-0.0203616	3.586696
DON	205	0.0019829	0.0159103	-0.0493674	0.041201	-0.3612288	4.094517
VDE	205	-0.000297	0.0288657	-0.1072555	0.080487	-0.4102624	4.475007
FTHI	205	0.0014644	0.0158727	-0.0605431	0.056319	-0.5799975	5.960122
SDY	205	0.0019039	0.0161836	-0.0511603	0.065377	-0.2464341	5.061012
IFEU	205	0.0009329	0.021889	-0.0724802	0.055369	-0.4793763	3.344789
DSUM	205	-0.000148	0.0089121	-0.0510552	0.019132	-1.189647	7.887635
IBDC	205	0.0009127	0.0045258	-0.0114689	0.016126	0.5932023	4.00346
HYEM	205	0.0006209	0.010409	-0.0710905	0.0321	-1.722249	14.21083
EQWL	205	0.002101	0.0159097	-0.063941	0.048295	-0.8265561	6.091476
VYM	205	0.0017777	0.0160763	-0.0577059	0.041883	-0.797379	5.111708
VMBS	205	0.0002439	0.0033259	-0.0104425	0.011223	-0.4375671	4.337839
PRF	205	0.0017511	0.0169396	-0.0608597	0.051127	-0.7012153	5.210317
VOE	205	0.001626	0.0170731	-0.0663667	0.044628	-0.6180599	4.754349
CN	205	0.0017179	0.0388426	-0.1348391	0.159029	-0.1313623	5.849841
CZA	205	0.0018267	0.0166345	-0.0586517	0.048016	-0.6067144	4.72919
GQRE	205	0.0009243	0.0170697	-0.0491977	0.050094	-0.2014362	3.471078
DGRO	205	0.0022025	0.0164478	-0.0657485	0.047265	-0.7618394	5.305619
CFA	205	0.0020809	0.1598826	-0.0519037	0.044325	-0.5405567	4.180029

It should be noted that the FMB has the highest return and the TUR has the lowest return. Comparing the performance of each fund to the average return of ETFs, it is concluded that 28 ETFs have a higher return than the average. It is also noticed that 18 ETFs have higher returns and 32 ETFs have a lower return than the S&P500.

Furthermore, it is observed that the smaller standard deviation is presented by the VCSH, while the KBWY ETF has the largest. Comparing with the average of the standard deviations of the ETFs, the standard deviation of each fund, it is concluded that 14 of them reveal a higher risk than the average of all the ETFs under scrutiny. It should also be emphasized that only two ETFs exhibit a larger standard deviation and 48 ETFs have a smaller standard deviation than the S&P500. This means that nearly all the ETFs investigated have lower volatility and hence weaker risk in relation to the general market indicator. This is beneficial for investing decisions of interested economic agents.

Regarding the asymmetry, it is noteworthy that the 43 advanced funds are found to be asymmetric towards the left (negatively asymmetric) and this is not good news for investors. On the other hand, only 7 ETFs have a positive asymmetrical distribution that benefits investors. Concerning the kurtosis factor, it is noted that 47 advanced funds have leptokurtic distributions. Also, the S&P500 denotes a negative asymmetric and leptokurtic distribution.

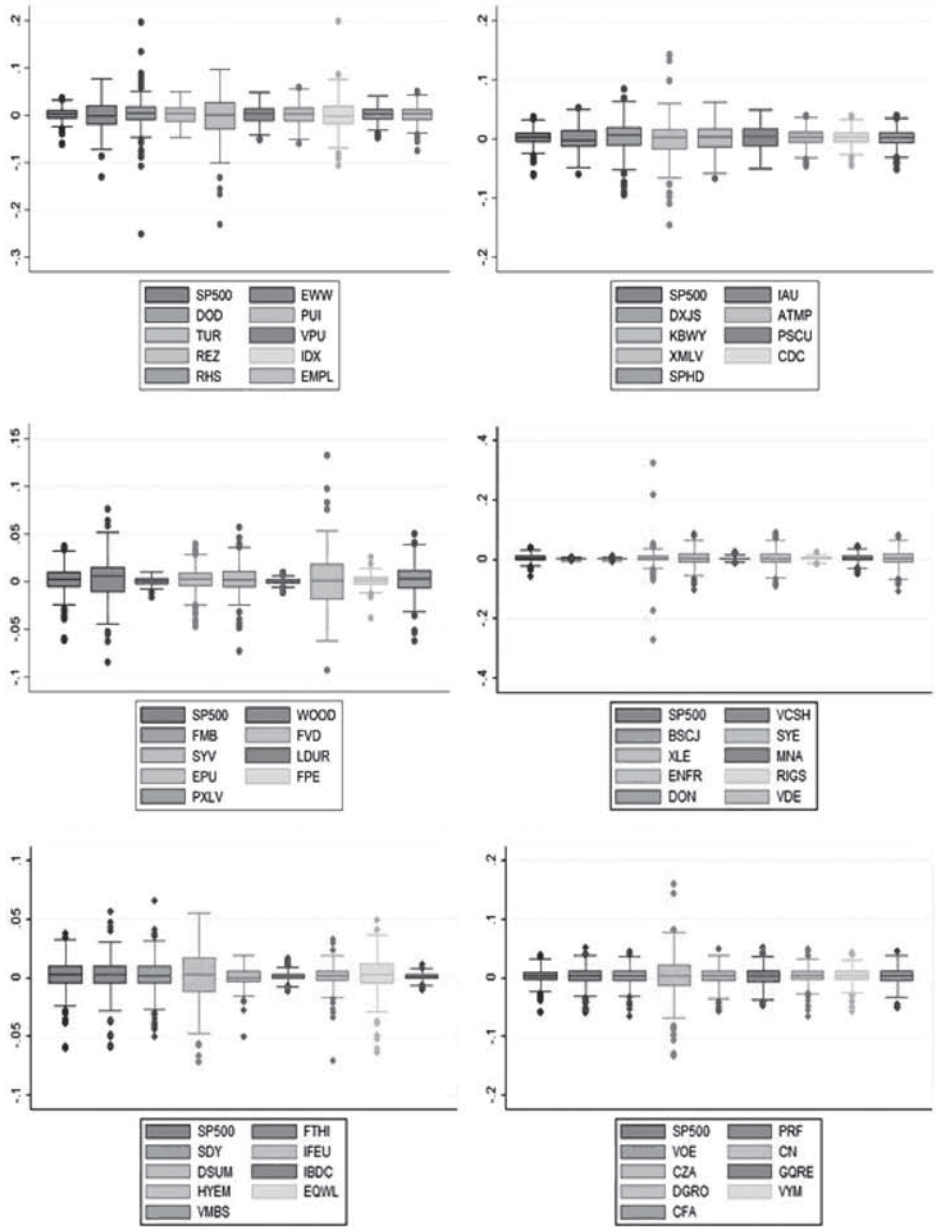
Graphs: Boxplots of ETFs

In Figure 1, the boxplots of the S&P500 index and all the ETFs are laid out. The findings by the boxplots abide by the results extracted from the descriptive statistics. To be more precise, six boxplots are constructed per group and altogether form the ETFs investigated. It can be easily seen that in each boxplot there is also the general SP500 index so that the useful comparison of each ETF with the general market indicator can be performed.

Also, via the boxplots, one can see that the S&P500 benchmark index is characterized by a negative asymmetry and a leptokurtic distribution. As regards asymmetry, the majority of ETFs have negative asymmetry, as in the middle part of their chart the median is upward and most observations are concentrated at the bottom of the square.

The ETF SYE has the largest range between extreme values and VCSH has the smallest range. This conclusion comes out from Table 1 by examining their Min and Max values. One can easily discern the above by the boxplots as the square with the median values is very thin and many values are not concentrated in the middle. On the other hand, the most of ETFs have leptokurtic distributions. The basic conclusion is that the descriptive statistics are confirmed by the boxplots.

Figure 1: Boxplots of S&P500 and the 50 ETFs under scrutiny



3.2 Methodology

Based on the study by Koulis et al. (2011), we analyzed the global high-rated ETFs investigated to assess their performance and determine the ability of each fund manager to select the securities. For this purpose, we use the CAPM Model and the Sharpe, Treynor, and Jensen and the beta and a/b indices.

The CAPM model is the extension of the portfolio theory developed by Markowitz (1952). As reported by Papadamou and Siriopoulos (2014), according to the CAPM model, the return of a security Ri must compensate us for the risk-free return Rf of which we are deprived when investing in this security, providing us with a risk premium (bi [E (Rm) - Rf]) to take on this extra risk. In our case, the securities we are looking at are ETFs. The risk-free interest rate has been set to be zero, and the S&P500 equity index has been adopted as a benchmark market indicator. The model under consideration is in the form of:

Excess Returns of ETF = a + b * Excess Returns of S&P500 (1)

a : estimated return of management ability

b : assessment of the systemic risk of the funds

Managerial skills relate to the capabilities of fund managers to produce higher performance by selecting the appropriate shares (Jensen, 1968). The Jensen Index is used to assess the managerial skills. Jensen's alpha (a) was first used by Michael Jensen (1968) and is a measure to assess the capabilities of fund managers.

The alpha is calculated by the formula:

$\alpha = Ri - [Rf + \beta * (Rm - Rf)]$

Ri: the realized return of ETFs

Rm: the return of the market

Rf: the risk - free return factor and

b: the index beta

According to the CAPM theory, if $a_p > 0$, then the manager is able to predict the future returns of the securities or a part of them. However, if $\alpha_p = 0$ there is a

balance and the manager has demonstrated that he has not a prediction ability greater than the ability of the market participants.

The Sharpe index is a measure of profitability, which considers the extra return as risk-benefit compensation for the overall risk (Sharpe, 1966). In our case, this index, compares the extra returns per unit of risk of ETFs with the S&P500, while the risk-free interest rate is set to zero. The Sharpe ratio is calculated as:

$$Sharpe\ ratio = \frac{E(R) - Rf}{\sigma}$$

E(R): expected return of mutual funds

R_f: the risk – free rate

σ:standard deviation

The Treynor index is similar to Sharpe, except that Treynor uses β as a measure of volatility (Treynor and Mazuy, 1966). Therefore, ETFs that have a high Treynor index are considered more suitable for investments because their performance is high in relation to the systematic risk their managers take on, so they are preferable. From the following formula we see that the calculations are based on the ETF's performance as well as the systemic risk:

$$Treynor\ ratio = \frac{E(R) - Rf}{\beta}$$

where:

E(R): expected return of mutual funds

R_f: the risk – free rate

β: the beta coefficient

4. Empirical Results

The following table (Table 3) presents the econometric results after performing tests for autocorrelation and heteroscedasticity using the software Stata 15, as well as calculating the performance rates for each ETF individually.

Table 3: Econometric Results

ETFs	Selectivity skills (a)	Beta (b)	a/b	R2	Sharpe ratio	Treynor ratio
SP500		1			-44.13326	-0.67808
EWW	-0.00264 (0.172)	0.90006 (0.000)***	-0.002938	0.20640	-18.25812	-0.75613
DOD	0.00067 (0.786)	0.9171 (0.000)***	0.000726	0.14400	-34.56120	-0.73769
PUI	0.00094 (0.483)	0.32794 (0.000)***	0.002879	0.06650	-15.48347	-2.06830
TUR	-0.00530 (0.079)*	1.00169 (0.000)***	-0.005291	0.11740	-35.77403	-0.68134
VPU	0.00099 (0.451)	0.26332 (0.002)***	0.003768	0.04600	-30.13429	-2.57616
REZ	0.00048 (0.753)	0.39562 (0.000)***	0.001220	0.07400	-19.95251	-1.71518
IDX	-0.00233 (0.277)	0.96417 (0.000)***	-0.002412	0.19620	-42.61290	-0.70529
RHS	0.00050 (0.599)	0.57051 (0.000)***	0.000868	0.30590	-33.90676	-1.18903
EMPL	-0.00143 (0.226)	0.73689 (0.000)***	-0.001938	0.31940	-37.17161	-0.92266
IAU	0.00048 (0.704)	-0.24835 (0.003)***	-0.001940	0.04410	-24.83765	2.73729
DXJS	0.00079 (0.641)	0.87310 (0.000)***	0.000908	0.24080	-19.32153	-0.77569
ATMP	-0.00314 (0.132)	1.25306 (0.000)***	-0.002508	0.30310	-27.82762	-0.54289
KBWY	-0.00001 (0.993)	0.70450 (0.000)***	-0.000018	0.19940	-32.00119	-0.96302
PSCU	0.00188 (0.185)	0.45387 (0.000)***	0.004132	0.11020	-45.44818	-1.49178
XMLV	0.00119 (0.113)	0.68353 (0.000)***	0.001734	0.50240	-46.86177	-0.99113
CDC	0.00057 (0.360)	0.74647 (0.000)***	0.000764	0.63380	-44.27427	-0.90825
SPHD	0.00068 (0.377)	0.69510 (0.000)***	0.000985	0.49190	-31.17395	-0.97531
WOOD	0.00050 (0.672)	0.90055 (0.000)***	0.000558	0.40930	-160.09074	-0.75247
FMB	0.00064 (0.031)**	-0.04470 (0.020)**	-0.014427	0.02650	-47.53795	15.19939
FVD	0.00055 (0.378)	0.72536 (0.000)***	0.000763	0.61610	-39.84485	-0.93476

SYV	0.00082 (0.390)	0.68211 (0.000)***	0.001198	0.38230	-252.39967	-0.99369
LDUR	0.00036 (0.063)*	0.00824 (0.502)	0.043159	0.00220	-23.02231	-82.46184
EPU	-0.00043 (0.822)	0.74112 (0.000)***	-0.000578	0.15370	-110.17142	-0.91573
FPE	0.00092 (0.032)**	0.09420 (0.001)***	0.009777	0.05510	-39.88212	-7.24121
PXLV	0.00005 (0.946)	0.89145 (0.000)***	0.000054	0.65230	-22.38266	-0.76078
VCSH	0.00031 (0.065)*	-0.00932 (0.393)	-0.03368	0.000005	-39.88212	72.88770
BSCJ	0.00038 (0.047)**	-0.02259 (0.071)*	-0.01715	0.000007	-283.83972	30.08122
SYE	0.00148 (0.591)	0.54862 (0.002)***	0.00271	0.001738	-246.76890	-1.23344
XLE	-0.00205 (0.191)	1.06273 (0.000)***	-0.00193	0.00075	-16.23420	-0.63963
MNA	0.00054 (0.157)	0.11811 (0.000)***	0.00462	0.00003	-24.80890	-5.75066
ENFR	-0.00281 (0.108)	1.11306 (0.000)***	-0.00253	0.00089	-118.46841	-0.61125
RIGS	0.00037 (0.325)	0.17703 (0.000)***	0.00213	0.00003	-22.79243	-3.83710
DON	0.00047 (0.467)	0.83737 (0.000)***	0.00056	0.00025	-112.14691	-0.80953
VDE	-0.00228 (0.167)	1.10097 (0.000)***	-0.00207	0.00082	-42.73829	-0.61752
FTHI	0.00035 (0.696)	0.61861 (0.000)***	0.00056	0.00024	-23.73597	-1.09666
SDY	0.00045 (0.535)	0.80664 (0.000)***	0.00055	0.00026	-42.96349	-0.84047
IFEU	-0.00021 (0.877)	0.63644 (0.000)***	-0.00033	0.00047	-41.98405	-1.06659
DSUM	-0.00027 (0.659)	0.07161 (0.076)*	-0.00386	0.00007	-31.21079	-9.49674
IBDC	0.00102 (0.001)***	-0.06341 (0.002)***	-0.01619	0.00002	-76.90624	10.70916
HYEM	0.00013 (0.845)	0.27152 (0.000)***	0.00048	0.00010	-150.07319	-2.50189
EQWL	0.00057 (0.367)	0.85010 (0.000)***	0.00067	0.00024	-65.94742	-0.79728
VYM	0.00017 (0.765)	0.88969 (0.000)***	0.00019	0.00025	-42.88068	-0.76216
VMBS	0.00030 (0.184)	-0.03604 (0.016)	-0.00856	0.00001	-42.46585	18.85817

PRF	-0.000008 (0.987)	0.97711 (0.000)***	-0.000008	0.00028	-204.97923	-0.69398
VOE	-0.00008 (0.896)	0.94769 (0.000)***	-0.00008	0.00028	-40.28246	-0.71565
CN	-0.00065 (0.780)	1.31623 (0.000)***	-0.00049	0.00150	-39.95426	-0.51474
CZA	0.00022 (0.733)	0.88911 (0.000)***	0.00025	0.00027	-17.45851	-0.76259
GQRE	-0.00009 (0.927)	0.56569 (0.000)***	-0.00016	0.00028	-40.97906	-1.20018
DGRO	0.00053 (0.348)	0.92423 (0.000)***	0.00058	0.00026	-39.89319	-0.73320
CFA	0.00046 (0.405)	0.89514 (0.000)***	0.00052	0.00025	-42.59626	-0.75718

From Table 3, we can see that with regard to the fund manager's selectivity skills, 34 mutual fund managers have satisfactory abilities to select ETFs, while the remaining 16 show that their manager lacks selectivity skills and is unable to outperform the market. In other words, the majority of the managers have the ability to make an efficient selection of securities in order to acquire returns above the average market return. It is also discernible that only three ETFs are statistically significant in a confidence interval of 90% (*), three in a confidence interval of 95% (**) and only one in a confidence interval of 99% (***). Therefore, the general observations of constant alpha cannot provide reliable statistical conclusions for the examining period.

Concerning the beta coefficient (β), 42 ETFs show bearish behavior, 6 show bullish behavior by their managers, and 2 ETFs approximately follow the market. This means that investors follow a defensive behavior possibly as a way of dealing with the uncertainty that prevails after the end of the quantitative easing. It is worth mentioning that 6 ETFs exhibit a negative b which means that when market returns are rising, then the ETFs returns fall. However, it should be noted that all ETFs are statistically significant except three: the LDUR, VCSH and VMBS. ETFs with high b tend to be more volatile and therefore riskier though they offer higher returns. On the other hand, those with lower β present a lower level of risk but generally lead to lower returns. Thereby, the overall conclusions derived through the beta assessment are that a very large proportion of ETFs are of limited risk as fund managers do not seem to prefer risk-taking in favor of higher returns.

More reliable than Jensen's individual index (a) and beta (b) is the a / b ratio, as it shows in a more trustworthy manner the manager's capabilities, since it presents

selectivity skills in relation to the level of aggressiveness of fund managers. In this study, the ETF with the largest a/b is LDUR and is equal to 0.043159, meaning that the manager seems to be the most capable with respect to the performance-risk nexus. The smallest a/b is revealed by the FMB and equals -0.014427. When assessing the risk-adjusted returns of a fund, investors usually use a along with b in order to reach more reliable conclusions. While a high a/b ratio implies satisfactory profits in rollover periods, it could also imply large losses during serious market events such as the period we are considering. The average of this index for the ETFs under review is 0.001614. It is worth noting that only 9 advanced funds have an index higher than their average. That is, they have higher excess returns in relation to volatility. This is a negative indication of the progress of advanced funds as it is found that most do not have the expected returns that would be worthy of the risk taken.

The Sharpe index for the general market index, is -44.13326. As a general index, S&P500 was used to compare the Sharpe ratio of each ETF to that of the general market indicator to see whether the return on the capital is better or worse than the market. By comparing the Sharpe ratio of each fund with that of the general market indicator, we concluded that 15 ETFs had a lower risk-adjusted return than the S&P500 market index. Contrariwise, 35 ETFs are found to have a higher Sharpe index, which means that they present better returns even when overall risk is taken into consideration. Therefore, it is concluded that the majority of the ETFS evaluated had higher returns than the market and would be more profitable for investing, which is a positive indication of their course during the end of the quantitative easing period. Thereby, it should be emphasized that favorable investment opportunities have been brought about during the period of normalization of US monetary policy.

Finally, the Treynor index is used to rank the portfolios in order of efficiency and takes into account no longer the standard deviation such as the Sharpe index but the systemic market risk (beta). In particular, in this study, the Treynor index of the general market index is -0.67808. Thus, we see that 7 ETFs denote a better Treynor index than the representative market indicator, which means that investors can achieve very high returns without showing aggressive behavior while the other 43 funds have a lower Treynor index. Therefore, it becomes evident that most ETFs present low returns for each unit of risk they suffer, which is a negative sign for potential investors in the ETFs analyzed in this study.

5. Conclusions and Suggestions for Further Research

ETFs constitute a pole of attraction for many researchers as many surveys have been carried out to examine their efficiency and the management capabilities of their managers (Sharpe (1966); Koulis et al. (2011), Papadamou & Siriopoulos (2004), Christensen (2005), Thanou (2008)). However, most surveys focused on the evaluation of only national mutual funds.

The purpose of this paper is to evaluate the profitability of fifty global high-rated ETFs traded on US stock exchanges, as well as the capabilities of their managers after the launch of quantitative easing tapering in the US. The period of normalization of US monetary policy is of extreme interest due to the domino effects triggered by shocks in the US economy that usually spill over to other economies. In particular, ETFs rated by the Morningstar rating company with five stars were selected, as they were the highest rated and above the industry average to which each ETF belongs.

According to Sharpe's performance measure, we conclude that most ETFs have higher return than the market. With regard to the Treynor index, it has been observed that the majority of ETFs are revealed to have a lower Treynor ratio, which means that for most ETFs the nexus between returns and systemic risk is not favorable. Treynor index results were also confirmed by the a / b ratio, as most ETFs exhibit worse returns than desired in connection to risk, which means that the volatility of the ETFs over the expected return is high. In more detail, the study showed that global ETFs during the period from 4/10/2014 to 24/09/2018 provide evidence for the existence of satisfactory selectivity skills. That is, their managers have the ability to make an efficient selection of securities in order to achieve returns above the average market return. It should be underlined that most ETFs exhibit bearish behavior. Therefore, their managers are not particularly keen on risk and prefer safer investment options.

All in all, it is reasonable that ETFs deal with the uncertainty that accompanies the end of the process of quantitative easing with a more defensive behavior in order to be able to confront the uncertainties inhibited in market movements during the normalization of the monetary policy. It is highly probable that sweeping up the liquidity by the US monetary authorities could lead to high levels of volatility in assets' returns.

Finally, this paper is an integrated study of the financial performance and aggressiveness in relation to the market of the world's highest profile and high-rated ETFs. It indicates how ETF managers have behaved after the end of quantitative

easing. The added value of the findings is important for investors in particular, to outline the impact of non-restrictive monetary policy measures and to anticipate the course of ETFs for future investments. Given the growing demand for ETFs over the last few years, the authors believe that this study could provide a roadmap for further investigation into the important matter of ETFs performance during the QE tapering period, which has been constituting unchartered waters in academic research so far.

References

1. Abdel-Kader, M., & Qing, K. Y. (2007). Risk-adjusted performance, selectivity, timing ability, and performance persistence of Hong Kong mutual funds. *Journal of Asia-Pacific Business*, 8(2), 25-58.
2. Aizenman, J., Binici, M., & Hutchison, M. M. (2014). *The transmission of Federal Reserve tapering news to emerging financial markets* (No. w19980). National Bureau of Economic Research.
3. Avdjiev, S., & Takáts, E. (2014). Cross-border bank lending during the taper tantrum: the role of emerging market fundamentals, https://ssrn.com/abstract=2498634.
4. Călin, A. C. (2015). The Effects of the Federal Reserve's Tapering Announcement on the US Real Estate Market. *Financial studies*, 19(3), 79-90.
5. Christensen, M. (2005). Danish mutual fund performance-selectivity, market timing and persistence, http://dx.doi.org/10.2139/ssrn.670701.
6. Cumby. R. E., Glen, J. D. (1990). Evaluating the Performance of International Mutual Funds, *The Journal of Finance*, Vol(45), No(2).
7. Estrada, G. B., Park, D., & Ramayandi, A. (2016). Taper tantrum and emerging equity market slumps. *Emerging Markets Finance and Trade*, 52(5), 1060-1071.
8. Fabris, N. (2018). Challenges for Modern Monetary Policy. *Journal of Central Banking Theory and Practice,* 7(2), 5-24.
9. Handjnicolaou, G., (1980). The Performance of Greek Mutual Funds in the Period 1973-76: A Cases of internationally diversified portfolios (In Greek), Spoudai, University of Piraeus, 11(3-4), , 381-391.
10. Jensen, M. C. (1968). The performance of mutual funds in the period 1945–1964. *The Journal of finance*, 23(2), 389-416.
11. Joyce, M. A., & Tong, M. (2012). QE and the gilt market: a disaggregated analysis. *The Economic Journal*, 122(564), F348-F384.
12. Joyce, M., Lasaosa, A., Stevens, I., & Tong, M. (2011). The financial market impact of quantitative easing in the United Kingdom. *International Journal of Central Banking*, 7(3), 113-161.
13. Joyce, M., Miles, D., Scott, A., & Vayanos, D. (2012). Quantitative easing and unconventional monetary policy–an introduction. *The Economic Journal*, 122(564), F271-F288.
14. Karan, M. B., Uysal, E. U., & Kaya, M. (2017). Value at Risk Performance of Emerging Market Equity Portfolios During the Fed's Tapering. In *Risk Management, Strategic Thinking and Leadership in the Financial Services Industry* (pp. 191-209). Springer, Cham.

15. Karolyi, G. A., & McLaren, K. J. (2017). Racing to the exits: International transmissions of funding shocks during the Federal Reserve's taper experiment. *Emerging Markets Review*, *32*, 96-115.
16. Koulis, A., Botsaris, C., Adam, M., & Beneki, C. (2011). An Assessment of the Performance of Greek Mutual Equity Funds Selectivity and Market Timing. *Applied Mathematical Sciences*, Vol(5), No(4), 159-171.
17. Kyriazis, N. A. (2017). Eurozone Debt Monetization and Helicopter Money Drops: How Viable can this be? *Journal of Central Banking Theory and Practice*, *6*(3), 5-15.
18. Kyriazis, N. A., & Economou, E. M. (2017). The Relation of Brexit with the UK's QE Decisions and its Impact on the Eurozone. *Journal of Central Banking Theory and Practice*, 6(1), 5-14. Kyriazis, N. A., & Economou, E. M. (2019). Brexit and new perspectives of an unconventional way of Eurozone revival. *Journal of Central Banking Theory and Practice*, *8*(3), 5-20.
19. Lee, C. F., & Rahman, S. (1990). Market timing, selectivity, and mutual fund performance: An empirical investigation. *Journal of Business*, 261-278.
20. Lim, J. J., Mohapatra, S., & Stocker, M. (2014). Tinker, Taper, QE, Bye? The Effect of Quantitative Easing on Financial Flows to Developing Countries. *World Bank Policy Research Working Paper*, (6820).
21. Lintner, J., 1965a. Security Prices, Risk, and Maximal Gains From Diversification. *The Journal of Finance*, 20(4), pp.587-615.
22. Lintner, J., 1965b. The Valuation of Risk Assets and the Selection of Risky Investments in Stock Portfolios and Capital Budgets. *The Review of Economics and Statistics*, 47(1), pp.13-37
23. Mansor, F., & Bhatti, M. I. (2011, March). The Islamic mutual fund performance: New evidence on market timing and stock selectivity. In 2011 International Conference on Economics and Finance Research IPEDR (Vol. 4).
24. Markowitz, H. (1952), Portfolio Selection, The Journal of Finance, 7(1), 77-91.
25. Mossin, J., 1966. Equilibrium in a Capital Asset Market. *Econometrica*, 34(4), pp.768-783.
26. Papadamou, S., Siriopoulos, C. (2004). American Equity Mutual Funds in European Markets: Hot Hands Phenomenon and Style Analysis. *International Journal of Finance and Economics*, 9:85-97.
27. Papadamou, S., Spyromitros, E., & Kyriazis, N. A. (2018). Quantitative easing effects on commercial bank liability and government yields in UK: A threshold cointegration approach. *International Economics and Economic Policy*, *15*(2), 353-371.
28. Papadamou, S., Kyriazis, N. A., & Tzeremes, P. G. (2019). Spillover Effects of US QE and QE Tapering on African and Middle Eastern Stock Indices. *Journal of Risk and Financial Management*, *12*(2), 57.

29. Papadamou, S., Kyriazis, N. A., & Tzeremes, P. G. (2019). US non-linear causal effects on global equity indices in Normal times versus unconventional eras. *International Economics and Economic Policy*, 1-27.
30. Papadamou, S., Syriopoulos C., & Kyriazis, N. A., (2020). A Survey of Empirical Findings on Unconventional Central Bank Policies. *Journal of Economic Studies (forthcoming).*
31. Perold, A. F. (2004). The capital asset pricing model. *Journal of economic perspectives*, 18(3), 3-24.
32. Poterba, J. M., & Shoven, J. B. (2002). Exchange-traded funds: A new investment option for taxable investors. *American Economic Review*, 92(2), 422-427.
33. Sahay, M. R., Arora, M. V. B., Arvanitis, M. A. V., Faruqee, M. H., N'Diaye, M. P., & Griffoli, M. T. M. (2014). Emerging market volatility: Lessons from the taper tantrum (No. 14-19). International Monetary Fund.
34. Sharpe, W.F. (1964). Capital Asset Prices: A Theory of Market Equilibrium Under Conditions of Risk, *Journal of Finance*, 19, 425-442.
35. Sorros, J. N. (2003). Return and risk analysis: A case study in equity mutual funds operating in the Greek financial market. Managerial Finance, 29(9), 21-28.
36. Thanou, E. (2008). Mutual Fund Evaluation During Up and Down Market Conditions: The Case of Greek Equity Mutual Funds, *International Research Journal of Finance and Economics*, ISSN 1450-2887, issue 13, 84-93.
37. Tillmann, P. (2016). Unconventional monetary policy and the spillovers to emerging markets. *Journal of International Money and Finance*, 66, 136-156.
38. Treynor, J., & Mazuy, K. (1966). Can mutual funds outguess the market. *Harvard business review*, 44(4), 131-136.
39. Twinoburyo, E. N., & Odhiambo, N. M. (2018). Monetary policy and economic growth: a review of international literature. *Journal of Central Banking Theory and Practice*, 7(2), 123-137.