Performance and Trading Characteristics of Exchange Traded Funds: Developed vs Emerging Markets

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Abstract: Exchange Traded Funds (ETFs) are one of the most successful financial innovations of the last decades. The main focus of this study is to examine the risk adjusted performance, tracking error and trading characteristics of emerging and developed markets ETF. 43 passively managed equity ETFs have been chosen to cover both markets. The results indicate that the emerging markets are less efficient in terms of index replication and possess higher tracking error compared to the developed market ETF. Conversely, emerging markets provide better risk adjusted performance. Last but not least, it is also found that assets size has positive impacts towards ETFs performance and in contrast, the expense ratio has a negative impact on ETFs performance. To determine the policy matters, investment types and strategy for the two different types of capital market products, this study is quite relevant to the individual investor, institutional investors, policy makers and the regulators.

Keywords: Exchange Traded Funds, Capital markets, Performance, Tracking error, Trading characteristics,
JEL Classification: C1, G10, G11

1. Introduction

Over the years, there has been continuous innovation in the financial markets which allows investors the choice to invest in several different products consisting of, for example, different types of risk (volatility), prices, and composition of securities. One of the examples of such innovation is the Exchange Traded Funds (ETFs). An Exchange Traded Fund (ETF) is a publicly traded and open-ended index tracking fund which can be continuously traded during an exchange's trading hours. The general goal of an ETF is to imitate the returns of an underlying index. Therefore, ETFs are able to provide investors with an investment alternative that has a risk-return profile similar to the basket of underlying assets. ETFs are essentially passive investment products, generating market (Beta) rather than trying to seek outperformance (Alpha) for the portfolio. ETFs have unique characteristics in general, combining the advantages of conventional mutual funds with those of stocks while having a relatively low cost structure.

ETFs can be an important investment when one focuses on the aspect of liquidity, diversification, transparency, and cost factors. The development of this financial product boosted investors' interest which then contributed towards the increase of various kinds of ETFs within a very short period (Agapova 2011). ETFs popularity has increased manifold since its inception and there is a tremendous increase in the numbers of ETFs around the globe. ETFs originated in

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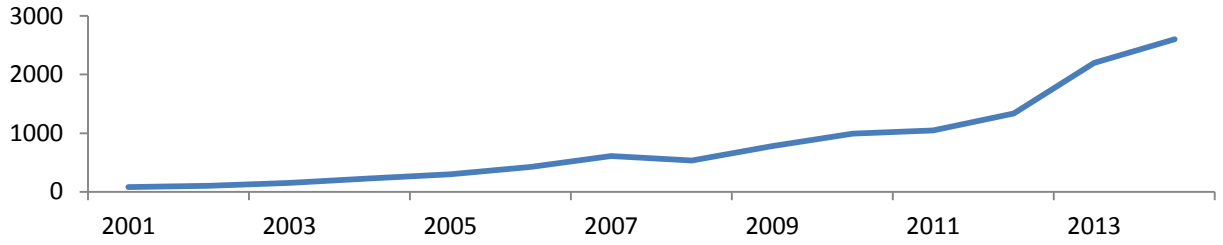
1993 when S&P 500 Depository Receipt (SPDR or "Spider") obtained permission from Securities and Exchange Commission (SEC) to compose assets with the structure containing different types of securities and then selling it off to the market. (Investment Company Institute, 2011). As a result of SEC's approval on the structuring and trading of ETFs, other new products were introduced for example country/region specific ETFs, commodity ETFs, sector-based ETFs and sustainability ETFs.

Figure 1.0 shows the ETF growth over the last decade. When it was first introduced in 1993, "Spider" was the only ETF in the US market, and its value was approximately US$500 million. Since then, the market for ETFs has grown substantially and as of 2014, more than 2000 ETFs were traded for a total worth of approximately US$2.6 trillion (ETFGI, 07 Oct 2014)[1].

Figure 1.0: Global ETF Asset under management($bn**)**



The increase in these kinds of products is accompanied by different studies in the area. The objective of ETFs is to track the performance of specific benchmarks indices which is done by replicating those portfolios with low tracking error levels. However, past studies conducted by Elton *et al.* (1996), Gastineau (2004), Dobi and Avellaneda (2012), Chang and Krueger (2012) and Tang and Xu (2013) found higher level of tracking errors. The main reason of tracking error is the negative relationship between ETFs expense ratio and performance. The expense ratios (i.e. costs) are, to a great extent, a compensation for management services (Gastineau 2004). As this debate continues with contradictory findings, this paper will focus on ETFs performance and tracking error levels.

It should be noted, however, that all the previous studies that are reported in the open literature is principally dedicated to developed market ETFs. Hence, to the best of author's knowledge, the case of emerging (EM) versus developed (DM) markets has not been given great attention by the researchers in the past and this motivated the present study. The purpose of the paper is to first analyze and investigate if there are differences in performance and index tracking abilities between the two distinct kinds of ETFs. Secondly, the hypothetical disparities in tracking error levels between ETFs are examined. Lastly, the interactions among different trading characteristics of ETFs are also investigated.

2. Literature Review

In recent years, there has been an increasing amount of literature on ETFs. ETFs were first introduced in the 1990s and some early issues about its inception are addressed by Kupiec (1990) and Gastineau (2001). In addition, Poterba and Shoven (2002) reported on the growth of ETFs since its early establishment. Similarly, Carty (2001) found that ETFs provides substantial

[1] Source: ETFGI Database

advantages over traditional mutual funds and the individual stocks. On top of that, it also contribute several benefits i.e. instant diversification, trading flexibility, tax efficiency, transparent holdings, lower expense ratios, all day trading, and an extensive range of investment strategies. In addition, Alexander and Barbosa (2008) analyzed the hedging problem which arises in ETF creation/redemption when the underlying base of the ETF shares involves in illiquid stocks with relatively high transaction costs. They found that efficient hedging is important to offset long and short positions on a market maker's accounts, especially imbalances in net creation or redemption demands around the time of dividend payments.

A number of studies have researched on the performance of ETF and there were mixed opinions on it. Adjei (2009) discovered that the performance of ETF and the S&P index have no significant differences and it showed weak evidence of performance persistence for the 6 and 12 months horizons. On the other hand, Blitz *et al.* (2012) investigated the performance of ETFs and index mutual funds in Europe. It was documented that ETFs and European index funds actually failed to perform better than the benchmark by 50 to 150 basis points per annum. Furthermore, Meric *et al.* (2009) asserted that the US market experienced the worst bear market in its history, where they lost 56% of its value during the period from October 9, 2007 to March 9, 2009. They investigated the performance of 38 sector index funds and results revealed that the best performing sector was the consumer staples and healthcare sector funds. However, the home construction and financials sector index funds were the underperformers.

Wong and Shum (2010) investigated 15 worldwide ETFs performance which covered the whole bearish and bullish market from the year 1999 to 2007. They reported that ETFs constantly generated higher returns in the bullish market compared to the bearish market. Similarly, Gerasimos (2011) indicated that superior performance by ETF is more persistent in the short term horizons and their performance is predictable. Meanwhile, Prasanna (2012) investigated the performance of Indian market ETFs and reported that they provide statistically higher Sharpe ratios. Furthermore, it was suggested that there is no relation between ETFs performance and fund size. It is also further supported by Rompotis (2012) who examined 43 German ETFs traded on XTRA market from the year 2003 to 2005 and concluded that the ETFs performance was almost the same as the benchmark indices. In addition to the above studies, Mariani *et al.* (2009) investigated the return distributions of three ETFs and their corresponding benchmark indices using the Levy model and they concluded that these ETFs exhibited the same behavior as their indices.

Tracking error is one of the most important dimensions of ETF. The term "tracking error" refers to the deviations of ETF returns in relation to the benchmark returns. In a study by Johnson (2009), tracking errors were reported between foreign ETFs and also the underlying home index returns. This view is supported Blitz *et al.* (2011) as they found that passively managed emerging markets equity ETF display higher tracking errors. However, Buetow and Henderson (2012) found low level of tracking error by ETFs in reference to the benchmark indices, notably when the benchmark is composed of more liquid securities. Additionally, Frino and Gallagher (2001) highlighted the importance of constraining a funds tracking error in delivering identical results as the underlying index. They reported that tracking error is unavoidable due to market frictions and on an average; index funds outperform actively managed funds after expenses. Similarly, Shin and Soydemir (2010) discovered that exchange rates are significantly related to ETFs tracking error as it was reported that the Asian markets display large persistence in tracking error indicating it being less efficient than the US market.

Furthermore, Frino *et al.* (2004) demonstrated that the tracking error is significantly related to the liquidity, volatility, index replication strategy and fund size.

The literature focusing on trading features and characteristics of ETFs is quite limited. Patrick (2011) examined the trading features of ETFs listed in Hong Kong and found that the level of tracking error is negatively impacted by fund size and is positively impacted by expense ratio. Additionally, it was suggested that the tracking error levels are higher in Hong Kong compared to Australia and the US. On the other hand, Jack *et al.* (2009) indicated that the US ETFs shows comparatively large daily price fluctuations and those ETFs generally trade at premium as compare to discount. In relation to that, Gerasimos (2012) further noticed that the returns of ETF can be predicted and it is more likely for ETFs to trade at a premium. However, Borkovec and Serbin (2013) analyzed 12 US ETFs and found that ETFs and common stocks exhibit qualitatively different liquidity and cost characteristics.

Together these studies provide important insights about ETF performance and tracking abilities. However, literature is limited on the performance of DM and EM ETFs. Because an ETF is a relatively new financial instrument, there is limited literature on this area and this study is aimed to fill in the gap. Furthermore, the study will contribute towards the expansion of ETF literature with huge emphasis on the matter stated.

3. Data

For this study, 43 passively managed Equity ETFs are chosen to cover the developed and emerging markets, all from the leading provider of ETFs i.e. iShares, PowerShares, SPDR, Vanguard, Guggenheim and Market vectors. Furthermore, their main benchmark indices are used as a comparative value measure for the ETFs performances. Table 1 below depicts the chosen ETFs along with their corresponding benchmark index.

For all of the chosen ETFs, weekly data from January 5, 2007 until December 5, 2014 is collected from Bloomberg Database. All the chosen ETFs are traded on New York Stock Exchange and ETFs which were listed after the beginning of 2008 are excluded from the sample. The variables such as the closing net asset values (NAV), the closing trading prices of ETFs, the closing bid and ask quotes, and the highest and lowest prices are included in the data collection and interpretation. The data set is then further divided into three periods: i) the overall period, ii) during global financial crisis; and iii) post global financial crisis. In addition, for a proxy risk free rate, one-month U.S. treasury-bill is used. When composing the dataset, one important consideration that was made was the elimination of ETFs backed by bonds, currencies or commodities. The reason for this consideration is for the purpose of uniformity since equity ETFs are all backed by (mostly) stocks and subjected to the UCITS regulation.

4. Methodology

First, we examine the risk and return characteristics of the ETFs and their benchmarks indices. The calculation of return is stated below:

$$r_t = \frac{(Price_t - Price_{t-1})}{Price_{t-1}} * 100 \qquad (1)$$

where r_t is the weekly return, $Price_t$ is this week's price and $Price_{t-1}$ is last week's price.

As a measure of risk we use standard deviation using the following equation:

$$VAR = \frac{\sum_{i=1}^{n} (AR_i - \overline{AR})^2}{n-1} \qquad (2)$$

$$and\ SD = \sqrt{VAR} \qquad (3)$$

Table 1: List of Emerging and Developed Markets ETFs

Developed Markets (DM)		Emerging Markets (EM)	
ETF	Benchmark Index	ETF	Benchmark Index
iShares MSCI EAFE	MSCI EAFE Index	BLDRS EM Mkts 50 ADR	BNY EM Mkts 50 ADR Index
BLDRS Dev. 100 ADR	BNY Dev. Mkts 100 ADR	iShares MSCI EM Mkts	MSCI TR EM Mkts Index
iShares S&P Europe	S&P Europe 350 Index	Vanguard FTSE EM Mkts	FTSE EM Mkt Index
iShares MSCI EMU	MSCI EMU Index	Guggenheim BRIC	BNY BRIC Select DR Index
SPDR Euro STOXX 50	EURO STOXX 50 Index	iShares Latin America 40	S&P Latin America 40 Index
FTSE Vanguard Europe	FTSE Developed Europe Index	SPDR S&P EM Asia Pacific	S&P Asia Pacific EM BMI
BLDRS Europe 100 ADR	BNY Mellon Europe 100 ADR	SPDR S&P EM Europe	S&P European EM BMI Index
iShares MSCI Australia	MSCI Australia Index	SPDR S&P EM Mkts	S&P Emerging BMI Index
iShares MSCI Austria	MSCI Austria IMI 25/50 Index	SPDR S&P BRIC 40	S&P BRIC 40 Index
iShares MSCI Belgium	MSCI Belgium IMI 25/50	iShares MSCI Brazil	MSCI Brazil 25/50 Index
iShares MSCI Canada	MSCI Canada Index	iShares FTSE China	FTSE China 50 Index
iShares MSCI France	MSCI France Index	iShares MSCI Malaysia	MSCI Malaysia Index
iShares MSCI Germany	MSCI Germany Index	iShares MSCI Mexico	MSCI Mexico IMI 25/50 Index
iShares MSCI Hong Kong	MSCI Hong Kong Index	iShares MSCI South Africa	MSCI South Africa Index
iShares MSCI Italy	MSCI Italy 25/50 Index	PowerShares China	USX China Index
iShares MSCI Japan	MSCI Japan Index	Market Vectors Russia	Market Vectors Russia Index
iShares MSCI South Korea	MSCI Korea 25/50 Index	iShares MSCI Chile	MSCI Chile IMI 25/50 Index
iShares MSCI Netherlands	MSCI Netherlands IMI Index	SPDR S&P China	S&P China BMI Index
iShares MSCI Singapore	MSCI Singapore Index		
iShares MSCI Spain	MSCI Spain 25/50 Index		
iShares MSCI Sweden	MSCI Sweden Index		
iShares MSCI Switzerland	MSCI Switzerland 25/50 Index		
iShares MSCI Taiwan	MSCI Taiwan Index		
iShares MSCI UK	MSCI UK Index		
iShares Core S&P 500 US	S&P 500 Index		
iShares Dow Jones US	DJ US Total Stock Mkt Index		
PowerShares QQQ US	NASDAQ-100 Index		

where the return variance around the average return AR_i is presented by VAR and the risk of ETF portfolio is presented by SD. The study also focuses on the expense and trading features of ETFs. Which includes; (i) assets, (ii) expense ratio, (iii) premium, (iv) bid-ask spread, (v) volatility, and (vi) the turnover of ETFs. The following equation is used to find out ETFs price volatility:

$$Vol_t = \frac{(H_i - L_i)}{CP_I} * 100 \qquad (4)$$

where Vol_t represent the intraday volatility of the ETF; H_i and L_i is ETF intraday price (highest and lowest) while CP_i signifies the closing price of ETF.

Following Aber *et al.* (2009), the percentage where the midpoint or closing price of the ETFs' actually varies from its NAV is viewed as the premium or discount of an ETF. The premium/discount equation is:

$$PM_i = \frac{(P_i - NAV_i)}{NAV_i} * 100 \qquad (5)$$

where PM_i represents the percentage premium on day, P_i represents the ETF trading price on the particular day. The net asset value of the ETF for that particular same day is NAV_i . If $PM_i > 0$, it symbolizes a premium while if $PM_i < 0$, it symbolizes a discount.

Last but not least, we employ following Roll (1984) formula to find out the spread:

$$SPD_i = \frac{S}{\sqrt{A_i - B_i}} \qquad (6)$$

where *'s'* represents the ask/bid quotes difference. A_i represents ETFs holder selling price and B_i represents the ETFs holder buying price.

4.1 Regression Analysis (ETFs Replication)

In this, section, simple regression is performed to examine different motivating issues. Equation (7) below represents the single index model:

$$Rpt = \alpha_i + \beta i\, R_{bt} + \varepsilon_{pt} \quad (7)$$

It is noted that Rpt represents the ETFs' return, Rbt on the other hand signifies the benchmark return, while ε_{pt} represents the regression residuals. In addition, excess return (Alpha) of the ETF above the benchmark is represented by α_i. Since ETF follows a passive management strategy, the alpha estimates are expected to be insignificant. Apart from that, the beta coefficient (βi) measures the systematic risk of the ETFs' and indicates the management replication strategy. If beta is equal to unity, then it means that ETF is fully replicating the benchmark index. However, if the beta is higher (lower) than unity then it suggests aggressive (conservative) replication.

4.2 ETF Tracking Error/Level

Tracking error is the difference in returns of the ETF and its target benchmark. Several studies regarding the index funds have suggested various methods to measure tracking errors. The first method to calculate tracking error is proposed by Rompotis (2012). This method uses the standard error of regression from Equation (7) as the tracking error. The second method estimates the tracking error by taking the absolute value of the difference between ETF and benchmark returns. Equation (8) below is the presentation of this estimation:

$$TE_{2,p} = \frac{\sum_{t=1}^{n} |e_p|}{n} \quad (8)$$

The tracking error is represented by TE, while $|e_p|$ signifies the absolute return differences. The very last method to find the tracking error level is to find the average difference in ETFs and the underlying index returns. Equation (9) below represents the estimation of the tracking error:

$$TE_{3,p} = \sqrt{\frac{1}{n-1} \sum_{t=1}^{n} (e_{pt} - \overline{e_p})^2} \quad (9)$$

where, e_{pt} represents the difference of returns at time **t** while $\overline{e_p}$ on the other hand denotes the distinction in terms of the return over the time period.

4.3 Sharpe ratio

In this section, we rate the performance of ETFs and determine how well their return compensates the investor for the risk they take. The method we use is the Sharpe Ratio, which is estimated through the model below:

$$SP_{ef} = \frac{R_{et} - R_{ft}}{SD_{et}} \quad (10)$$

where SP_{ef} denotes the Sharpe ratio of the ETF, R_{et} represents the ETF's return, R_{ft} represents the risk-free rate measured by the one-month U.S. treasury-bill while SD_{et} signifies the standard deviation of ETF returns.

4.4 Markov Switching Model

What is embedded in the conventional computation of beta is the fact that beta is fixed and permanent over time. However, new edition of research has evolved thus providing the empirical evidence that beta actually varies over time (Faff and Brooks 1997). The process of modeling the characteristics of any ETFs return which are based on the long term time series encounters a crucial challenge that series often go through "structural breaks" due to different behavioral

shifts. These particular breaks might happen due to different circumstances such as wars, depressions, hyperinflations or other financial shocks. The breaks might be temporary and/or recurrent shifts in behavior. Hence this suggests that modeling the long term-time series, based on constant parameter might not be the best possible aspect to look into. A framework that is increasingly becoming popular is the regime switching model especially in terms of capturing the non-linear behavior observed in these time series. These models are based on the thought that different parameters such as mean and variance may display different values during different period of time or "regimes".

This study makes effort to capture the time variation in ETFs replication (beta). Markov-switching model is employed in order to estimate beta which changes with the occasional and discrete shifts in states by using ETF returns of EM and DM markets. Hence, we would be able to see the replication strategies used by the ETF providers during different regimes or states. Hamilton's (1989) seminal article presented the Markov-switching model in helping to overcome the boundaries and limitations experienced by the traditional time series tool which could not handle the nonlinearities within the macroeconomic time series. Hamilton's original MS model is fundamentally an extension of the linear univariate AR model which is represented as below:

$$y_t = \mu_{s_t} + \emptyset_1 \left(y_{t-1} - \mu_{s_{t-1}}\right) + \cdots + \emptyset_k \left(y_{t-k} - \mu_{s_{t-k}}\right) + \varepsilon_t \qquad (11)$$

It is important to note that $\emptyset_{ks}$ signifies the k autoregression parameters and ε_t on the other hand represents a white noise process. Meanwhile, μ_{s_t} represents the mean of y_t as state s_t occurs. This particular state is believed in being the outcome of the unobserved first order of the M-state of Markov process with the equation of; $(s_t = 1, \dots, M)$. The evolution of this process can also be explained in terms of the transition probabilities with , $\Pr(s_t = j | s_{t-1} = i) = p_{ij}$, where $\sum_{j=1}^{M} p_{ij} = 1$ and it also can be arrange in a matrix form as shown in the equation below;

$$P = \begin{bmatrix} P_{11} & \cdots & P_{M1} \\ \vdots & \ddots & \vdots \\ P_{1M} & \cdots & P_{MM} \end{bmatrix} \qquad (12)$$

Each of the elements of the transition matrix above, which is represented by **P**, explains the probability in an order that state ***i*** is followed by state *j*. Further, this specific process is believed to be dependent on the past values of y_t and s_t but only through s_{t-1}. As what is observed is only y_t and not the state, it is suggested that a method or way need to be explored in forming the best possible inferences on the current state in reference of the observed value of y_t. Hamilton (1989, 1994) demonstrated the way to estimate the parameters of the model and also the transition probabilities which leads the motion of the variable of interest where a recursive method to draw probabilistic inferences concerning the state of y_t (the value of s_t) is equipped with the history of y_t. Furthermore, a more detailed technical discussion concerning the Markov-regime switching methods can be referred in the study conducted by Kim and Nelson (1999).

4.5 Interaction among Trading Characteristics

Lastly, we will utilize cross-sectional regression analysis to find out the connection among important trading characteristics of DM and EM ETFs. The study follows the methodology proposed by Rompotis (2009, 2012). Firstly, the contributive factors that complement the ETFs return are examined with the equation below:

$$Return = \alpha_0 + \alpha_1 Risk(SD) + \alpha_2 Exp.Ratio + \alpha_3 Tracking\ error + \alpha_4 Ln - Assets + \varepsilon \qquad (13)$$

In the above equation tracking error and risk are expected to be statistically significant because ETF returns crucially depends upon the performance of benchmark. It is further expected that a negative relation is present between return and expenses and a positive between assets and ETFs' return. Conversely, due to the passive character of ETF, the expectations of a statistically significant estimation for assets is restricted.

Next, the contributive factors of ETF's risk are also investigated as stated below:

$$Risk(SD) = \alpha_0 + \alpha_1 TE + \alpha_2 Abs.Premium + \alpha_3 Bid_{ask}spread + \alpha_4 Volatility + \varepsilon \quad (14)$$

The calculation of the volatility is based on Equation (4) and the bid-ask spread on the other hand is based on Equation (6). It is expected that the proposed variables will influence the risk in a positive way.

For the next step, the factors affecting the ETF's tracking error (TE) are examined:

$$TE = \alpha_0 + \alpha_1 Risk(SD) + \alpha_2 Abs.Premium + \alpha_3 Bid_{ask}spread + \alpha_4 Exp.Ratio + \varepsilon \quad (15)$$

It has been shown by Rompotis (2009) that expenses, risk and bid-ask spread are the factors affecting the tracking error of ETFs. Therefore, for this study, similar results are expected besides the expectation of the positive relationship between absolute premium and tracking error.

Next, the influence of the factors on expense ratio of ETFs are investigated. The relationship is examined using the following formula:

$$Exp.Ratio = \alpha_0 + \alpha_1 Risk(SD) + \alpha_2 Abs.Premium + \alpha_3 Bid_{ask}spread + \alpha_4 \ln_{Assets} + +\varepsilon \quad (16)$$

It is expected that there will be a presence of positive relationship between the first three variables while for the expense ratio, it is expected that due to the possibility of the scale of the economies, it will eventually be negatively associated to assets.

The next issue is regarding the factors which are fundamental to the ETFs' bid-ask spread and the equation is stated below:

$$Bid\_ask\ spread = \alpha_0 + \alpha_1\ Exp.\ ratio + \alpha_2 Abs.\ Premium + \alpha_3 Ln\_Turnover + \alpha_4\ Volatility + \varepsilon$$

$$Bid\_ask\ spread = \alpha_0 + \alpha_1 Exp.Ratio + \alpha_2 Abs.Premium + \alpha_3 Ln\_Turnover + \alpha_4 Volatility + \varepsilon \quad (17)$$

The dependent variable is represented by the Roll's bid-ask spread and it is expected to be positively influenced by premium, volatility and expenses. While turnover is expected to have a negative infuence on spread.

Last but not the least, is the following equation for ETFs' turnover:

$$Ln_{Turnover} = \alpha_0 + \alpha_1 Volatility + \alpha_2 Return + \alpha_3 Exp.ratio + \alpha_4 \text{Abs. premium} + \varepsilon \quad (18)$$

It is assumed that the return and premium will positively affect turnover, while volatility and expenses affect turnover negatively.

5. Empirical Results and Analysis

5.1 Risk and Return Analysis

Firstly, Table 2 shows ETFs' risk and return in reference to the underlying indices. The results indicate that the average return of the EM ETFs is higher than those of the DM ETFs during all periods. As for the ETFs' risk, it is found that the EM ETFs' average standard deviation during all periods is far above the average standard deviation of the DM ETFs. In addition, results indicate that ETFs provide higher returns in bullish market compared to bearish market.

Table 3 summarizes the data for differences in mean test and it is reported in the form of a t-statistics (parametric) and Wilcoxon z-statistics (non-parametric) to test whether the mean difference between both types of ETFs is statistically significant or otherwise. The values of t-test and z- test demonstrated that there is a presence of significant difference between the mean returns for both ETFs during full sample and financial crisis (2007-2009) period.

Table 2: Percentage weekly Returns and Risk

ETF	Overall Period				2007-2009				2010-2014			
	Return		Risk		Return		Risk		Return		Risk	
	ETF	Index	ETF	Index	ETF	Index	ETF	Index	ETF	Index	ETF	Index
Developed												
iShares MSCI EAFE	0.022	0.02	3.17	3.04	-0.087	-0.092	3.98	3.89	0.09	0.09	2.57	2.4
BLDRS Developed 100 ADR	0.011	0.015	3.41	3.22	-0.086	-0.086	4.56	4.13	0.07	0.08	2.49	2.53
iShares S&P Europe	0.027	0.039	3.47	3.5	-0.087	-0.069	4.22	4.44	0.1	0.1	2.94	2.8
iShares MSCI EMU	0.009	0.018	3.85	3.85	-0.09	-0.067	4.46	4.59	0.07	0.07	3.44	3.34
SPDR Euro STOXX 50	0.008	0.013	4.01	4.01	-0.047	-0.037	4.62	4.71	0.05	0.04	3.61	3.54
Vanguard FTSE Europe	0.014	0.038	3.51	3.52	-0.112	-0.066	4.32	4.45	-11.73	-13.3	2.93	2.82
BLDRS Europe 100 ADR	0.006	0.021	3.36	3.33	-0.112	-0.078	4.34	4.26	-10.61	-11.09	2.6	2.63
iShares MSCI Australia	0.094	0.095	4.14	4.04	0.136	0.141	5.24	5.19	0.06	0.05	3.32	3.15
iShares MSCI Austria	-0.087	-0.07	4.49	4.36	-0.22	-0.179	5.66	5.57	-0.01	-0.01	3.63	3.44
iShares MSCI Belgium	-0.025	0.005	3.83	3.72	-0.303	-0.307	5	4.8	0.15	0.19	2.9	2.87
iShares MSCI Canada	0.109	0.116	3.53	3.71	0.168	0.188	4.74	5.12	0.07	0.07	2.54	2.51
iShares MSCI France	0.014	0.023	3.83	3.87	-0.065	-0.041	4.43	4.64	0.05	0.05	3.43	3.33
iShares MSCI Germany	0.099	0.101	3.99	3.97	0.017	0.023	4.84	4.83	0.15	0.15	3.4	3.35
iShares MSCI Hong Kong	0.165	0.198	3.29	3.15	0.081	0.073	4.32	4.14	0.17	0.2	2.48	2.38
iShares MSCI Italy	-0.097	-0.096	4.34	4.26	-0.217	-0.215	4.68	4.71	-0.02	-0.03	4.14	3.98
iShares MSCI Japan	-0.004	-0.012	2.74	2.57	-0.161	-0.184	3.36	3.04	0.1	0.1	2.27	2.25
iShares MSCI South Korea	0.149	0.151	4.55	4.5	0.189	0.181	6.09	6.06	0.12	0.13	3.31	3.22
iShares MSCI Netherlands	0.06	0.07	3.67	3.63	-0.049	-0.014	4.39	4.48	0.13	0.12	3.17	3.02
iShares MSCI Singapore	0.095	0.096	3.44	3.35	0.112	0.111	4.68	4.57	0.08	0.08	2.41	2.32
iShares MSCI Spain	0.016	0.022	4.34	4.27	0.04	0.027	4.4	4.53	0.01	0.02	4.32	4.12
iShares MSCI Sweden	0.116	0.128	4.48	4.34	-0.026	-0.012	5.53	5.46	0.21	0.21	3.72	3.5
iShares MSCI Switzerland	0.112	0.122	2.88	2.99	0	0.014	3.55	3.78	0.18	0.19	2.4	2.39
iShares MSCI Taiwan	0.085	0.079	3.55	3.19	0.027	0.024	4.7	4	0.11	0.1	2.63	2.58
iShares MSCI UK	0.012	0.024	3.36	3.45	-0.128	-0.108	4.4	4.66	0.1	0.1	2.55	2.45
iShares Core S&P 500 US	0.133	0.131	2.72	2.74	-0.079	-0.078	3.54	3.59	0.27	0.26	2.07	2.07
iShares Dow Jones US	0.134	0.131	2.78	2.74	-0.074	-0.078	3.68	3.59	0.26	0.26	2.06	2.07
PowerShares QQQ US	0.254	0.255	2.89	2.9	0.096	0.096	3.62	3.64	0.35	0.35	2.34	2.34
Average	0.057	0.064	3.62	3.56	-0.039	-0.031	4.5	4.48	-0.71	-0.79	2.95	2.866
Minimum	-0.097	-0.09	2.72	2.57	-0.303	-0.307	3.36	3.04	-11.72	-13.3	2.063	2.069
Maximum	0.254	0.255	4.55	4.5	0.189	0.188	6.09	6.06	0.351	0.354	4.319	4.122
Emerging												
BLDRS EM Mkts 50 ADR	0.079	0.09	3.96	3.86	0.241	0.255	5.33	5.17	-0.02	-0.01	2.83	2.79
iShares MSCI EM Mkts	0.105	0.087	3.99	3.54	0.216	0.168	5.36	4.73	0.04	0.03	2.87	2.58
Vanguard FTSE EM Mkts	0.099	0.094	3.85	3.53	0.186	0.19	5.15	4.77	0.04	0.03	2.8	2.52
Guggenheim BRIC	0.109	0.13	4.39	4.38	0.385	0.389	5.98	5.94	-0.06	-0.03	3.06	3.09
iShares Latin America 40	0.116	0.113	4.61	4.53	0.437	0.411	6.26	6.11	-0.08	-0.07	3.24	3.22
SPDR S&P EM Asia Pacific	0.146	0.131	3.54	3.16	0.235	0.179	4.79	4.24	0.09	0.1	2.61	2.35
SPDR S&P EM Europe	-0.008	-0.031	5.17	4.84	0.06	0.022	7.22	6.74	-0.05	-0.06	3.57	3.37
SPDR S&P EM Mkts	0.101	0.086	3.62	3.37	0.193	0.166	4.9	4.56	0.05	0.03	2.66	2.47
SPDR S&P BRIC 40	0.093	0.083	4.54	4.3	0.228	0.215	6.52	6.19	0.02	0.01	3.1	2.92
iShares MSCI Brazil	0.104	0.124	5.12	5.25	0.561	0.593	6.8	7.08	-0.18	-0.17	3.76	3.72
iShares FTSE China	0.135	0.114	4.32	4.24	0.279	0.239	5.69	5.65	0.05	0.03	3.24	3.11
iShares MSCI Malaysia	0.128	0.125	2.64	2.5	0.141	0.136	3.35	3.14	0.12	0.12	2.12	2.03
iShares MSCI Mexico	0.139	0.138	4.19	4.33	0.165	0.163	5.61	5.86	0.14	0.13	3.05	3.06
iShares MSCI South Africa	0.142	0.16	4.33	4.45	0.174	0.224	5.59	5.94	0.12	0.11	3.37	3.25
PowerShares China	0.177	0.178	4.35	4.28	0.255	0.248	5.67	5.56	0.13	0.14	3.32	3.3
Market Vectors Russia	-0.055	-0.052	6.03	5.83	0.097	0.065	9.1	8.78	-0.12	-0.1	3.95	3.84
iShares MSCI Chile	0.04	0.04	4.12	3.83	0.268	0.234	5.86	5.43	-0.06	-0.05	3.11	2.9
SPDR S&P China	0.192	0.174	4.2	4.02	0.366	0.341	5.73	5.54	0.09	0.07	3.03	2.85
Average	0.102	0.099	4.28	4.12	0.249	0.235	5.83	5.64	0.017	0.017	3.094	2.965
Minimum	-0.055	-0.05	2.64	2.5	0.06	0.022	3.35	3.138	-0.178	-0.17	2.117	2.029
Maximum	0.192	0.178	6.03	5.834	0.561	0.593	9.1	8.78	0.136	0.137	3.953	3.844

Table 3: Differences in mean test on DM ETFs and EM ETFs

	Mean		Difference in Mean		Std. Deviation	
Period	DM	EM	t-test	z-test	DM	EM
Overall Period	0.057	0.102	-3.30	-2.72	0.07	0.06
2007-2009	-0.040	0.249	-6.49	-3.72	0.13	0.12
2010-2014	-0.719	0.017	-1.38	-1.07	3.64	0.09

The results are consistent with the study conducted by Wong and Shum (2010) that in a bullish market, ETFs often provide higher returns compared to the bearish market. On the same note, Rompotis (2012) found that the performance of ETFs is almost similar to their benchmark indices, but the investment in these ETFs is more risky than the benchmark indices.

5.2 Regression Analysis

Table 4 depicts the results of the time-series performance regression in reference to the three different periods, the average alpha estimate for the EM ETFs is positive for all periods except post crisis, when the alpha estimate is equal to zero. Comparatively, for all periods, DM ETFs displays alpha lesser than the EM ETFs. However, most of these alphas are not statistically significant. These findings are expected because all ETFs in the sample follow a passive investing strategy and do not seek to out-perform the benchmark indices. For the beta estimate which shows the replication strategy of the ETFs, the EM ETFs tracks the underlying indices much more closely in comparison to the benchmark indices for the all the understudy periods. Most of the beta estimates are below unity which suggests inefficient replication and conservative nature of ETFs. The DM ETFs average beta for the post crisis period is 1.07 and this suggests an aggressive nature of the replication strategy.

Table 4: Regression Results

ETF	Overall Period					2007-2009					2010-2014				
	α	t-test	β	t-test	R^2	α	t-test	β	t-test	R^2	α	t-test	β	t-test	R^2
Developed															
iShares MSCI EAFE	0.00	0.04	0.99	58.57	0.89	0.00	0.03	0.97	35.12	0.89	0.00	0.04	1.02	47.93	0.90
BLDRS DM 100 ADR	0.00	-0.11	1.03	82.38	0.94	0.01	0.06	1.07	45.68	0.93	-0.01	-0.21	0.97	94.24	0.97
iShares S&P Europe	-0.01	-0.24	0.96	75.82	0.93	-0.02	-0.27	0.92	46.02	0.93	-0.01	-0.13	1.02	63.29	0.94
iShares MSCI EMU	-0.01	-0.20	0.97	80.03	0.94	-0.03	-0.29	0.94	44.94	0.93	0.00	0.07	1.01	71.95	0.95
SPDR Euro STOXX 50	0.00	-0.10	0.97	77.24	0.94	-0.01	-0.12	0.94	43.04	0.92	0.00	0.08	0.99	69.13	0.95
Vanguard FTSE Europe	-0.02	-0.41	0.95	63.20	0.91	-0.05	-0.48	0.92	38.44	0.91	0.00	-0.06	0.99	51.07	0.91
BLDRS Europe 100 ADR	-0.01	-0.44	0.99	97.31	0.96	-0.03	-0.49	1.00	61.33	0.96	0.00	-0.12	0.97	73.72	0.96
iShares MSCI Australia	0.00	0.04	0.96	53.38	0.87	0.00	0.02	0.94	32.04	0.87	0.01	0.13	0.99	43.69	0.88
iShares MSCI Austria	-0.02	-0.29	0.99	70.96	0.92	-0.05	-0.35	0.97	40.34	0.91	0.00	0.07	1.02	64.70	0.94
iShares MSCI Belgium	-0.03	-0.42	0.95	48.64	0.85	-0.01	-0.07	0.95	27.28	0.83	-0.04	-0.61	0.96	46.21	0.89
iShares MSCI Canada	0.00	0.02	0.93	99.22	0.96	0.00	-0.03	0.91	57.87	0.96	0.00	0.05	1.00	97.94	0.97
iShares MSCI France	-0.01	-0.16	0.96	73.88	0.93	-0.03	-0.27	0.92	41.70	0.92	0.00	-0.07	1.00	67.08	0.95
iShares MSCI Germany	0.00	0.02	0.98	79.84	0.94	-0.01	-0.05	0.96	45.05	0.93	0.01	0.17	0.99	71.15	0.95
iShares MSCI HK	0.01	0.14	0.93	39.19	0.79	0.02	0.09	0.91	22.38	0.76	0.01	0.13	0.95	35.73	0.83
iShares MSCI Italy	0.00	-0.05	0.98	75.52	0.93	-0.01	-0.12	0.95	42.50	0.92	0.01	0.09	1.01	64.97	0.94
iShares MSCI Japan	0.01	0.08	0.86	27.39	0.65	0.00	0.02	0.90	16.91	0.65	0.02	0.23	0.81	21.33	0.64
iShares MSCI S. Korea	0.01	0.09	0.93	47.94	0.85	0.02	0.11	0.93	30.02	0.85	0.00	0.01	0.94	36.01	0.84
iShares MSCI N. lands	-0.01	-0.17	0.97	70.21	0.92	-0.04	-0.35	0.94	41.04	0.92	0.01	0.12	1.01	59.99	0.93
iShares MSCI Singapore	0.00	0.07	0.95	49.07	0.85	0.01	0.05	0.94	29.13	0.85	0.01	0.10	0.97	41.73	0.87
iShares MSCI Spain	-0.01	-0.09	0.98	72.51	0.93	0.01	0.14	0.93	40.21	0.91	-0.01	-0.17	1.02	63.02	0.94
iShares MSCI Sweden	-0.01	-0.18	0.99	70.53	0.92	-0.01	-0.11	0.97	40.83	0.92	-0.01	-0.15	1.03	61.81	0.94
iShares MSCI Switz. land	0.00	0.00	0.92	64.58	0.91	-0.01	-0.14	0.89	37.22	0.90	0.00	0.07	0.97	57.06	0.93
iShares MSCI Taiwan	0.01	0.10	0.95	32.95	0.72	0.00	0.02	0.98	18.61	0.69	0.02	0.26	0.91	31.00	0.79
iShares MSCI UK	-0.01	-0.20	0.93	62.09	0.90	-0.03	-0.28	0.90	37.26	0.90	0.00	-0.03	1.00	53.03	0.92
iShares S&P 500 US	0.00	0.29	0.99	262.94	0.99	0.00	-0.06	0.98	160.49	0.99	0.00	0.28	1.00	209.08	0.99
iShares Dow Jones US	0.00	0.09	1.01	191.95	0.99	0.01	0.17	1.02	106.19	0.99	0.00	0.25	0.99	203.05	0.99
PowerShares QQQ US	0.00	-0.03	1.00	406.61	1.00	0.00	0.04	0.99	239.25	1.00	0.00	-0.26	1.00	340.33	1.00
Average	0.00	-0.08	0.96	90.15	0.90	-0.01	-0.10	0.95	52.63	0.89	0.00	0.01	0.98	79.27	0.92
Minimum	-0.03	-0.44	0.86	27.39	0.65	-0.05	-0.49	0.89	16.91	0.65	-0.04	-0.61	0.81	21.33	0.64
Maximum	0.01	0.29	1.03	406.61	1.00	0.02	0.17	1.07	239.25	1.00	0.02	0.28	1.03	340.33	1.00

Emerging															
BLDRS EM Mkts 50	-0.01	-0.70	1.02	219.40	0.99	-0.02	-0.55	1.03	138.69	0.99	-0.01	-0.52	1.01	163.23	0.99
iShares MSCI EM Mkts	0.01	0.20	1.04	49.05	0.85	0.04	0.24	1.05	29.61	0.85	0.00	0.04	1.03	39.72	0.86
Vanguard FTSE EM Mkt	0.00	0.06	1.01	51.33	0.86	0.00	-0.02	1.00	30.56	0.86	0.01	0.20	1.04	43.01	0.88
Guggenheim BRIC	-0.02	-0.82	0.99	175.36	0.99	0.00	-0.12	1.00	160.03	0.99	-0.03	-0.98	0.98	91.51	0.97
iShares Latin America	0.00	0.04	1.01	179.87	0.99	0.02	0.33	1.02	113.34	0.99	-0.01	-0.31	1.00	135.97	0.99
SPDR S&P EM AP	0.02	0.20	0.98	36.35	0.77	0.06	0.30	0.98	20.67	0.75	0.00	-0.03	0.99	32.00	0.80
SPDR S&P EM Europe	0.02	0.32	1.02	64.70	0.91	0.04	0.21	1.03	39.81	0.92	0.01	0.16	1.01	48.45	0.90
SPDR S&P EM Mkts	0.01	0.23	1.01	57.71	0.89	0.03	0.18	1.01	33.59	0.89	0.01	0.20	1.02	48.33	0.90
SPDR S&P BRIC 40	0.01	0.14	1.02	77.42	0.94	0.01	0.06	1.02	44.98	0.94	0.01	0.25	1.03	62.21	0.94
iShares MSCI Brazil	-0.01	-0.26	0.95	87.97	0.95	0.01	0.05	0.94	55.46	0.95	-0.01	-0.21	0.98	66.17	0.94
iShares FTSE China	0.03	0.33	0.91	39.56	0.79	0.07	0.31	0.89	22.87	0.77	0.02	0.23	0.95	35.33	0.83
iShares MSCI Malaysia	0.01	0.17	0.94	40.00	0.80	0.01	0.10	0.95	23.80	0.79	0.01	0.17	0.94	32.87	0.81
iShares MSCI Mexico	0.01	0.19	0.95	92.30	0.95	0.01	0.13	0.93	54.29	0.95	0.01	0.23	0.98	81.50	0.96
iShares MSCI S. Africa	-0.01	-0.08	0.92	58.80	0.89	-0.03	-0.17	0.89	36.68	0.90	0.01	0.18	0.98	46.40	0.89
PowerShares China	0.00	-0.15	1.01	219.03	0.99	0.00	0.08	1.02	126.12	0.99	-0.01	-0.40	1.00	197.54	0.99
Market Vectors Russia	-0.01	-0.06	0.89	32.62	0.74	0.04	0.09	0.85	15.65	0.68	-0.02	-0.27	0.97	46.32	0.89
iShares MSCI Chile	0.00	-0.02	1.03	61.91	0.91	0.03	0.16	1.03	32.39	0.91	-0.01	-0.22	1.03	54.85	0.92
SPDR S&P China	0.03	0.31	0.94	41.44	0.81	0.05	0.24	0.92	23.34	0.79	0.02	0.28	0.98	37.90	0.85
Average	0.01	0.01	0.98	88.05	0.89	0.02	0.09	0.97	55.66	0.88	0.00	-0.06	1.00	70.18	0.91
Minimum	-0.02	-0.82	0.89	32.62	0.74	-0.03	-0.55	0.85	15.65	0.68	-0.03	-0.98	0.94	32.00	0.80
Maximum	0.03	0.33	1.04	219.40	0.99	0.07	0.33	1.05	160.03	0.99	0.02	0.28	1.04	197.54	0.99

5.3 Comparison of Sharpe Ratios

The average Sharpe ratios of the DM and EM Markets ETFs are presented in Table 5 below where the average Sharpe ratio of the EM ETFs is higher than the DM ETFs during the full sample and financial crisis period. The differences in mean test show that the Sharpe ratios are significantly different during the two periods mentioned above. Interestingly, the results demonstrate that ETFs display lower returns in bearish markets compared to bullish markets. The results are consistent with past studies by Ching-Chung *et al.* (2005), Meric *et al.* (2009), Wong and Shum (2010), Prasanna (2012) and Rompotis (2012).

Table 5: Average Sharpe Ratios

	ETF		Differences in mean test	
Period	DM	EM	t-test	z-test
Full sample	0.008	0.018	-2.66	-2.42
2007-2009	-0.027	0.031	-3.08	-2.64
2010-2014	0.042	0.006	-1.12	-0.81

5.4 Tracking Error

Referring to Table 6, the results for three different tracking error estimates are demonstrated. The results of each one of those three various methods are shown in the first three columns of the table while the average tracking error is provided in the fourth column. The results in this section indicate that DM ETFs exhibit lower tracking error than EM ETFs. The presence of the tracking errors shows partial replication by ETFs. Overall, the average mean of all the ETFs tracking errors is higher during crisis period which advocates that the ETF pricing is more volatile during the market downturns. One of the factors that complicate ETF replication in emerging markets is the difference in time zones for the underlying markets because of the geographical location in which those ETFs are traded. On top of that, foreign exchange rate is another factor which can impact tracking levels (Shin and Soydemir 2010). Moreover, stock returns cross-sectional dispersion in emerging markets are structurally greater as compared to the developed markets. As a result, similar-sized deviations between portfolio and index weights typically result in larger return deviations for an EM ETF than a DM ETF.

5.5 Markov Switching

The Markov switching model and estimates for the high (bullish) and low (bearish) beta regimes are presented and summarized in Table 7. The table presents the parameter estimates i.e. alpha, beta and the transition probabilities of EM and DM ETFs. Results show that during the high beta (bullish) regime, the results show that on an average, the DM ETFs beta (1.16) is higher than the EM ETFs beta (1.05). This finding shows that EM ETFs have more deviation from benchmark indices and follows a more aggressive replication strategy. On the contrary, during the low beta (bearish) regime, the results show that on an average, the DM ETFs beta (0.81) is higher and much closer to unity than the EM ETFs beta (0.73). The results indicate that during low beta regimes, the DM tracks much closely to their underlying index and EM ETFs have a more conservative replication.

Table 6: Tracking error estimates

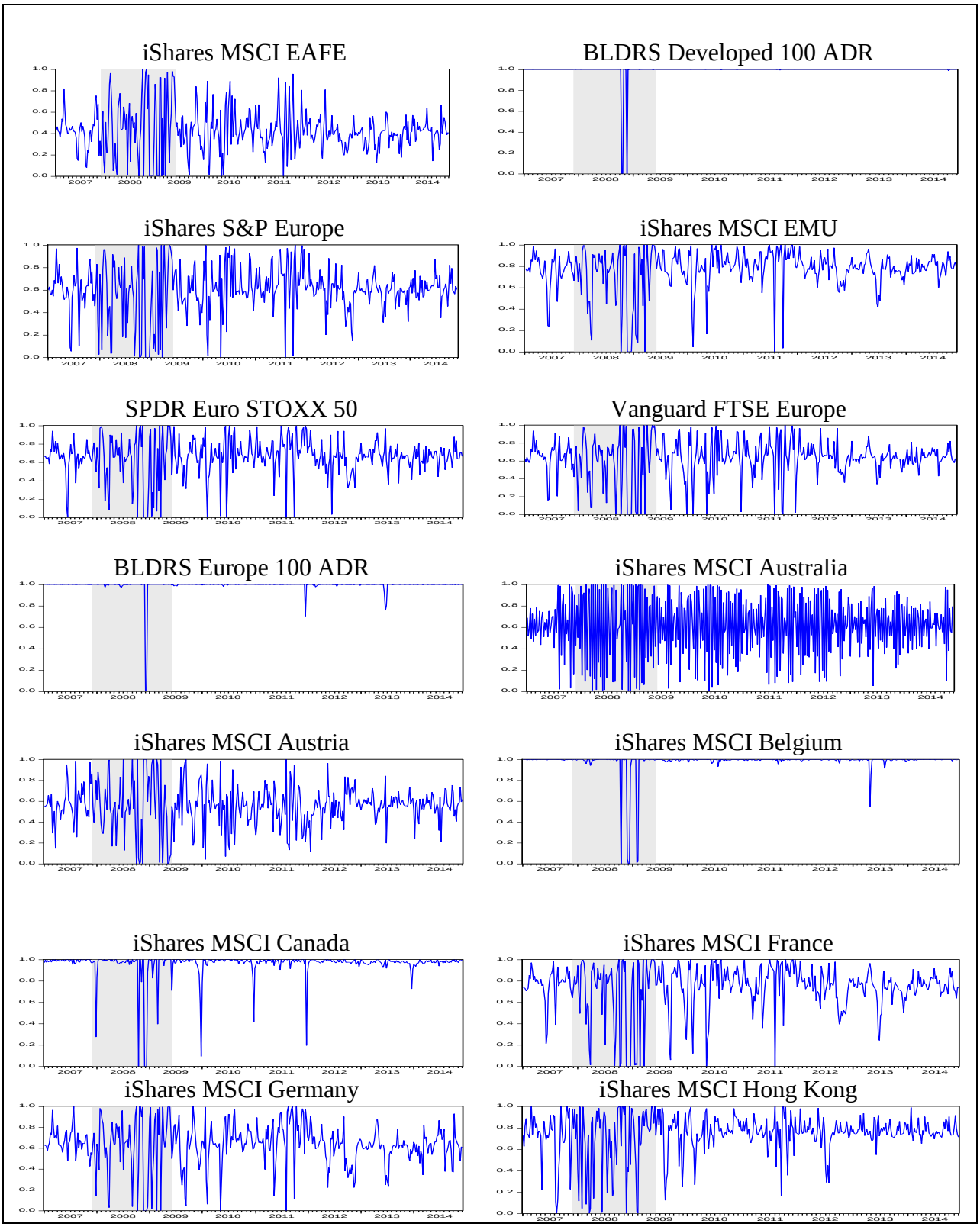
ETF	Overall Period				2007-2009				2010-2014			
	TE-1	TE-2	TE-3	Avg.	TE-1	TE-2	TE-3	Avg.	TE-1	TE-2	TE-3	Avg.
Developed												
iShares MSCI EAFE	0.75	0.72	1.04	0.84	1.00	0.88	1.33	1.07	0.60	0.55	0.81	0.65
BLDRS Developed 100 ADR	0.38	0.73	0.82	0.64	0.49	1.12	1.20	0.94	0.31	0.29	0.42	0.34
iShares S&P Europe	0.63	0.66	0.90	0.73	0.83	0.80	1.10	0.91	0.50	0.52	0.72	0.58
iShares MSCI EMU	0.68	0.67	0.95	0.77	0.90	0.82	1.19	0.97	0.54	0.51	0.75	0.60
SPDR Euro STOXX 50	0.71	0.75	1.02	0.82	0.91	0.94	1.29	1.04	0.58	0.56	0.81	0.65
Vanguard FTSE Europe	0.73	0.81	1.08	0.87	0.95	0.99	1.33	1.09	0.59	0.64	0.88	0.70
BLDRS Europe 100 ADR	0.41	0.55	0.69	0.55	1.44	1.25	1.90	1.53	0.37	0.41	0.55	0.45
iShares MSCI Australia	1.07	1.02	1.47	1.19	1.44	1.25	1.90	1.53	0.84	0.77	1.14	0.92
iShares MSCI Austria	0.84	0.91	1.24	0.99	1.18	1.18	1.67	1.34	0.63	0.60	0.87	0.70
iShares MSCI Belgium	0.87	1.20	1.48	1.18	1.14	1.74	2.08	1.65	0.71	0.64	0.95	0.77
iShares MSCI Canada	0.42	0.62	0.71	0.58	0.62	0.91	1.00	0.84	0.30	0.28	0.41	0.33
iShares MSCI France	0.71	0.74	1.02	0.82	0.93	0.94	1.27	1.04	0.57	0.55	0.79	0.64
iShares MSCI Germany	0.68	0.72	0.98	0.79	0.92	0.90	1.29	1.04	0.53	0.52	0.75	0.60
iShares MSCI Hong Kong	0.58	1.06	1.51	1.05	1.65	1.33	2.10	1.69	0.58	0.67	1.01	0.76
iShares MSCI Italy	0.82	0.78	1.13	0.91	0.95	0.92	1.32	1.06	0.73	0.66	0.99	0.79
iShares MSCI Japan	1.23	1.13	1.63	1.33	1.51	1.33	2.00	1.62	1.06	0.96	1.37	1.13
iShares MSCI South Korea	1.32	1.22	1.78	1.44	1.86	1.45	2.34	1.88	0.99	0.92	1.34	1.09
iShares MSCI Netherlands	0.72	0.73	1.02	0.82	0.97	0.86	1.28	1.04	0.57	0.58	0.82	0.66
iShares MSCI Singapore	0.93	0.94	1.31	1.06	1.40	1.20	1.84	1.48	0.64	0.58	0.86	0.69
iShares MSCI Spain	0.84	0.82	1.17	0.94	0.98	0.90	1.30	1.06	0.74	0.76	1.06	0.85
iShares MSCI Sweden	0.86	0.89	1.24	1.00	1.18	1.10	1.61	1.30	0.66	0.66	0.93	0.75
iShares MSCI Switzerland	0.61	0.65	0.87	0.71	0.86	0.83	1.13	0.94	0.46	0.46	0.65	0.52
iShares MSCI Taiwan	1.28	1.36	1.86	1.50	1.92	1.76	2.62	2.10	0.90	0.83	1.21	0.98
iShares MSCI UK	0.68	0.83	1.05	0.85	0.98	1.10	1.40	1.16	0.50	0.53	0.74	0.59
iShares Core S&P 500 US	0.13	0.17	0.21	0.17	0.18	0.21	0.27	0.22	0.10	0.12	0.16	0.13
iShares Dow Jones US	0.16	0.24	0.29	0.23	0.28	0.33	0.43	0.35	0.10	0.13	0.16	0.13
PowerShares QQQ US	0.10	0.11	0.14	0.12	0.13	0.14	0.19	0.15	0.08	0.08	0.11	0.09
Average	0.71	0.78	1.06	0.85	1.02	1.01	1.42	1.15	0.56	0.55	0.79	0.63
Minimum	0.10	0.11	0.14	0.12	0.13	0.14	0.19	0.15	0.08	0.08	0.11	0.09
Maximum	1.32	1.36	1.86	1.50	1.92	1.76	2.62	2.10	1.06	0.96	1.37	1.13
Emerging												
BLDRS EM Mkts 50 ADR	0.25	0.28	0.36	0.30	0.33	0.37	0.48	0.39	0.20	0.20	0.28	0.22
iShares MSCI EM Mkts	1.10	1.06	1.53	1.23	1.60	1.32	2.08	1.67	0.80	0.71	1.07	0.86
Vanguard FTSE EM Mkts	0.09	0.08	1.42	0.53	1.46	1.27	1.94	1.56	0.74	0.64	0.98	0.79
Guggenheim BRIC	0.49	0.43	0.51	0.47	0.28	0.36	0.46	0.37	0.49	0.46	0.53	0.49
iShares Latin America 40	0.33	0.40	0.52	0.42	0.47	0.50	0.68	0.55	0.23	0.30	0.38	0.30
SPDR S&P EM Asia Pacific	1.24	1.17	1.71	1.37	1.89	1.46	2.40	1.92	0.88	0.76	1.17	0.93
SPDR S&P EM Europe	1.05	1.11	1.53	1.23	1.46	1.47	2.08	1.67	0.82	0.75	1.12	0.90
SPDR S&P EM Mkts	0.86	0.81	1.19	0.95	1.26	1.04	1.64	1.31	0.63	0.54	0.84	0.67
SPDR S&P BRIC 40	0.81	0.77	1.12	0.90	1.25	0.99	1.60	1.28	0.59	0.51	0.77	0.62
iShares MSCI Brazil	0.78	0.89	1.15	0.94	1.02	1.16	1.49	1.22	0.63	0.62	0.88	0.71
iShares FTSE China	1.47	1.37	1.97	1.60	2.23	1.66	2.72	2.20	1.00	0.89	1.34	1.08
iShares MSCI Malaysia	0.90	0.79	1.20	0.97	1.18	1.01	1.55	1.25	0.74	0.57	0.93	0.74
iShares MSCI Mexico	0.60	0.71	0.90	0.74	0.84	1.00	1.25	1.03	0.45	0.38	0.59	0.47
iShares MSCI South Africa	0.81	1.07	1.41	1.10	1.27	1.41	1.80	1.49	0.81	0.74	1.10	0.89
PowerShares China	0.25	0.32	0.40	0.32	0.38	0.42	0.56	0.45	0.17	0.20	0.27	0.21
Market Vectors Russia	1.49	2.76	3.08	2.44	2.84	4.45	5.16	4.15	0.89	0.93	1.29	1.04
iShares MSCI Chile	0.76	0.95	1.22	0.98	1.12	1.40	1.80	1.44	0.62	0.62	0.92	0.72
SPDR S&P China	1.33	1.27	1.83	1.47	2.11	1.57	2.61	2.10	0.89	0.77	1.18	0.95
Average	0.81	0.90	1.28	1.00	1.28	1.27	1.80	1.45	0.64	0.59	0.87	0.70
Minimum	0.09	0.08	0.36	0.30	0.28	0.36	0.46	0.37	0.17	0.20	0.27	0.21
Maximum	1.49	2.76	3.08	2.44	2.84	4.45	5.16	4.15	1.00	0.93	1.34	1.08

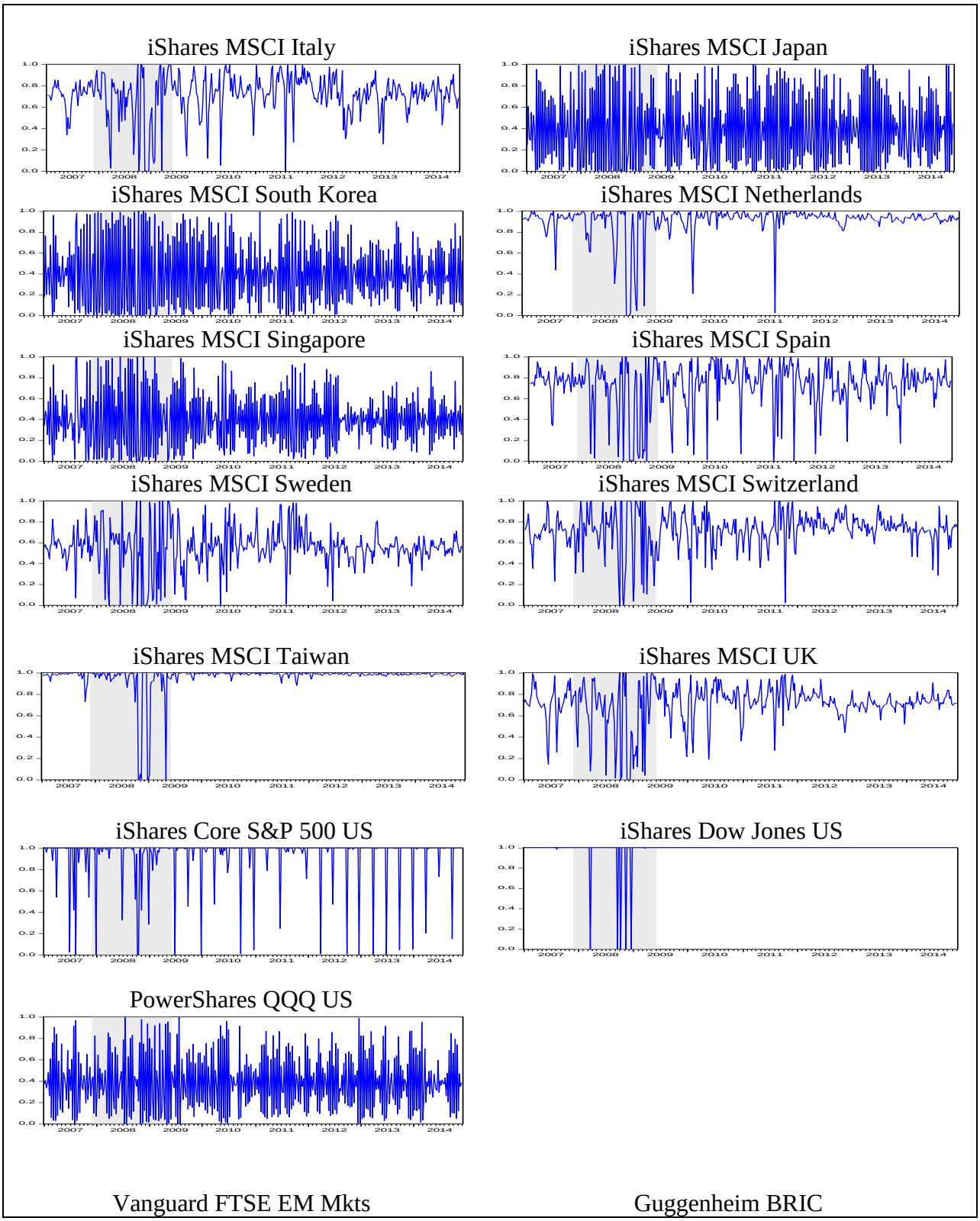
Table 7: Markov Switching Regression Estimates

ETF	High beta regime				Low beta regime				Transition probability	
	α	p-val	β	p-val	α	p-val	β	p-val	P_{11}	P_{22}
Developed										
iShares MSCI EAFE	-0.03	0.79	1.23	0.00	-0.03	0.76	0.87	0.00	0.53	0.66
BLDRS DM 100 ADR	5.28	0.00	2.03	0.00	-0.01	0.76	0.99	0.00	0.33	1.00
iShares S&P Europe	-0.04	0.46	1.12	0.00	-0.06	0.49	0.84	0.00	0.65	0.49
iShares MSCI EMU	-0.02	0.72	1.07	0.00	-0.10	0.43	0.81	0.00	0.84	0.47
SPDR Euro STOXX 50	0.01	0.92	1.10	0.00	-0.11	0.32	0.82	0.00	0.71	0.45
VG FTSE Europe	-0.03	0.65	1.14	0.00	-0.15	0.16	0.79	0.00	0.69	0.49
BLDRS EU 100 ADR	1.01	0.01	1.68	0.00	-0.02	0.51	0.98	0.00	0.39	0.99
iShares MSCI Australia	-0.55	0.00	1.00	0.00	0.86	0.00	0.92	0.00	0.37	0.00
iShares MSCI Austria	-0.05	0.63	1.20	0.00	-0.03	0.73	0.88	0.00	0.52	0.62
iShares MSCI Belgium	-0.07	0.23	1.02	0.00	3.00	0.00	0.14	0.01	0.99	0.41
iShares MSCI Canada	0.03	0.30	0.99	0.00	-0.19	0.49	0.62	0.00	0.97	0.29
iShares MSCI France	-0.04	0.44	1.10	0.00	-0.08	0.46	0.78	0.00	0.82	0.48
iShares MSCI Germany	-0.07	0.25	1.10	0.00	0.05	0.60	0.83	0.00	0.73	0.53
iShares MSCI Hong Kong	-0.14	0.18	1.06	0.00	0.40	0.21	0.56	0.00	0.79	0.39
iShares MSCI Italy	-0.01	0.80	1.09	0.00	-0.06	0.61	0.83	0.00	0.80	0.52
iShares MSCI Japan	-0.74	0.00	0.91	0.00	1.12	0.00	0.79	0.00	0.34	0.00
iShares MSCI South Korea	-0.75	0.00	0.99	0.00	1.11	0.00	0.81	0.00	0.36	0.05
iShares MSCI Netherlands	-0.01	0.82	1.03	0.00	-0.09	0.74	0.67	0.00	0.95	0.48
iShares MSCI Singapore	-0.46	0.00	1.05	0.00	0.65	0.00	0.80	0.00	0.38	0.07
iShares MSCI Spain	0.04	0.51	1.10	0.00	-0.33	0.03	0.79	0.00	0.79	0.45
iShares MSCI Sweden	-0.01	0.85	1.15	0.00	-0.09	0.41	0.86	0.00	0.61	0.52
iShares MSCI Switzerland	-0.12	0.31	1.21	0.00	0.02	0.67	0.86	0.00	0.41	0.77
iShares MSCI Taiwan	1.17	0.12	1.83	0.00	0.01	0.83	0.86	0.00	0.48	0.98
iShares MSCI UK	-0.03	0.64	1.07	0.00	-0.05	0.73	0.77	0.00	0.80	0.51
iShares Core S&P 500 US	0.03	0.00	1.00	0.00	-0.53	0.00	0.91	0.00	0.93	0.05
iShares Dow Jones US	0.02	0.05	1.00	0.00	-1.61	0.00	1.00	0.00	0.99	0.00
PowerShares QQQ US	0.05	0.00	1.00	0.00	-0.07	0.00	0.99	0.00	0.35	0.00
Average			1.16				0.81			
Emerging										
BLDRS EM Mkts 50 ADR	-1.31	0.00	1.16	0.00	0.01	0.38	1.02	0.00	0.00	0.98
iShares MSCI EM Mkts	-0.24	0.37	1.40	0.00	0.03	0.75	0.95	0.00	0.35	0.84
Vanguard FTSE EM Mkts	-0.06	0.35	1.07	0.00	1.37	0.09	0.62	0.00	0.97	0.38
Guggenheim BRIC	0.04	0.02	1.00	0.00	-1.90	0.00	0.87	0.00	0.97	0.22
iShares Latin America 40	0.07	0.00	1.02	0.00	-1.59	0.00	0.99	0.00	0.96	0.00
SPDR S&P EM Asia Pacific	-0.61	0.00	1.00	0.00	1.08	0.00	0.96	0.00	0.43	0.02
SPDR S&P EM Europe	-0.04	0.61	1.09	0.00	0.07	0.82	0.60	0.00	0.86	0.25
SPDR S&P EM Mkts	-0.04	0.51	1.06	0.00	0.22	0.43	0.65	0.00	0.85	0.00
SPDR S&P BRIC 40	-0.54	0.00	1.06	0.00	0.55	0.00	0.99	0.00	0.18	0.18
iShares MSCI Brazil	0.04	0.48	1.01	0.00	-1.06	0.00	0.73	0.00	0.96	0.46
iShares FTSE China	-0.88	0.00	0.95	0.00	1.22	0.00	0.87	0.00	0.30	0.08
iShares MSCI Malaysia	-0.54	0.00	0.97	0.00	0.69	0.00	0.93	0.00	0.27	0.09
iShares MSCI Mexico	0.01	0.77	0.99	0.00	0.15	0.56	0.60	0.00	0.99	0.67
iShares MSCI South Africa	0.00	0.90	1.01	0.00	-0.07	0.80	0.75	0.00	0.96	0.70
PowerShares China	-0.12	0.09	1.02	0.00	0.10	0.01	1.00	0.00	0.00	0.14
Market Vectors Russia	0.01	0.92	1.07	0.00	-2.07	0.05	-0.08	0.27	0.98	0.36
iShares MSCI Chile	0.01	0.86	1.05	0.00	-1.34	0.02	-0.15	0.14	0.99	0.24
SPDR S&P China	-0.79	0.00	0.99	0.00	1.13	0.00	0.89	0.00	0.33	0.08
Average			1.05				0.73			

The graphs of the smoothed probabilities of low/high beta regimes for all the ETFs in the sample are illustrated in Figure 2 where the shaded area indicated the global financial crisis. In almost all figures, it can be seen that during the crisis period there is rather a high frequency of changes in terms of the tracking ability (beta) of the ETFs which affirm the previous results

obtained. This is actually not surprising as most of the variations in beta of ETFs can be attributed to underlying index returns.

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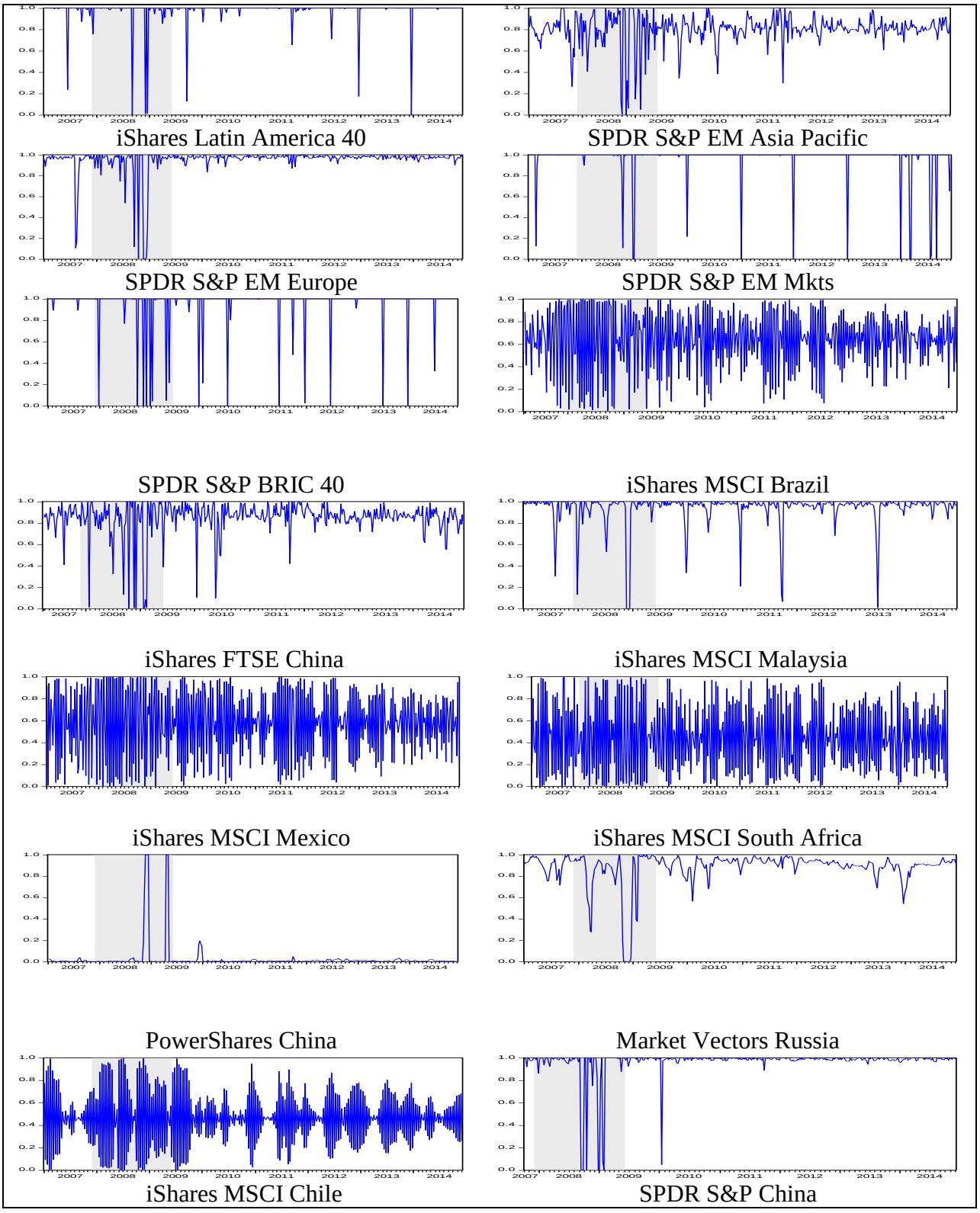
iShares MSCI Sweden
iShares MSCI Switzerland
iShares MSCI Taiwan
iShares MSCI UK
iShares Core S&P 500 US
iShares Dow Jones US
PowerShares QQQ US
Vanguard FTSE EM Mkts
Guggenheim BRIC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SPDR S&P EM Europe
SPDR S&P EM Mkts
SPDR S&P BRIC 40
iShares MSCI Brazil
iShares FTSE China
iShares MSCI Malaysia
iShares MSCI Mexico
iShares MSCI South Africa
PowerShares China
Market Vectors Russia
iShares MSCI Chile
SPDR S&P China

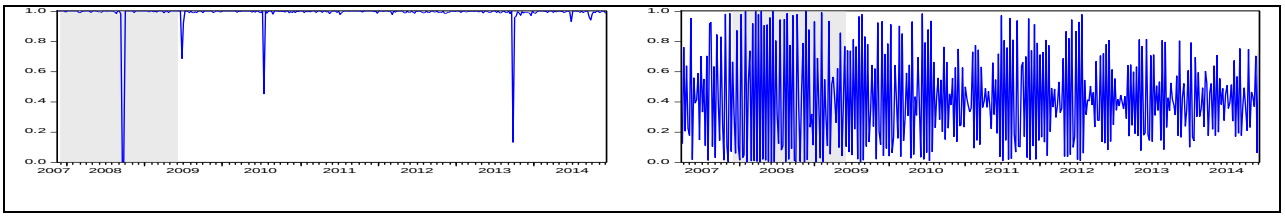

Figure 2: Smoothed Probabilities of a Low/High Beta Regime

5.6 Trading Characteristics

Table 8 presents an overview of the ETF trading characteristics. It can be seen from the table that the DM ETFs reaches $1.2billion in terms of its average pecuniary turnover, while the EM ETFs reaches a value of $5.2billion. Based on the sample, the average size of DM and EM ETFs is approximately $9.5 billion and $4.9 billion respectively. Furthermore, the EM ETFs volatility on average (5.36%) is higher than the DM Markets ETF (4.59). Similarly, the average DM ETF and EM ETF are trading on a discount to its NAV at the respective rates of 0.11% and 0.44. Apart from that, the samples of DM and EM ETFs' average percentage bid-ask spread is equivalent to 0.04% and 0.06%. Last but not least, the DM and EM ETFs' published expense ratio in average is reported to be equivalent to 0.43% and 0.56%, respectively.

Individually, a large number of the samples of ETFs are traded on premium (36 from 47 ETFs trade on premium, while 3 ETFs do not represent any premium or discount). The findings are consistent with the study by Aber *et al.* (2009), who compared the tracking ability between ETFs and mutual funds claiming that ETFs are anticipated in trading at premium rather than at discount, accompanied by large daily price fluctuations. Similarly, Gerasimos (2011) concluded that ETFs usually trade at a premium from their NAV and their pattern in terms of the returns usually is not surprising at all.

5.7 Interaction among Trading Characteristics

Table 9 presents the results obtained from the cross-sectional regression analysis and shows the important relationships between different trading features of ETFs such as expense ratio, size, bid-ask spread, premium, size, return, turnover and volatility of ETF. The total number of ETFs sample is 45 and the table is divided into six panels.

Panel A provides the cross sectional regression results for the factors contributing to the ETFs' return. The results indicate that the ETFs' return and risk has a negative relation but is statistically insignificant. On the contrary, the ETFs' tracking error has a negative impact on their returns and shows a significant relationship at 5% level. This statistically significant connection between the return and tracking error is actually expected. This is due to the fact that the underlying index majorly influences the tracking error because the return of the ETFs is influenced by the return of the underlying indices. Apart from that, the negative significant relation is also observed between expense ratio and ETF returns. This result is again expected because expenses usually play a role in affecting the return of the mutual funds or ETFs as suggested in past various studies by Agapova (2011), Gastineau (2004) and Poterba and Shoven (2002). Furthermore, the assets have a statistically significant and positive impact on ETFs. However, the value of R^2 is equivalent to 0.28 which reflects a low regression fit.

Table 8: Expense and Trading characteristics of EM and DM ETFs

ETF	Assets Usd (M)	Turnover	Volatility (%)	Premium (%)	Spread (%)	Exp. Ratio
Developed						
iShares MSCI EAFE	43435	4977759292	4.06	0.16	0.01	0.33
BLDRS Developed 100	71	2287170	4.34	0.27	0.00	0.30
iShares S&P Europe	1967	122370779	4.43	0.11	0.07	0.60
iShares MSCI EMU	4093	254662461	4.88	0.09	0.09	0.50
SPDR Euro STOXX 50	1477	98260046	5.08	0.12	0.08	0.29
Vanguard FTSE Europe	4697	415251800	4.44	0.14	0.03	0.12
BLDRS Europe 100 ADR	22	980594	4.26	0.89	0.00	0.30
iShares MSCI Australia	2072	330549175	5.30	0.14	0.02	0.51
iShares MSCI Austria	128	19603673	5.50	-0.03	0.08	0.51
iShares MSCI Belgium	91	10369599	4.69	0.06	0.14	0.50
iShares MSCI Canada	3504	271065250	4.83	0.00	0.02	0.51
iShares MSCI France	390	54405372	4.95	0.10	0.09	0.51
iShares MSCI Germany	3563	332939977	5.06	0.08	0.02	0.51
iShares MSCI HK	2308	294392243	2.80	0.06	0.02	0.51
iShares MSCI Italy	616	66052101	5.53	0.08	0.06	0.50
iShares MSCI Japan	9482	1405549656	3.64	0.03	0.01	0.48
iShares MSCI S. Korea	3478	735405446	5.52	-0.04	0.02	0.61
iShares MSCI N. lands	181	14470729	4.57	0.07	0.09	0.50
iShares MSCI Singapore	1363	160646080	4.47	0.01	0.02	0.51
iShares MSCI Spain	764	90249026	5.58	0.08	0.05	0.51
iShares MSCI Sweden	393	35974359	5.69	0.09	0.07	0.51
iShares MSCI Swt. land	742	37509096	3.76	0.09	0.09	0.51
iShares MSCI Taiwan	2787	610691843	4.82	0.00	0.01	0.61
iShares MSCI UK	2188	136584847	4.39	0.36	0.06	0.51
iShares S&P 500 US	38294	2587018754	3.59	-0.01	0.00	0.07
iShares Dow Jones US	99207	116077335894	3.64	-0.02	0.00	0.20
PowerShares QQQ US	28251	20984467512	4.00	-0.01	0.00	0.20
Average	9465	5560253806	4.59	0.11	0.04	0.43
Maximum	99207	116077335894	5.69	0.89	0.14	0.61
Minimum	22	980594	2.80	-0.04	0.00	0.07
Emerging						
BLDRS EM Mkts 50	437	34414710	5.23	-0.03	0.00	0.30
iShares MSCI EM Mkts	36418	11931804000	5.27	0.07	0.00	0.67
Vanguard FTSE EM	30475	2582030049	5.06	0.21	0.02	0.15
Guggenheim BRIC	495	43291931	5.87	-0.05	0.08	0.64
iShares Latin America 40	1595	343945877	6.00	0.00	0.03	0.49
SPDR S&P EM Asia Pac.	488	21923296	5.10	0.13	0.11	0.59
SPDR S&P EM Europe	132	12195446	-0.10	6.21	0.10	0.59
SPDR S&P EM Mkts	179	7449995	5.04	0.19	0.10	0.65
SPDR S&P BRIC 40	323	15333377	6.12	0.08	0.07	0.50
iShares MSCI Brazil	6909	4639517971	6.97	0.23	0.00	0.61
iShares FTSE China	6231	3872818707	5.97	0.06	0.00	0.74
iShares MSCI Malaysia	835	130948528	3.93	-0.01	0.12	0.51
iShares MSCI Mexico	1999	825347736	5.57	0.02	0.02	0.50
iShares MSCI S. Africa	517	104184054	6.20	0.16	0.06	0.61
PowerShares China	346	30236031	6.14	-0.07	0.07	0.70
Market Vectors Russia	1428	507524527	6.94	0.60	0.02	0.62
iShares MSCI Chile	431	51639827	5.44	0.05	0.11	0.61
SPDR S&P China	719	44532763	5.77	0.14	0.07	0.59
Average	4998	1399952157	5.36	0.44	0.06	0.56
Maximum	36418	11931804000	6.97	6.21	0.12	0.74
Minimum	132	7449995	-0.10	-0.07	0.00	0.15

Table 9: Cross Sectional Regression Analysis

Panel A
Return Model

$Return = \alpha_0 + \alpha_1 Risk(SD) + \alpha_2 Expense\ Ratio + \alpha_3 Tracking\ error + \alpha_4 \text{Ln\_Assets} + \varepsilon$

Variable	Co-efficient	Std. Error	t-test	p-value
Constant	-0.02	0.08	-0.22	0.83
Risk (SD)	-0.02	0.02	-0.97	0.34
Expense Ratio	-0.22	0.08	-2.64	0.01
Tracking Error	-0.07	0.03	-2.31	0.03
Ln_Assets	0.02	0.01	2.71	0.01
R^2	0.28			

Panel B
Return Model

$Risk\ (SD) = \alpha_0 + \alpha_1 \text{TE} + \alpha_2 Abs\ Premium + \alpha_3 Bid\text{-}ask\ spread + \alpha_4 \text{Volatility} + \varepsilon$

Variable	Co-efficient	Std. Error	t-test	p-value
Constant	0.29	0.22	1.31	0.20
Tracking Error	0.23	0.1	2.29	0.03
Abs Premium	0.24	0.26	0.93	0.36
Bid-ask spread	-0.56	1.00	-0.56	0.58
Volatility	0.67	0.05	14.55	0.00
R^2	0.87			

Panel C
Tracking Error Model

$Tracking\ Error = \alpha_0 + \alpha_1 \text{Risk (SD)} + \alpha_2 Abs\ Premium + \alpha_3 Bid\text{-}ask\ spread + \alpha_4 \text{Exp Ratio} + \varepsilon$

Variable	Co-efficient	Std. Error	t-test	p-value
Constant	-0.22	0.29	-0.75	0.46
Risk (SD)	0.11	0.09	1.21	0.23
Abs Premium	0.56	0.34	1.62	0.11
Bid-ask spread	-0.64	1.41	-0.45	0.65
Expense Ratio	1.40	0.41	3.42	0.00
R^2	0.41			

Panel D
Expense Ratio Model

$Expense\ Ratio = \alpha_0 + \alpha_1 \text{Risk (SD)} + \alpha_2 Absolute\ Premium + \alpha_3 Bid\text{-}ask\ spread + \alpha_4 ln\_Assets + \varepsilon$

Variable	Co-efficient	Std. Error	t-test	p-value
Constant	0.12	0.20	0.58	0.57
Risk (SD)	0.10	0.03	3.51	0.00
Abs Premium	-0.16	0.15	-1.10	0.28
Bid-ask spread	0.93	0.67	1.38	0.18
ln_Assets	-0.01	0.02	-0.56	0.58
R^2	0.36			

Panel E
Bid-ask Spread Model

$Bid\text{-}ask\ spread = \alpha_0 + \alpha_1 Expense\ ratio + \alpha_2 Absolute\ Premium + \alpha_3 Ln\_Turnover + \alpha_4 Volatility + \varepsilon$

Variable	Co-efficient	Std. Error	t-test	p-value
Constant	0.24	0.05	4.91	0.00
Expense ratio	0.05	0.03	1.53	0.13
Abs Premium	0.08	0.03	2.76	0.01
Ln_Turnover	-0.01	0.00	-5.35	0.00
Volatility	-0.00	0.01	-0.20	0.84
R^2	0.50			

Panel F
Turnover Model

$Ln\_turnover = \alpha_0 + \alpha_1 Volatility + \alpha_2 Return + \alpha_3 Expense\ ratio + \alpha_4 Absolute\ premium + \varepsilon$

Variable	Co-efficient	Std. Error	t-test	p-value
Constant	20.09	1.95	10.29	0.00
Volatility	0.14	0.44	0.31	0.76
Return	9.20	4.77	1.93	0.06
Abs Premium	4.27	2.53	1.69	0.10
Volatility	-3.64	2.27	-1.60	0.12
R^2	0.23			

Panel B on the other hand reports the results of risk model where the factors influencing the risk of ETFs are evaluated. The results display that all contributive factors have a positive effect on the risk except for the bid-ask spread but the relationship is insignificant. The statistically significant estimations of tracking error and volatility are seen at 5% and 1% level respectively. In addition, the R^2 of the model is seen to be high and is equivalent to 0.87 and thus, this shows a

powerful regression fit. The results obtained meet the expectation of this study that all of the above factors positively affect the risk.

Panel C presents the results of tracking error model. It can be seen from the results that risk, premium and expense ratio have a positive impact on tracking error. However, the only statistically significant relation is between tracking error and expense ratio. The results are parallel to this study's expectations and are consistent with previous studies by Patrick (2011), Rompotis (2008) and Frino *et al.* (2004).

Panel D shows the results of expense ratio model. The only significant relationship at 1% level is risk which is according to the expectation of this study. The impact of assets on expense ratio is negative but insignificant. However, this negative relation shows the attainment of economies of scale as the size of ETF increases. Finally, the value of R^2 (0.36) also conveys that the model successfully explained the definition of the expense ratio of the ETFs.

The next model emphasizes on the factors affecting the ETFs' liquidity. The results are demonstrated in Panel E where the factors that significantly impact ETFs spread are premium and turnover. The estimations indicate that premium positively affects the bid-ask spread at 1% significance level. On the other hand, spread is negatively affected by turnover at 1% significant level. The expense ratio and volatility turnover does not affect the bid-ask spread because their estimates are statistically insignificant. The results are consistent with previous literature by Borkovec and Serbin (2013) and Marshall *et al.* (2013). This reflects a satisfactory regression fit considering the explanatory power of the model where the R^2 carries a value of 0.50.

Finally, Panel F represents the results obtained for the turnover model. The results indicate that turnover is positively and significantly impacted by return and premium. On the other hand, all other variables in the model are statistically insignificant. In addition, the constant of model shows a positive pattern and is influential at 1% level, and this portrays that there are some other contributing factors which may influence the ETFs' turnover but this model failed in capturing the other contributing factor. This claim is supported by the relevantly low R^2 value of 0.23.

4.5 Conclusion

Most literature on Exchange Traded Funds (ETF) is mainly focused on the developed markets. This study contributes to the literature by emphasizing not only on the developed markets (DM) but also on emerging markets (EM) ETF. Firstly, ETFs' risk and return are examined in reference to the underlying indices and the results indicate that the average return of the EM ETFs is higher than the DM ETFs during all periods. In the performance analysis based on Sharpe ratios, it is found that the average Sharpe ratios of EM ETFs are higher than DM ETFs.

In case of beta estimate which shows the replication strategy of the ETFs, the EM ETFs tracks the underlying indices much more closely in comparison to the DM ETFs. However, most of alphas are not statistically significant. These findings were expected because ETFs adhere to a passive management investing strategy and do not seek to beat the benchmark indices. The figures displaying Markov switching model indicate that during the high beta (bullish) regime, the DM ETFs have a more aggressive replication strategy. On the contrary, the EM ETFs have more deviation from the benchmark indices during the low beta regime.

Next, the tracking errors of the two distinct types of ETFs are investigated. The rank of tracking error is according to the expectations that the DM ETFs shows lower tracking error than the EM ETFs. This indicates that emerging markets are less efficient. In general, the average mean of all the ETFs tracking error is higher during crisis period, which indicate that ETF pricing is more volatile during market downturns.

Lastly, the interactions among different ETFs' characteristics are examined. The results suggest that assets size positively impacts the performance while expense ratio and tracking error negatively influence the performance. Similarly, risk has a positive relation to tracking error and volatility. The liquidity of ETFs is influenced positively by turnover and negatively by premium. Last but not least, the return and absolute premium have a positive impact on the turnover of ETFs. While a big portion of turnover remains unexplained, it is believed that the unexplained part of turnover is due to the ETFs' features which are distinctive in nature; thus, making them attractive and is able to capture the interest of the investors.

Some important observations are noted and summarized above and the findings offer diverse economic and policy implications by providing a clear understanding regarding the ETF performance and at the same time, promoting the wider investment community with an aid in identifying specific ETFs which are suitable to the individual and institutional portfolio requirements. In addition, the results might be of interest to arbitrageurs seeking to exploit the highlighted deviations. ETFs can be one of the best investment products available for the investors by providing instant diversification in holdings like stocks and bonds or other assets like commodities.

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