Actively versus passively managed equity ETFs: new empirical insights

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Abstract: This study employs a sample of 37 active and passive ETF pairs, which invest in common stocks, to assess their performance and risk up to December 31, 2016. Several return metrics are computed such as absolute, buy-and-hold returns and risk-adjusted returns. Moreover, a cross-sectional regression analysis is applied, which seeks to identify the factors that may influence the performance of ETFs. Finally, the ability of managers to time the market is examined. The findings are similar to those in the previous literature. In particular, the active ETFs are inferior to passive ETFs in terms of performance and overall risk also failing to deliver any material excess-market return. In addition, the active ETF managers are lacking in superior market timing skills. Finally, the performance of ETFs is found to be related to expenses and volume in a negative fashion while a positive relation is revealed between performance and the assets invested in ETFs.

Keywords: exchange traded funds; ETFs; active management; performance; market timing; expenses.

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1 Introduction

One long-lasting and inconclusive debate in finance literature concerns the ability of active asset managers to create value for their investors and gain above-market returns. Professional practitioners and several academic studies support the idea that the active management can benefit investors. On the other hand, a plethora of empirical research articles denies the ability of professional investment managers to beat the market by implementing profitable active investment strategies.[1]

A new chapter in the "active vs. passive management" debate concerns the actively managed exchange traded funds (ETFs), which are supposed to compete with their well-established passively managed counterparts for the interest of investors. Similarly to the case of more traditional active and passive investment vehicles, such as open-end mutual funds, the key question is whether active ETF managers are capable of identifying those opportunities which will enable them to outperform the market and their passive rivals.

Given the tremendous growth of the passive ETFs market and the trillions invested in such products worldwide, possible favourable empirical results for active ETFs could justify their existence and inform investors about a possibly profitable investment tool. On the contrary, favourable empirical results for passive ETFs could further reinforce the doubt about the merits of active portfolio management, explain the weak growth of active ETFs compared to their passive peers and, possibly, question the very existence of active ETFs.

Active ETFs reached the marketplace in the USA in February 2008. After a rather weak growth of this niche of the ETF industry during its infant years, active ETFs have started gaining significant popularity with practitioners and investors over the recent years. This growing popularity is testified by the increase in the number of active funds in the US from 73 at the end of 2013 to 173 in December 2016 and the doubling of the assets invested in active ETF products over the same period.[2] The assets held by active ETFs by the end of 2016 amounted to $29bn from about $0.7 in 2008.[3] At the same time, total assets invested in exchange traded products in US approximate $2.5 trillion[4], and, thus, active ETFs count for about 1.16% of the entire ETF market in the USA.

Given the relatively weak growth of the active segment of the ETF market over its first nine years, the literature which examines their performance and their ability to compete with the first-generation indexed ETFs is limited. The very first study on active ETFs is that of Rompotis (2011a). This study reveals that actively managed ETFs underperform the corresponding passive ETFs and the market indices while they fail to provide investors with any material positive excess return relative to the market return. The latter conclusion is verified by the findings of Rompotis (2011b). Rompotis (2013) also shows that the active ETFs underperform their passive peers while they are more volatile than them. Moreover, Schizas (2014) finds that active ETFs are not as active as they are supposed to be falling short when compared to passive ETFs in terms of performance and risk. Similarly to the previous studies, Dolvin (2014) indicates that active funds are more volatile than their passive peers. However, Dolvin (2014) reports that active ETFs can deliver a positive alpha. Going further, Meziani (2015) identifies the transparency issue and the relevant contention between the Securities and Exchange Commission (SEC) and fund sponsors seeking for approval of new active ETFs, as the main obstacle to the growth of active ETFs. He also reveals that only fixed-income active ETFs can contribute to enhancing the performance of an investment portfolio and reducing its overall risk. In a study on the Canadian actively managed ETFs, Rompotis (2015) demonstrate that, similarly to their US cousins, these funds fail to perform as they are expected to with the majority of them delivering significantly negative alphas.

This study is an expansion to our previous work on active ETFs. Specifically, we have assembled a sample of 37 active and passive ETF pairs having common equity benchmarks to examine standard issues surrounding their performance and risk up to December 31, 2016. In particular, we compare the absolute and buy-and-hold returns of active and passive ETFs, estimate risk-adjusted types of returns, apply cross-sectional

regression analysis to identify factors that may influence the return of ETFs, and assess the market timing skills of ETF managers.

The results obtained do not deviate significantly from those of the previous literature on the subject. Similarly to the findings of Rompotis (2011a, 2011b and 2013) and Schizas (2014), active equity ETFs are found to be inferior to their passive rivals in terms of performance and overall risk. Moreover, they cannot deliver any substantial alpha (in several cases the alphas of active ETFs are significantly negative in statistical and economic terms. In addition, they underperform their passive counterparts, when risk-adjusted return estimates are taken into consideration, whereas their managers do not seem to possess any superior market timing skills. Moreover, it is found that performance is negatively related to expenses and trading volumes. A positive relation is revealed between ETFs and the level of assets under management.

This study has been motivated by the increasing interest of investors in actively managed ETFs, the significant growth in the number of such products and the money channeled to them. When it comes to the contribution of this study compared to the previous studies on the subject, we should note that we use a wider sample of matched active and passive ETFs and more recent data than the previous studies. Moreover, we consider more factors in assessing performance of active and passive ETFs than the previous studies. Along with expenses, assets and volume, we also evaluate the impact on ETF returns by factors such as size, value, momentum, operating profitability and investment growth. Finally, market timing skills are assessed via an enhanced set of regression models. All the above enhance the knowledge we already have about the failure of active ETFs to compete with their passive counterparts.

We deem the results of this study important because they can explain why over the last couple of years active funds have experienced significant outflows, which have been channeled to passively managed products, especially ETFs.[5] They can also explain why active management has recently started to fade away as the default investment strategy of investors. Moreover, given that in our study we use equity active ETFs, their poor performance records could explain why fixed-income choices dominate in the active ETF marketplace.[6] The establishment of a firm conviction about the failure of actively managed investment products in the long-run could save money and time for investors.

The remainder of this paper is structured as follows. Section 2 develops the methodology used in our empirical investigation. Section 3 describes the data used in this study and provides information about the trading features of the sample. Empirical findings are discussed in Section 4 and conclusions are offered in Section 5.

2 Methodology

In this section, we describe the empirical methods used to examine the performance of active and passive ETFs. In the first step, we calculate the raw returns of ETFs. A single-factor and a multi-factor regression analysis of ETFs' performance follows. Then, risk-adjusted returns are computed. Afterwards, a cross-sectional regression analysis of ETFs' performance is applied. Finally, the market timing skills of ETF managers are assessed. The methods used in our empirical analysis are not such innovative but are standard and well-documented in the literature.

2.1 Raw return analysis

We compute the raw return of active ETFs and their passive peers in two ways. The first one concerns the absolute return. Neneh and Smit (2014) define absolute return as the gain or loss on a portfolio over a period of time which is not referenced to a market index or another benchmark. Percentage absolute return is calculated with the following formula (1):

$$AR_{i,t} = \frac{P_{i,t} - P_{i,t-1}}{P_{i,t-1}} \tag{1}$$

where $AR_{i,t}$ refers to the percentage absolute return of the i^{th} ETF on the trading day t and $P_{i,t}$ refers to the close trade price of the ETF on day t.[7] The second type of raw return considered is the benchmark-adjusted return, computed as the difference in absolute returns between an ETF and its benchmark.[8] Benchmark-adjusted return is shown in formula (2):

$$BAR_{i,t} = AR_{i,t} - BR_{i,t} \tag{2}$$

where $BAR_{i,t}$ refers to the percentage benchmark-adjusted return of the i^{th} ETF on day t, $AR_{i,t}$ is defined as above and $BR_{i,t}$ concerns the return of benchmark.

In essence, formulas (1) and (2) calculate average daily returns over a specific time period. Along with daily returns, we compute buy-and-hold returns under the assumption that an investor buys shares of an ETF on a certain day and holds them up to a specific date.[9] In our analysis, the buy-and-hold return reflects the long-term performance obtained from investing in an ETF.

The percentage buy-and-hold raw return is estimated similarly to the returns deriving from formula (1). The only difference between the two measures concerns the estimation window. In formula (1), return is calculated between two successive trading days while, in the case of the buy-and-hold performance, return is assessed over an extended horizon. In the case of active ETFs, this horizon covers the whole trading history of funds. Benchmark-adjusted buy-and-hold returns are computed too following formula (2).

2.2 Single-factor performance analysis

The first regression model used to assess the performance of ETFs is the single-factor model (3):

$$R_i - R_f = \alpha_i + \beta_i \left(R_m - R_f \right) + \varepsilon_i \tag{3}$$

where R_i denotes the daily return of ETFs, R_m represents the return of benchmarks and R_f is the risk-free rate expressed by the one-month US Treasury bill rate.

Alpha indicates the above-market return that can be achieved by an ETF and is used to evaluate the selection skills of ETF managers. If ETFs can achieve above-market returns, alpha estimates will be positive and statistically significant. Beta measures the part of ETF's risk that cannot be mitigated by diversification techniques and indicates the systematic risk of ETFs. In the case of passively managed ETFs, beta can also be used as a measure of ETFs' replication efficiency. Specifically, a beta equal to unity will indicate

that ETFs adopt a full replication strategy, whereas a beta which differs from unity implies that ETFs depart from full replication strategies.[10]

2.3 Multifactor performance analysis

We assess the exposure of ETFs to certain market factors with the Fama & French (2015) five-factor model also including the Fama & French version of Carhart (1997) momentum factor. The model is shown in equation (4):

$$R_i - R_f = \alpha_i + \beta_{1,i}\left(R_m - R_f\right) + \beta_{2,i}SMB + \beta_{3,i}HML + \beta_{4,i}UMD + \beta_{5,i}CMA + \beta_{6,i}RMW + \varepsilon_i \tag{4}$$

where R_i, R_m and R_f are defined as above, small minus big (SMB) is the average return on nine small cap portfolios minus the average return on nine big cap portfolios, high minus low (HML) is the average return on two value portfolios (in book-to-market equity terms) minus the average return on two growth portfolios, UMD is the average of the returns on two (big and small) high prior return portfolios minus the average of the returns on two low prior return portfolios[11], conservative minus aggressive (CMA) is the average return on two conservative portfolios minus the average return on two aggressive portfolios and robust minus weak (RMW) is the average return on two robust operating profitability portfolios minus the average return on two weak operating profitability portfolios.[12]

In the Fama and French model, the size effect implies that small cap companies outperform large firms. The book-to-market equity ratio effect captured by the HML factor implies that the average returns on stocks with a high book-value to market-value equity ratio must be greater than the returns on stocks with a low book-value to market-value equity ratio. The existence of a momentum in asset prices is an anomaly, which is difficult to explain. The difficulty is that, as the efficient capital markets theory suggests, an increase in the price of an asset cannot be indicative of a further increase in future prices. Trying to explain this anomaly, behavioural finance suggests that investors are not rational and they underreact to the release of new information, thus, failing to reflect new information in stock prices.

The CMA and RMW factors correspond to the Fama and French (2015) investment and operating profitability factors. The authors consider past investment as a proxy for the expected future investment and suggest that CMA implies a negative relation between the expected investment and the expected internal rate of return. Moreover, based on the findings of Fama and French (2015), a negative loading is expected for the RMW factor, that is, the excess return of ETFs must be affected by the profitability factor in a negative fashion.

2.4 Risk-adjusted performance analysis

We employ standard risk-adjusted return measures to rate the performance of ETFs. The first evaluation method used is the Sharpe ratio shown in formula (5):

$$S_i = \frac{\overline{R}_i - \overline{R}_f}{\sigma_i} \tag{5}$$

where $\overline{R}_i$ denotes the average daily return for the i^{th} ETF, $\overline{R}_f$ is the average daily risk-free rate and σ_i is the standard deviation of ETF excess return (i.e., ETF return minus risk-free rate). The Sharpe ratio is estimated by the division of excess return by risk and is used to determine how well an ETF compensates its investors for the per unit risk they take. The higher is the Sharpe ratio, the better is the performance of the ETF.

The second risk-adjusted return estimated concerns the Treynor ratio shown in formula (6):

$$T_i = \frac{\overline{R}_i - \overline{R}_f}{\beta_i} \tag{6}$$

where $\overline{R}_i$ and $\overline{R}_f$ are defined as above and β_i is the systematic risk of ETFs. Two versions of the Treynor ratio are considered. The first one includes the betas deriving from the performance regression model (3). The second uses the betas obtained from the multifactor model (4). Similarly to the Sharpe ratio, the higher is the Treynor ratio, the better is the performance of ETFs.

The last method used is the Sortino ratio depicted in formula (7):

$$Sor_i = \frac{\overline{R}_i - \overline{R}_f}{\sigma_{i,d}} \tag{7}$$

where $\overline{R}_i$ and $\overline{R}_f$ are defined as above and $\sigma_{i,d}$ is the standard deviation of ETFs' negative excess returns. The Sortino ratio differentiates between good and bad volatility in the Sharpe ratio. This differentiation of upward and downward volatility allows risk-adjusted returns to provide a performance measure of ETFs without penalising them for upward price changes. Similarly to the Sharpe and Treynor ratios, the higher is the Sortino ratio, the better is the performance of active and passive ETFs.

2.5 Cross-sectional performance analysis

We seek to identify factors that can affect the performance of ETFs at the cross-sectional level. In particular, we assess the relation of performance with expenses, bid/ask spread, magnitude of assets under management and trading volumes. The model run is shown in equation (8):

$$\text{Per} = \lambda_0 + \lambda_1 \text{ExpRat} + \lambda_2 \text{Spread} + \lambda_3 \text{LnAssets} + \lambda_4 \text{LnVol} + \text{u} \tag{8}$$

where Per refers to ETFs' performance, ExpRat concerns the expense ratios published by ETFs, LnAssets is the natural logarithm of assets managed by ETFs and LnVol is the natural logarithm of ETFs' average daily volume of shares traded. Several alternative types of performance are taken into consideration, namely the average absolute daily return, absolute buy-and-hold return, alphas deriving from the single- and multi-factor regression models (3) and (4), Sharpe ratio, Treynor ratios deriving from the single- and multi-factor regression models (3) and (4), and Sortino ratio.

As far as expenses are concerned, the literature on mutual funds and ETFs has shown that they actually erode performance.[13] Based on the findings of the literature, we should expect negative and statistically significant estimates for expense ratios. The same

expectation applies to the bid/ask spread, which is another kind of cost shouldered to investors and relates to market liquidity. When it comes to assets, the literature has shown that performance deteriorates as the size of a fund increases (Chen et al., 2004; Barras et al., 2010; Boyson, 2008). Based on this pattern, we should expect negative estimates for the natural logarithm of assets included in the cross-sectional model. Finally, with regard to the trading volume and its impact on performance, Edelen et al. (2013) report a negative such relation. If the same relation applies to ETFs, the estimates of the natural logarithm of volume will be negative.

2.6 Market timing analysis

The ability of ETF managers to time the market is assessed in this section. Market timing implies the efficient increase or decrease in the portfolio's exposure to equities prior to market accessions or decreases, respectively. The market timing ability of ETF managers is influenced by the investing objective of the fund and the usage or not of leverage and derivative products. In our analysis, we use three alternative models to assess the market timing skills of ETF managers.

The first method is the Treynor and Mazuy (1966) model shown in equation (9):

$$R_i - R_f = \alpha_i + \beta_i \left(R_m + R_f \right) + \gamma_i \left(R_m - R_f \right)^2 + \varepsilon_i \tag{9}$$

where R_i, R_m, R_f, α_i and β_i are defined as above and γ_i measures the market timing skills. If the manager increases (decreases) efficiently the portfolio's exposure to the market index prior to market accessions (recessions), γ_i will be positive indicating that the manager can capture the bull and bear moments of the market.

The second model is that of Henriksson and Merton (1981), which assumes that a manager allocates money between securities of higher risk when markets are expected to rise and securities of lower risk when markets are expected to fall. The model is presented in equation (10):

$$R_i - R_f = \alpha_i + \beta_i \left(R_m - R_f \right) + \gamma_i I_i \left(R_m - R_f \right) + \varepsilon_i \tag{10}$$

where R_i, R_m, R_f, α_i and $\beta_{i,}$ and I_i is an indicator function for the *ith* ETF which equals unity when the excess return of the market is positive and zero otherwise. γ_i captures the difference in the target betas and is positive for the successful market timer.

The third model used is the higher moment model suggested by Jagannathan and Korajczyk (1986). This model is based on the Treynor and Mazuy (1966) model and further includes a cubic term of the market excess performance. The cubic term is used to evaluate the ability of managers to time the market volatility. The model is shown in equation (11):

$$R_i - R_f = \alpha_i + \beta_i \left(R_m - R_f \right) + \gamma_i \left(R_m - R_f \right)^2 + \delta_i \left(R_m - R_f \right)^3 + \varepsilon_i \tag{11}$$

where R_i, R_m, R_f, α_i, β_i and γ_i are defined as above and δ_i measures the response of each ETF to market volatility.

Table 1 Profiles of ETFs

Panel A: Active ETFs								
Ticker	*Name*	*Benchmark*	*Inception date*	*Expense ratio*	*Bid/ask Speard*	*Assets ($000s)*	*Volume*	*Trade frequency*
WBIC	WBI Tactical SMY Shares	S&P Mid Cap 400 Index	25/8/2014	1.05%	0.19%	82,760	20,092	100.0%
WBID	WBI Tactical SMS Shares	S&P Mid Cap 400 Index	25/8/2014	1.03%	0.20%	67,530	15,384	100.0%
WBIA	WBI Tactical SMG Shares	S&P Mid Cap 400 Index	25/8/2014	1.01%	0.18%	62,220	19,525	100.0%
WBIB	WBI Tactical SMV Shares	S&P Mid Cap 400 Index	25/8/2014	1.02%	0.17%	64,710	15,396	100.0%
DIVI	AdvisorShares Athena High Dividend ETF	MSCI ACWI Index	29/7/2014	0.99%	0.53%	8,170	4,054	73.4%
WBIG	WBI Tactical LCY Shares	S&P 500 Index	25/8/2014	1.05%	0.19%	79,500	19,960	100.0%
WBIL	WBI Tactical LCS Shares	S&P 500 Index	25/8/2014	1.05%	0.17%	65,740	16,268	100.0%
WBIE	WBI Tactical LCG Shares	S&P 500 Index	25/8/2014	1.03%	0.17%	55,130	18,380	100.0%
WBIF	WBI Tactical LCV Shares	S&P 500 Index	25/8/2014	1.05%	0.16%	63,060	17,903	100.0%
SMCP	AlphaMark Actively Managed Small Cap ETF	S&P 600 Small Cap Index	21/4/2015	0.90%	0.58%	25,120	6,866	67.4%
SYLD	Cambria Shareholder Yield ETF	S&P 500 Index	14/5/2013	0.59%	0.23%	130,590	39,454	100.0%
FFTY	Innovator IBD 50 Fund	S&P 500 Index	9/4/2015	0.80%	0.26%	37,050	44,321	100.0%
VALX	Validea Market Legends ETF	S&P 500 Index	10/12/2014	0.79%	0.44%	22,710	4,684	97.5%
ARKK	ARK Innovation ETF	S&P 500 Index	31/10/2014	0.75%	0.24%	15,240	1,925	98.5%
HECO	EcoLogical Strategy ETF	MSCI ACWI Index	18/6/2012	0.95%	0.23%	6,220	18,127	63.6%
ARKG	ARK Genomic Revolution Multi-Sector ETF	S&P 500 Index	31/10/2014	0.75%	0.49%	8,260	2,639	99.5%
FWDI	AdvisorShares Madrona International ETF	MSCI EAFE Index	20/6/2011	1.25%	4.37%	15,190	5,694	67.8%
AADR	AdvisorShares Dorsey Wright ADR ETF	MSCI EAFE Index	20/7/2010	1.27%	0.64%	22,740	3,256	81.2%
IVAL	ValueShares International Quantitative Value E	MSCI EAFE Value Index	17/12/2014	0.79%	0.62%	41,180	7,157	95.3%

Notes: This table presents the profiles of active and passive ETFs, which include their ticker, name, benchmark, inception date, expense ratio, bid-ask spread as the percentage difference between the highest price a market participant is willing to pay to buy an ETF and the lowest price at which a market participant is willing to sell an ETF, averaged over the past 45 days, assets under management as at December 31, 2016, average daily volume, and average trading frequency as the fraction of the days with no zero volume to the entire trading history of ETFs.
Tickets, names, inception dates, expense ratios and bid/ask spreads have been found on etf.com. Benchmarks have been found in the prospectuses of ETFs. Volumes and trading frequencies have been computed with data found on Nasdaq.com.

Table 1 Profiles of ETFs (continued)

Panel A: Active ETFs

Ticker	*Name*	*Benchmark*	*Inception date*	*Expense ratio*	*Bid/ask Speard*	*Assets ($000s)*	*Volume*	*Trade frequency*
ARKW	ARK Web x.0 ETF	S&P 500 Index	30/9/2014	0.75%	0.25%	17,550	2,178	99.3%
PRME	First Trust Heitman Global Prime Real Estate	FTSE EPRA/NAREIT Global RET Ind	11/11/2015	0.95%	0.34%	960	3,253	49.3%
ARKQ	ARK Industrial Innovation ETF	S&P 500 Index	30/9/2014	0.75%	0.19%	18,350	1,888	99.1%
PHDG	Powershares S&P 500 Downside Hedged PortF	S&P 500 Index	6/12/2012	0.39%	0.59%	88,880	96,432	99.8%
FTHI	First Trust High Income ETF	S&P 500 Index	6/1/2014	0.85%	0.43%	45,900	6,715	79.0%
FWDD	AdvisorShares Madrona Domestic ETF	S&P 500 Index	20/6/2011	1.25%	0.61%	26,140	2,898	71.9%
SYE	SPDR MFS Systematic Core Equity ETF	S&P 500 Index	8/1/2014	0.60%	0.28%	6,370	750	48.6%
FTLB	First Trust Low Beta Income ETF	S&P 500 Index	6/1/2014	0.85%	0.78%	5,330	2,764	67.9%
SYG	SPDR MFS Systematic Growth Equity ETF	Russell 1000 Growth Index	8/1/2014	0.60%	0.31%	12,920	1,226	64.0%
SYV	SPDR MFS Systematic Value Equity ETF	Russell 1000 Value Index	8/1/2014	0.60%	0.56%	2,860	482	42.1%
TTFS	AdvisorShares Wilshire Buyback ETF	Russell 3000 Index	4/10/2011	0.90%	0.24%	187,580	15,487	93.5%
QMOM	MomentumShares U.S. Quantitative Mom ETF	S&P 500 Index	2/12/2015	0.79%	0.21%	29,200	6,488	79.9%
VAMO	Cambria Value & Momentum ETF	S&P 500 Index	8/9/2015	0.59%	0.79%	5,990	3,108	82.2%
HUSE	US Market Rotation Strategy ETF	S&P Composite 1500 Index	23/7/2012	1.07%	0.36%	4,700	24,273	70.0%
QVAL	ValueShares U.S. Quantitative Value ETF	S&P 500 Value Index	22/10/2014	0.79%	0.27%	62,730	16,390	99.8%
EMLP	First Trust North American Energy Infrastructu	S&P 500 Index	20/6/2012	0.95%	0.06%	1,570,000	254,567	100.0%
PSR	PowerShares Active US Real Estate Fund	FTSE NAREIT All Equity Index	20/11/2008	0.80%	0.28%	26,230	3,708	92.2%
UTES	Reaves Utilities ETF	Dow Jones U.S. Utilities Index	23/9/2015	0.95%	0.20%	14,790	2,463	81.9%
Average				*0.88%*	*0.45%*	*81,070*	*19,626*	*85.53%*

Notes: This table presents the profiles of active and passive ETFs, which include their ticker, name, benchmark, inception date, expense ratio, bid-ask spread as the percentage difference between the highest price a market participant is willing to pay to buy an ETF and the lowest price at which a market participant is willing to sell an ETF, averaged over the past 45 days, assets under management as at December 31, 2016, average daily volume, and average trading frequency as the fraction of the days with no zero volume to the entire trading history of ETFs.
Tickets, names, inception dates, expense ratios and bid/ask spreads have been found on etf.com. Benchmarks have been found in the prospectuses of ETFs. Volumes and trading frequencies have been computed with data found on Nasdaq.com.

Table 1 Profiles of ETFs (continued)

Panel B: Passive ETFs								
Ticker	*Name*	*Benchmark*	*Inception date*	*Expense ratio*	*Bid/ask Speard*	*Assets ($000s)*	*Volume*	*Trade frequency*
IJH	iShares Core S&P Mid-Cap ETF	S&P Mid Cap 400 Index	22/5/2000	0.07%	0.02%	36,210,000	1,245,973	100.00%
IJH	iShares Core S&P Mid-Cap ETF	S&P Mid Cap 400 Index	22/5/2000	0.07%	0.02%	36,210,000	1,245,973	100.00%
IJH	iShares Core S&P Mid-Cap ETF	S&P Mid Cap 400 Index	22/5/2000	0.07%	0.02%	36,210,000	1,245,973	100.00%
IJH	iShares Core S&P Mid-Cap ETF	S&P Mid Cap 400 Index	22/5/2000	0.07%	0.02%	36,210,000	1,245,973	100.00%
ACWI	iShares MSCI ACWI ETF	MSCI ACWI Index	26/3/2008	0.33%	0.02%	6,060,000	1,887,322	100.00%
IVV	iShares Core S&P 500 ETF	S&P 500 Index	15/5/2000	0.04%	0.01%	92,020,000	4,274,311	100.00%
IVV	iShares Core S&P 500 ETF	S&P 500 Index	15/5/2000	0.04%	0.01%	92,020,000	4,274,311	100.00%
IVV	iShares Core S&P 500 ETF	S&P 500 Index	15/5/2000	0.04%	0.01%	92,020,000	4,274,311	100.00%
IVV	iShares Core S&P 500 ETF	S&P 500 Index	15/5/2000	0.04%	0.01%	92,020,000	4,274,311	100.00%
IJR	iShares Core S&P Small-Cap ETF	S&P 600 Small Cap Index	22/5/2000	0.07%	0.03%	27,430,000	1,021,519	100.00%
IVV	iShares Core S&P 500 ETF	S&P 500 Index	15/5/2000	0.04%	0.01%	92,020,000	4,287,900	100.00%
IVV	iShares Core S&P 500 ETF	S&P 500 Index	15/5/2000	0.04%	0.01%	92,020,000	4,166,680	100.00%
IVV	iShares Core S&P 500 ETF	S&P 500 Index	15/5/2000	0.04%	0.01%	92,020,000	4,245,495	100.00%
IVV	iShares Core S&P 500 ETF	S&P 500 Index	15/5/2000	0.04%	0.01%	92,020,000	4,228,188	100.00%
ACWI	iShares MSCI ACWI ETF	MSCI ACWI Index	26/3/2008	0.33%	0.02%	6,060,000	1,483,960	100.00%
IVV	iShares Core S&P 500 ETF	S&P 500 Index	15/5/2000	0.04%	0.01%	92,020,000	4,228,188	100.00%
EFA	iShares MSCI EAFE ETF	MSCI EAFE Index	14/8/2001	0.33%	0.02%	60,870,000	19,960,477	100.00%
EFA	iShares MSCI EAFE ETF	MSCI EAFE Index	14/8/2001	0.33%	0.02%	60,870,000	19,725,426	100.00%
EFV	iShares MSCI EAFE Value ETF	MSCI EAFE Value Index	1/8/2005	0.40%	0.06%	4,430,000	401,384	100.00%

Notes: This table presents the profiles of active and passive ETFs, which include their ticker, name, benchmark, inception date, expense ratio, bid-ask spread as the percentage difference between the highest price a market participant is willing to pay to buy an ETF and the lowest price at which a market participant is willing to sell an ETF, averaged over the past 45 days, assets under management as at December 31, 2016, average daily volume, and average trading frequency as the fraction of the days with no zero volume to the entire trading history of ETFs.
Tickets, names, inception dates, expense ratios and bid/ask spreads have been found on etf.com. Benchmarks have been found in the prospectuses of ETFs. Volumes and trading frequencies have been computed with data found on Nasdaq.com.

Table 1 Profiles of ETFs (continued)

Panel B: Passive ETFs								
Ticker	*Name*	*Benchmark*	*Inception date*	*Expense ratio*	*Bid/ask Speard*	*Assets ($000s)*	*Volume*	*Trade frequency*
IVV	iShares Core S&P 500 ETF	S&P 500 Index	15/5/2000	0.04%	0.01%	92,020,000	4,313,797	100.00%
REET	iShares Global REIT ETF	FTSE EPRA/NAREIT Global RET Ind	8/7/2014	0.14%	0.22%	303,550	58,835	100.00%
IVV	iShares Core S&P 500 ETF	S&P 500 Index	15/5/2000	0.04%	0.01%	92,020,000	4,313,797	100.00%
IVV	iShares Core S&P 500 ETF	S&P 500 Index	15/5/2000	0.04%	0.01%	92,020,000	4,254,265	100.00%
IVV	iShares Core S&P 500 ETF	S&P 500 Index	15/5/2000	0.04%	0.01%	92,020,000	4,226,733	100.00%
IVV	iShares Core S&P 500 ETF	S&P 500 Index	15/5/2000	0.04%	0.01%	92,020,000	4,162,257	100.00%
IVV	iShares Core S&P 500 ETF	S&P 500 Index	15/5/2000	0.04%	0.01%	92,020,000	4,225,959	100.00%
IVV	iShares Core S&P 500 ETF	S&P 500 Index	15/5/2000	0.04%	0.01%	92,020,000	4,226,733	100.00%
IWF	iShares Russell 1000 Growth ETF	Russell 1000 Growth Index	22/5/2000	0.20%	0.01%	32,280,000	2,000,069	100.00%
IWD	iShares Russell 1000 Value ETF	Russell 1000 Value Index	22/5/2000	0.20%	0.01%	34,870,000	2,106,385	100.00%
IWV	iShares Russell 3000 ETF	Russell 3000 Index	22/5/2000	0.20%	0.03%	7,210,000	279,787	100.00%
IVV	iShares Core S&P 500 ETF	S&P 500 Index	15/5/2000	0.04%	0.01%	92,020,000	4,124,849	100.00%
IVV	iShares Core S&P 500 ETF	S&P 500 Index	15/5/2000	0.04%	0.01%	92,020,000	4,205,914	100.00%
ITOT	iShares Core S&P Total U.S. Stock Market ET	S&P Composite 1500 Index	20/1/2004	0.03%	0.03%	6,530,000	330,925	100.00%
IVE	iShares S&P 500 Value ETF	S&P 500 Value Index	22/5/2000	0.18%	0.01%	12,970,000	854,949	100.00%
IVV	iShares Core S&P 500 ETF	S&P 500 Index	15/5/2000	0.04%	0.01%	92,020,000	4,186,037	100.00%
USRT	iShares Core U.S. REIT ETF	FTSE NAREIT All Equity Index	1/5/2007	0.08%	0.36%	73,120	15,615	99.90%
IDU	iShares U.S. Utilities ETF	Dow Jones U.S. Utilities Index	12/6/2000	0.44%	0.05%	681,470	203,480	100.00%
Average				*0.12%*	*0.03%*	*58,212,382*	*3,670,488*	*100.00%*

Notes: This table presents the profiles of active and passive ETFs, which include their ticker, name, benchmark, inception date, expense ratio, bid-ask spread as the percentage difference between the highest price a market participant is willing to pay to buy an ETF and the lowest price at which a market participant is willing to sell an ETF, averaged over the past 45 days, assets under management as at December 31, 2016, average daily volume, and average trading frequency as the fraction of the days with no zero volume to the entire trading history of ETFs.
Tickets, names, inception dates, expense ratios and bid/ask spreads have been found on etf.com. Benchmarks have been found in the prospectuses of ETFs. Volumes and trading frequencies have been computed with data found on Nasdaq.com.

3 The sample

The sample includes 37 pairs of US-listed equity active and passive ETFs. Table 1 describes the profiles of the sample. For each ETF, the table presents the ticker, name, benchmark, inception date, expense ratio, bid-ask spread, calculated as the percentage difference between the highest price a market participant is willing to pay to buy an ETF and the lowest price at which a market participant is willing to sell an ETF, averaged over the past 45 days, assets under management as at December 31, 2016, average daily volume in terms of shares traded, and average trading frequency, calculated as the fraction of the days with no zero volume to the entire trading history of each single ETF.[14] For each ETF pair, the study period spans from the inception date of each ETF pair till December 31, 2016.[15]

A first note that can be made is that the active ETFs in the sample are managed by several investment companies. On the other hand, we chose passive ETFs exclusively from the family of iShares, which is the leader in the global ETF market. In addition, about half of active ETFs are referenced to the S&P 500 Index (19 out of 37 funds), four active ETFs are compared to the S&P 400 Mid Cap Index and the rest are benchmarked to various domestic or international stock indices. When two or more active ETFs have the same benchmark, we use only one passive ETF to make the pairs adjusting, of course, its study period to those of the corresponding active ETFs.

The average expense ratio of active ETFs is equal to 88 basis points (bps). This is by far greater than the expense ratios of passive ETFs, which range from 4 bps the minimum to 44 bps the maximum. These ratios highlight an advantage of passively managed ETFs over their active peers in terms of managerial expenses. This finding is not surprising given that passive management entails low or nil research costs relative to active ETFs, which need to apply thorough research analysis to detect those investment opportunities that will help them outperform the market. The cost disadvantage of active ETFs is also verified by their bid/ask spreads, which are significantly higher than those of passive ETFs, both on average terms and at the individual ETF level.

With respect to the popularity of ETFs with investors, as it could be inferred by trading features such as the assets under management, volume and trading frequency, the figures in Table 1 indicate a clear advantage of passive ETFs. The gap in assets, volumes and trading frequencies between the two groups is chaotic. This pattern comes as no surprise given the short history of active ETFs relative to that of the passive counterparts and, also, given the poor performance records of active ETFs compared to market returns or the performance of passive ETFs.

4 Empirical results

4.1 Raw return analysis

The raw return and risk calculations of ETFs are provided in Table 2. The table reports the average daily absolute returns, absolute buy-and-hold returns, standard deviation of daily returns, benchmark-adjusted daily and buy-and-hold returns.

Table 2 Returns of ETFs

Ticker		*Daily absolute return*		*Buy-and-hold absolute return*		*Risk*		*Benchmark-adjusted daily return*		*Benchmark-adjusted buy-and-hold return*	
Active	*Passive*	*Active*	*Passive*	*Active*	*Passive*	*Active*	*Passive*	*Active*	*Passive*	*Active*	*Passive*
WBIC	IJH	–0.022	0.029	–13.002	15.469	0.642	0.957	–0.057	–0.007	–33.332	–4.861
WBID	IJH	–0.015	0.029	–9.641	15.469	0.719	0.957	–0.050	–0.007	–29.971	–4.861
WBIA	IJH	–0.010	0.029	–7.382	15.469	0.790	0.957	–0.046	–0.007	–27.712	–4.861
WBIB	IJH	–0.001	0.029	–2.151	15.469	0.767	0.957	–0.037	–0.007	–22.481	–4.861
DIVI	ACWI	–0.045	0.001	–27.306	–2.215	1.206	0.935	–0.053	–0.007	–30.368	–5.277
WBIG	IVV	–0.029	0.023	–16.720	11.597	0.579	0.895	–0.052	0.000	–28.655	–0.338
WBIL	IVV	–0.012	0.023	–7.422	11.597	0.548	0.895	–0.035	0.000	–19.357	–0.338
WBIE	IVV	–0.016	0.023	–10.496	11.597	0.701	0.895	–0.039	0.000	–22.430	–0.338
WBIF	IVV	–0.002	0.023	–2.451	11.597	0.658	0.895	–0.025	0.000	–14.386	–0.338
SMCP	IJR	–0.017	0.041	–11.120	16.345	1.445	1.082	–0.058	0.000	–27.364	0.101
SYLD	IVV	0.032	0.037	28.883	35.430	0.885	0.823	–0.005	0.000	–6.776	–0.229
FFTY	IVV	–0.001	0.020	–3.438	6.970	1.189	0.918	–0.021	0.000	–10.499	–0.091
VALX	IVV	0.018	0.023	6.605	9.966	1.083	0.914	–0.005	–0.001	–3.892	–0.531
ARKK	IVV	0.006	0.023	–1.619	10.838	1.341	0.897	–0.017	0.000	–12.559	–0.102
HECO	ACWI	0.042	0.029	45.133	33.718	1.373	0.863	0.005	–0.008	–3.448	–14.864
ARKG	IVV	–0.016	0.023	–15.787	10.838	1.742	0.897	–0.039	0.000	–26.727	–0.102
FWDI	EFA	0.008	0.005	–4.297	–3.558	1.483	1.206	–0.009	–0.012	–22.036	–21.298
AADR	EFA	0.036	0.017	62.671	17.028	1.137	1.210	0.010	–0.010	20.625	–25.018
IVAL	EFV	0.010	–0.006	1.788	–6.731	1.157	1.211	0.002	–0.014	0.568	–7.951

Notes: This table presents the average daily absolute returns of ETFs, the buy-and-hold absolute returns, the risk computed as the standard deviation of daily returns, the benchmark-adjusted daily returns, i.e., ETF return minus benchmark return, and the benchmark-adjusted buy-and-hold returns. Buy-and-hold returns are calculated under the assumption that an investor buys an ETF on the first day of the study period of each ETF and holds it up to December 31, 2016. The study period of each ETF pair starts from the latest inception date in each pair, whether this date concerns the active or the passive ETF in the pair (see Table 1 for inception dates).

Table 2 Returns of ETFs (continued)

Ticker		*Daily absolute return*		*Buy-and-hold absolute return*		*Risk*		*Benchmark-adjusted daily return*		*Benchmark-adjusted buy-and-hold return*	
Active	*Passive*	*Active*	*Passive*	*Active*	*Passive*	*Active*	*Passive*	*Active*	*Passive*	*Active*	*Passive*
ARKW	IVV	0.049	0.026	25.537	13.482	1.367	0.907	0.023	0.000	12.023	–0.032
PRME	REET	–0.008	0.015	–3.829	2.811	1.042	0.983	–0.042	–0.019	–12.609	–5.969
ARKQ	IVV	0.026	0.026	10.812	13.482	1.224	0.907	–0.001	0.000	–2.702	–0.032
PHDG	IVV	–0.003	0.048	–4.422	57.888	0.554	0.814	–0.051	0.000	–62.762	–0.452
FTHI	IVV	0.012	0.030	6.035	21.906	0.958	0.849	–0.017	0.000	–15.781	0.090
FWDD	IVV	0.049	0.044	74.882	72.406	1.304	0.963	0.005	0.000	2.069	–0.407
SYE	IVV	0.033	0.030	24.855	21.781	0.783	0.850	0.003	0.000	3.056	–0.019
FTLB	IVV	0.011	0.030	5.287	21.906	0.938	0.849	–0.019	0.000	–16.529	0.090
SYG	IWF	0.035	0.031	26.036	22.906	0.872	0.869	–0.003	–0.006	–2.728	–5.859
SYV	IWD	0.025	0.027	16.164	19.282	0.987	0.859	–0.012	–0.010	–12.129	–9.010
TTFS	IWV	0.070	0.055	138.018	97.300	0.931	0.884	0.007	–0.008	18.472	–22.246
QMOM	IVV	0.003	0.029	–0.843	7.271	1.084	0.856	–0.028	–0.001	–8.504	–0.391
VAMO	IVV	-0.008	0.046	–3.087	14.844	0.569	0.863	–0.055	–0.001	–18.370	–0.439
HUSE	ITOT	0.038	0.050	45.594	69.246	0.923	0.815	–0.020	–0.008	–39.332	–15.680
QVAL	IVE	0.006	0.030	0.162	15.061	1.091	0.913	–0.034	–0.010	–21.648	–6.749
EMLP	IVV	0.026	0.049	27.346	69.140	0.954	0.813	–0.024	0.000	–41.557	0.237
PSR	USRT	0.079	0.075	267.184	201.795	1.733	2.050	–0.018	–0.022	–96.272	–161.661
UTES	IDU	0.055	0.047	17.205	14.502	1.008	0.994	–0.012	–0.019	–4.617	–7.321
Average		*0.013*	*0.030*	*18.518*	*26.862*	*1.021*	*0.957*	*–0.022*	*–0.005*	*–17.317*	*–8.973*

Notes: This table presents the average daily absolute returns of ETFs, the buy-and-hold absolute returns, the risk computed as the standard deviation of daily returns, the benchmark-adjusted daily returns, i.e., ETF return minus benchmark return, and the benchmark-adjusted buy-and-hold returns. Buy-and-hold returns are calculated under the assumption that an investor buys an ETF on the first day of the study period of each ETF and holds it up to December 31, 2016. The study period of each ETF pair starts from the latest inception date in each pair, whether this date concerns the active or the passive ETF in the pair (see Table 1 for inception dates).

The average absolute return of active ETFs equals 1.3 bps being slightly inferior to the corresponding returns of passive ETFs. At the fund level, just 11 out of 37 active ETFs present higher returns than their passive peers. Based on raw absolute returns, the inference that can be drawn is that active ETFs do not outperform the passive ones. In fact, some level of underperformance seems to be the case. Underperformance of active ETFs is verified by the absolute buy-and-hold returns. More specifically, the average buy-and-hold return of active and passive ETFs amounts to 18.52% and 28.86%, respectively, indicating a substantial long-term performance advantage of passive ETFs over their active counterparts.

As far as volatility is concerned, the average risk estimate of active ETFs is equal to 1.021% and the respective figure for passive ETFs is equal to 0.957%. These results show that the active ETFs carry slightly more risk than the passive ones. That said, it should be pointed out that, when focusing on the individual risk estimates of ETFs, we can see several cases that the active ETFs are less volatile than the passive.

On the question of whether ETFs, either active or passive, can offer investors material above-market returns, the results in Table 2 say that neither of the two can do so. The average benchmark-adjusted daily returns of active and passive ETFs are slightly negative being equal to –0.022% and –0.005%, respectively. In addition, the majority of funds deliver negative benchmark-adjusted daily returns. In the case of active ETFs, only seven funds present positive returns. In the case of passive ETFs, benchmark-adjusted returns are negative or nil.

Benchmark-adjusted buy-and-hold returns tell the same story about the ability of ETFs to beat the market. The sample's averages are significantly negative for both ETF groups. However, in the long-run, the passive ETFs seem to deliver better excess-market returns than the active ETFs, given that the average benchmark-adjusted buy-and-hold returns of active and passive ETFs amount to –17.32% and –8.97%, respectively. At the fund level, we can trace seven active ETFs which outperform their peers in terms of benchmark-adjusted long-term return terms (six of them achieve a positive benchmark-adjusted long-term performance).

The main conclusion that can be reached by analysing raw returns and risks is that, on average, active ETFs cannot outperform either their benchmarks or the passively managed peers. In addition, they seem to be a more risky choice for investors in most of the cases. However, at the fund level, the results reveal that there are certain promising active ETFs that would be worth being considered by investors, given that they are less volatile than the index tracking peers and can achieve better market-adjusted returns that them. Overall, our results are in line with the findings of the existing literature on active ETFs, which also show that, occasionally but not systematically active ETFs can beat the passive ones in terms of performance and risk.

4.2 Single-factor performance analysis

The results of the single-factor performance regression analysis are reported in Table 3. The table includes the alpha and beta estimates for active and passive ETFs along with probabilities on the statistical significance of estimates and R-squared on the explanatory power of the model.

Table 3 Single-factor performance regression results

Panel A: Active ETFs						*Panel B: Passive ETFs*					
Ticker	*Alpha*	*Prob.*	*beta*	*Prob.*	R^2	*Ticker*	*Alpha*	*Prob.*	*beta*	*Prob.*	R^2
WBIC	–0.039[b]	0.012	0.530[a]	0.000	0.611	IJH	–0.006	0.336	1.001[a]	0.000	0.962
WBID	–0.037[b]	0.039	0.574[a]	0.000	0.598	IJH	–0.006	0.336	1.001[a]	0.000	0.962
WBIA	–0.033[c]	0.084	0.679[a]	0.000	0.647	IJH	–0.006	0.336	1.001[a]	0.000	0.962
WBIB	–0.030	0.111	0.659[a]	0.000	0.609	IJH	–0.006	0.336	1.001[a]	0.000	0.962
DIVI	–0.043	0.271	0.818[a]	0.000	0.251	ACWI	–0.017	0.223	1.131[a]	0.000	0.726
WBIG	–0.047[a]	0.001	0.415[a]	0.000	0.526	IVV	–0.001	0.711	0.999[a]	0.000	0.992
WBIL	–0.028[b]	0.049	0.393[a]	0.000	0.510	IVV	–0.001	0.711	0.999[a]	0.000	0.992
WBIE	–0.033[b]	0.042	0.662[a]	0.000	0.685	IVV	–0.001	0.711	0.999[a]	0.000	0.992
WBIF	–0.023	0.160	0.531[a]	0.000	0.572	IVV	–0.001	0.711	0.999[a]	0.000	0.992
SMCP	–0.067	0.202	0.752[a]	0.000	0.234	IJR	0.002	0.428	0.998[a]	0.000	0.996
SYLD	–0.007	0.510	1.044[a]	0.000	0.829	IVV	0.001	0.839	1.000[a]	0.000	0.990
FFTY	–0.011	0.709	1.099[a]	0.000	0.714	IVV	0.000	0.987	1.004[a]	0.000	0.992
VALX	0.010	0.688	0.967[a]	0.000	0.654	IVV	0.004	0.174	1.001[a]	0.000	0.992
ARKK	–0.015	0.730	0.902[a]	0.000	0.378	IVV	0.000	0.987	1.003[a]	0.000	0.992
HECO	0.018	0.327	0.781[a]	0.000	0.169	ACWI	–0.010	0.316	1.082[a]	0.000	0.668
ARKG	–0.016	0.771	0.993[a]	0.000	0.286	IVV	0.000	0.987	1.003[a]	0.000	0.992
FWDI	0.013	0.579	0.699[a]	0.000	0.171	EFA	0.002	0.905	0.890[a]	0.000	0.568
AADR	0.018	0.327	0.648[a]	0.000	0.296	EFA	–0.002	0.871	0.901[a]	0.000	0.574
IVAL	0.013	0.637	0.786[a]	0.000	0.501	EFV	0.009	0.722	0.872[a]	0.000	0.642

Notes: This table presents the results of the single-factor performance regression model via which the daily excess return (return minus risk free rate) of ETFs is regressed on the excess return of benchmarks. Alpha reflects the above-market return that can be achieved by an ETF. Beta counts for the systematic risk of ETFs. [a]Indicates statistical significance at 1% level; [b]Indicates statistical significance at 5% level; c indicates statistical significance at 10% level. The study period of each ETF pair spans from the latest inception date in each pair, whether this date concerns the active or the passive ETF in the pair, to December 31, 2016 (see Table 1 for inception dates).

Table 3 Single-factor performance regression results (continued)

Panel A: Active ETFs						*Panel B: Passive ETFs*					
Ticker	*Alpha*	*Prob.*	*beta*	*Prob.*	R^2	*Ticker*	*Alpha*	*Prob.*	*beta*	*Prob.*	R^2
ARKW	0.057	0.130	0.921[a]	0.000	0.389	IVV	0.004	0.196	0.998[a]	0.000	0.992
PRME	0.028	0.574	0.507[a]	0.000	0.249	REET	–0.017	0.354	1.024[a]	0.000	0.877
ARKQ	0.017	0.631	0.864[a]	0.000	0.399	IVV	0.004	0.196	0.998[a]	0.000	0.992
PHDG	–0.017	0.053	0.635[a]	0.000	0.306	IVV	0.003	0.260	0.998[a]	0.000	0.990
FTHI	–0.013	0.559	0.477[a]	0.000	0.175	IVV	0.004[c]	0.062	0.999[a]	0.000	0.991
FWDD	0.019	0.115	0.866[a]	0.000	0.171	IVV	–0.002	0.450	0.996[a]	0.000	0.991
SYE	0.018	0.421	0.370[a]	0.000	0.204	IVV	0.006	0.014	0.993[a]	0.000	0.991
FTLB	0.019	0.376	0.376[a]	0.000	0.187	IVV	0.004[c]	0.062	0.999[a]	0.000	0.991
SYG	0.016	0.507	0.613[a]	0.000	0.350	IWF	–0.006[a]	0.009	0.999[a]	0.000	0.994
SYV	0.032	0.237	0.486[a]	0.000	0.145	IWD	–0.003	0.298	0.997[a]	0.000	0.990
TTFS	0.007	0.328	0.962[a]	0.000	0.621	IWV	–0.007[a]	0.002	0.997[a]	0.000	0.989
QMOM	–0.025	0.428	0.797[a]	0.000	0.324	IVV	0.005	0.170	1.013[a]	0.000	0.990
VAMO	–0.030	0.330	0.186[a]	0.000	0.180	IVV	0.000	0.938	0.996[a]	0.000	0.990
HUSE	0.000	0.994	0.657[a]	0.000	0.220	ITOT	–0.013[a]	0.000	0.999[a]	0.000	0.976
QVAL	–0.027	0.290	0.998[a]	0.000	0.694	IVE	–0.006	0.461	0.997[a]	0.000	0.991
EMLP	0.009	0.596	0.672[a]	0.000	0.429	IVV	0.002	0.613	1.002[a]	0.000	0.989
PSR	0.002	0.835	0.854[a]	0.000	0.153	USRT	–0.020[a]	0.005	0.941[a]	0.000	0.867
UTES	0.035	0.248	0.739[a]	0.000	0.439	IDU	–0.018	0.262	0.999[a]	0.000	0.980
Average	*–0.006*	*0.376*	*0.700*	*0.000*	*0.402*		*–0.003*	*0.432*	*0.995*	*0.000*	*0.933*

Notes: This table presents the results of the single-factor performance regression model via which the daily excess return (return minus risk free rate) of ETFs is regressed on the excess return of benchmarks. Alpha reflects the above-market return that can be achieved by an ETF. Beta counts for the systematic risk of ETFs. [a]Indicates statistical significance at 1% level; [b]Indicates statistical significance at 5% level; c indicates statistical significance at 10% level. The study period of each ETF pair spans from the latest inception date in each pair, whether this date concerns the active or the passive ETF in the pair, to December 31, 2016 (see Table 1 for inception dates).

The average alpha estimate of active ETFs is slightly negative amounting to –0.6 bps. The corresponding alpha of passive ETFs is also negative being equal to –0.3 bps. Based on these average terms, we can infer that neither group can offer investors material excess-market returns. On the contrary, there are certain cases that alphas are significantly negative in statistical terms (six alphas for active ETFs and four alphas for passive ETFs) showing that the respective funds underperform their benchmarks.

When it comes to the systematic risk, the results reveal that the active ETFs entail less systematic risk for investors than the passive ETFs. In particular, the average beta for the active group is equal to 0.70 when the corresponding average for the passive group is essentially equal to unity. The latter finding is reasonable, given that an index tracker usually adopts a full replication strategy in an effort to repeat the performance of its benchmark.[16] At the fund level, there are just two active ETFs which seem to be more aggressive than the stock market, i.e., their betas are higher than unity. In the case of passive ETFs, the majority of beta estimates move around unity.

The basic inference made from the single-factor regression analysis is that neither active ETFs nor their passive counterparts can beat the market and offer a material alpha. This finding is in line with the spirit of the results on raw returns in the previous section.

4.3 Multifactor performance analysis

The results of the six-factor performance regression model are provided in Table 4. The table includes the alpha coefficients along with the estimates of the explanatory variables of the model. Probabilities on the statistical significance of estimates are provided too along with R-squared on the sufficiency of the model to explain the performance of active and passive ETFs in the sample.

The results on the above-market return of active ETFs are in line with those derived from the single-factor model. The average alpha is slightly negative with the majority of single alphas being insignificant. Eight of them are significantly negative and just two are significantly positive. Based on these estimates, we reconfirm that active ETFs do not deliver any material excess-return to investors. Passive ETFs do not either. The majority of alphas for this group are equal to zero in statistical terms. Interestingly enough, nine passive ETFs have positive alphas. However, the magnitude of these positive alphas is below 2 bps and seem rather insignificant from an economic perspective.

The estimates of systematic risk are essentially equal to those obtained from the single-factor performance regression model. The average beta of active ETFs is equal to 0.684 (it was equal to 0.700 in the case of the simply market model above). Furthermore, only one active ETF has a beta greater than unity indicating that active ETFs have been quite conservative over the period under examination. On the other hand, the betas of passive ETFs approximate unity in most of the cases, with their average term being equal to 0.985.

The results on size factor reveal a positive relation of active ETFs' performance with the Fama & French size factor. There are 23 SMB estimates which are positive and statistically significant. This positive relation between active ETFs' return and size factor may be the result of active ETFs being small-cap portfolios themselves. We remind that the size factor of Fama & French implies that small-cap perform better than the larger ones, indicating a positive relationship between performance and size. A positive but weaker relationship seems to be the case for passive ETFs too, where only eight SMB estimates are significantly positive.

Table 4 Multifactor performance regression results

Panel A: Active ETFs															
Ticker	*Alpha*	*Prob.*	*beta*	*Prob.*	*SMB*	*Prob.*	*HML*	*Prob.*	*UMD*	*Prob.*	*CMA*	*Prob.*	*RMW*	*Prob.*	R^2
WBIC	–0.042[a]	0.007	0.542[a]	0.000	0.116[a]	0.001	0.101[b]	0.020	0.083[a]	0.000	0.018	0.796	0.139[b]	0.014	0.626
WBID	–0.041[b]	0.020	0.593[a]	0.000	0.149[a]	0.000	0.044	0.348	0.143[a]	0.000	0.035	0.645	0.132[c]	0.060	0.614
WBIA	–0.035[c]	0.069	0.687	0.000	0.067[c]	0.092	0.133[b]	0.021	0.089[a]	0.001	–0.108	0.184	0.071	0.318	0.655
WBIB	–0.037[b]	0.039	0.675[a]	0.000	0.156[a]	0.000	0.125[b]	0.019	0.161[a]	0.000	0.016	0.841	0.117	0.086	0.623
DIVI	–0.049	0.199	0.795[a]	0.000	0.170[b]	0.033	0.072	0.540	–0.175[a]	0.002	0.084	0.650	–0.045	0.755	0.271
WBIG	–0.048[a]	0.000	0.449[a]	0.000	0.152[a]	0.000	–0.026	0.477	0.066[a]	0.001	0.163[a]	0.001	0.157[a]	0.001	0.550
WBIL	–0.026[c]	0.058	0.425[a]	0.000	0.162[a]	0.000	0.008	0.817	0.116[a]	0.000	0.119[b]	0.013	0.135[a]	0.003	0.544
WBIE	–0.037[b]	0.016	0.693[a]	0.000	0.161[a]	0.000	–0.010	0.804	0.107[a]	0.000	0.103	0.096	0.222[a]	0.000	0.705
WBIF	–0.024	0.132	0.554[a]	0.000	0.186[a]	0.000	0.040	0.365	0.121[a]	0.000	0.150[b]	0.018	0.138[a]	0.009	0.592
SMCP	–0.031	0.473	0.623[a]	0.000	0.072	0.472	–0.460[a]	0.000	–0.432[a]	0.000	–0.091	0.631	–0.209[c]	0.070	0.287
SYLD	–0.009	0.508	0.967[a]	0.000	0.345[a]	0.000	0.201[a]	0.000	0.043[b]	0.018	0.140[a]	0.000	0.026	0.564	0.875
FFTY	–0.003	0.879	1.099[a]	0.000	0.721[a]	0.000	–0.094[c]	0.072	0.285[a]	0.000	–0.302[a]	0.000	–0.065	0.239	0.858
VALX	–0.003	0.853	0.948[a]	0.000	0.673[a]	0.000	0.024	0.656	–0.055[b]	0.033	–0.009	0.919	–0.037	0.575	0.772
ARKK	–0.003	0.934	0.772[a]	0.000	0.323[a]	0.000	–0.724[a]	0.000	–0.320[a]	0.000	–0.211	0.181	–0.575[a]	0.000	0.541
HECO	0.043[b]	0.040	0.720[a]	0.000	0.044	0.215	0.237[a]	0.000	0.233[a]	0.000	–0.595[a]	0.000	0.261[a]	0.000	0.186
ARKG	–0.031	0.463	0.894[a]	0.000	0.644[a]	0.000	–1.266[a]	0.000	–0.282[a]	0.000	–0.153	0.390	–1.203[a]	0.000	0.537
FWDI	0.016	0.482	0.667[a]	0.000	0.178[a]	0.006	–0.097	0.302	–0.096[b]	0.027	–0.200	0.132	–0.142	0.157	0.174
AADR	0.017	0.330	0.616[a]	0.000	0.127[a]	0.003	0.034	0.564	0.011	0.716	–0.213[b]	0.013	–0.326[a]	0.000	0.315
IVAL	0.005	0.857	0.750[a]	0.000	0.064	0.328	0.058	0.388	–0.094[a]	0.008	–0.468[a]	0.000	0.224[b]	0.035	0.512

Notes: This table presents the results of a six-factor performance regression model. The daily excess return of ETFs is regressed on the excess return of their benchmarks, and the Fama&French SMB (small minus big) factor, the Fama&French HML (high minus low book-to-price ratio) factor, the Carhart UMD (momentum) factor, the Fama&French CMA (conservative minus aggressive) factor and the Fama&French RMW (robust minus weak) factor. [a]Indicates statistical significance at 1% level; [b]Indicates statistical significance at 5% level; [c]Indicates statistical significance at 10% level. The study period of each ETF pair spans from the latest inception date in each pair, whether this date concerns the active or the passive ETF in the pair, to December 31, 2016 (see Table 1 for inception dates).

Table 4 Multifactor performance regression results (continued)

Panel A: Active ETFs															
Ticker	*Alpha*	*Prob.*	*beta*	*Prob.*	*SMB*	*Prob.*	*HML*	*Prob.*	*UMD*	*Prob.*	*CMA*	*Prob.*	*RMW*	*Prob.*	R^2
ARKW	0.049	0.125	0.835[a]	0.000	0.349[a]	0.000	–0.356[a]	0.000	–0.123[a]	0.011	–0.537[a]	0.000	–0.214[c]	0.051	0.481
PRME	0.012	0.826	0.533[a]	0.000	0.103	0.314	0.029	0.814	–0.030	0.544	0.000	0.999	–0.067	0.694	0.269
ARKQ	0.030	0.265	0.843[a]	0.000	0.457[a]	0.000	–0.304[a]	0.000	–0.283[a]	0.000	–0.204[c]	0.071	–0.042	0.645	0.485
PHDG	–0.020[b]	0.029	0.639[a]	0.000	0.009	0.621	0.096[a]	0.002	0.029[b]	0.046	–0.168[a]	0.000	0.040	0.231	0.289
FTHI	–0.009	0.701	0.502[a]	0.000	0.128[a]	0.007	0.006	0.933	0.000	0.990	0.080	0.482	0.209[b]	0.012	0.183
FWDD	0.024[c]	0.059	0.850[a]	0.000	0.039	0.259	0.091[c]	0.097	–0.057[b]	0.016	–0.137[b]	0.027	0.054	0.381	0.172
SYE	0.028	0.265	0.344[a]	0.000	0.013	0.783	0.059	0.419	–0.086[b]	0.010	–0.411[a]	0.000	0.113	0.189	0.213
FTLB	0.013	0.532	0.370[a]	0.000	0.098	0.114	–0.072	0.319	–0.078[b]	0.017	–0.022	0.837	0.164[c]	0.087	0.181
SYG	0.014	0.581	0.616[a]	0.000	–0.072	0.214	0.166[b]	0.025	–0.061	0.110	–0.164	0.162	0.057	0.500	0.367
SYV	0.028	0.301	0.431[a]	0.000	–0.063	0.405	0.184[c]	0.060	–0.099[b]	0.046	–0.227[c]	0.099	–0.189	0.119	0.163
TTFS	0.008	0.242	0.978[a]	0.000	0.079[a]	0.000	–0.034	0.129	–0.018	0.101	0.138[a]	0.000	0.122[a]	0.000	0.625
QMOM	–0.012	0.700	0.783[a]	0.000	0.140[c]	0.051	–0.262[a]	0.010	0.086[c]	0.051	0.242[b]	0.041	0.046	0.681	0.354
VAMO	–0.035	0.162	0.195[a]	0.000	0.602[a]	0.000	0.114[b]	0.048	0.124[a]	0.000	0.038	0.663	0.178[b]	0.014	0.308
HUSE	0.015	0.330	0.663[a]	0.000	–0.072[b]	0.010	–0.260[a]	0.000	–0.012	0.663	0.141[b]	0.038	–0.365[a]	0.000	0.191
QVAL	–0.022	0.294	0.959[a]	0.000	0.380[a]	0.000	–0.196[a]	0.002	–0.259[a]	0.000	–0.013	0.884	0.411[a]	0.000	0.779
EMLP	0.006	0.730	0.716[a]	0.000	–0.006	0.873	–0.155[a]	0.004	–0.232[a]	0.000	0.444[a]	0.000	–0.028	0.653	0.501
PSR	0.001	0.875	0.862[a]	0.000	0.047[b]	0.022	–0.086[a]	0.001	–0.040[a]	0.002	0.118[a]	0.002	0.062[c]	0.051	0.156
UTES	0.042	0.200	0.731[a]	0.000	–0.007	0.911	–0.146[c]	0.066	0.041	0.278	0.103	0.405	–0.058	0.542	0.456
Average	*–0.005*	*0.367*	*0.684*	*0.000*	*0.182*	*0.155*	*–0.074*	*0.225*	*–0.030*	*0.100*	*–0.057*	*0.276*	*–0.013*	*0.209*	*0.443*

Notes: This table presents the results of a six-factor performance regression model. The daily excess return of ETFs is regressed on the excess return of their benchmarks, and the Fama&French SMB (small minus big) factor, the Fama&French HML (high minus low book-to-price ratio) factor, the Carhart UMD (momentum) factor, the Fama&French CMA (conservative minus aggressive) factor and the Fama&French RMW (robust minus weak) factor. [a]Indicates statistical significance at 1% level; [b]Indicates statistical significance at 5% level; [c]Indicates statistical significance at 10% level. The study period of each ETF pair spans from the latest inception date in each pair, whether this date concerns the active or the passive ETF in the pair, to December 31, 2016 (see Table 1 for inception dates).

Table 4 Multifactor performance regression results (continued)

								Panel B: Passive ETFs							
Ticker	*Alpha*	*Prob.*	*beta*	*Prob.*	*SMB*	*Prob.*	*HML*	*Prob.*	*UMD*	*Prob.*	*CMA*	*Prob.*	*RMW*	*Prob.*	*R2*
IJH	0.020[a]	0.000	0.988[a]	0.000	0.029[a]	0.000	–0.008	0.114	–0.003	0.256	–0.051[a]	0.000	–0.016[b]	0.037	0.961
IJH	0.020[a]	0.000	0.988[a]	0.000	0.029[a]	0.000	–0.008	0.114	–0.003	0.256	–0.051[a]	0.000	–0.016[b]	0.037	0.961
IJH	0.020[a]	0.000	0.988[a]	0.000	0.029[a]	0.000	–0.008	0.114	–0.003	0.256	–0.051[a]	0.000	–0.016[b]	0.037	0.961
IJH	0.020[a]	0.000	0.988[a]	0.000	0.029[a]	0.000	–0.008	0.114	–0.003	0.256	–0.051[a]	0.000	–0.016[b]	0.037	0.961
ACWI	–0.009	0.511	1.093[a]	0.000	–0.014	0.701	0.010	0.836	0.002	0.915	–0.114[c]	0.074	–0.077	0.143	0.735
IVV	0.000	0.956	0.999[a]	0.000	0.003	0.497	–0.002	0.793	0.002	0.481	–0.010	0.519	0.002	0.857	0.992
IVV	0.000	0.956	0.999[a]	0.000	0.003	0.497	–0.002	0.793	0.002	0.481	–0.010	0.519	0.002	0.857	0.992
IVV	0.000	0.956	0.999[a]	0.000	0.003	0.497	–0.002	0.793	0.002	0.481	–0.010	0.519	0.002	0.857	0.992
IVV	0.000	0.956	0.999[a]	0.000	0.003	0.497	–0.002	0.793	0.002	0.481	–0.010	0.519	0.002	0.857	0.992
IJR	0.002	0.501	0.999[a]	0.000	–0.005	0.528	–0.002	0.755	–0.002	0.676	0.005	0.642	–0.007	0.444	0.996
IVV	0.001	0.849	0.999[a]	0.000	0.007	0.343	–0.005	0.517	–0.001	0.727	–0.005	0.756	0.008	0.505	0.990
IVV	0.003	0.511	1.004[a]	0.000	0.005	0.532	–0.011	0.370	0.006	0.113	0.000	0.980	0.002	0.866	0.992
IVV	0.003	0.311	1.001[a]	0.000	0.007	0.263	–0.010	0.297	0.001	0.803	–0.013	0.374	0.014	0.125	0.992
IVV	0.005[c]	0.084	1.001[a]	0.000	0.003	0.643	–0.011	0.247	–0.002	0.666	–0.001	0.936	0.006	0.642	0.992
ACWI	–0.002	0.819	1.024[a]	0.000	0.033	0.160	0.060[c]	0.053	0.026	0.116	–0.208[a]	0.000	–0.111[a]	0.005	0.683
IVV	0.005[c]	0.084	1.001[a]	0.000	0.003	0.643	–0.011	0.247	–0.002	0.666	–0.001	0.936	0.006	0.642	0.992
EFA	0.002	0.867	0.831[a]	0.000	0.117[a]	0.000	0.153[a]	0.002	–0.058[b]	0.023	–0.351[a]	0.000	–0.350[a]	0.000	0.624
EFA	0.001	0.938	0.839[a]	0.000	0.166[a]	0.000	0.136[a]	0.006	–0.040	0.108	–0.190[a]	0.003	–0.438[a]	0.000	0.634
EFV	0.006	0.806	0.823[a]	0.000	0.030	0.619	0.010	0.905	–0.141[a]	0.000	–0.195[c]	0.055	–0.113	0.209	0.659

Notes: This table presents the results of a six-factor performance regression model. The daily excess return of ETFs is regressed on the excess return of their benchmarks, and the Fama&French SMB (small minus big) factor, the Fama&French HML (high minus low book-to-price ratio) factor, the Carhart UMD (momentum) factor, the Fama&French CMA (conservative minus aggressive) factor and the Fama&French RMW (robust minus weak) factor. [a]Indicates statistical significance at 1% level; [b]Indicates statistical significance at 5% level; [c]Indicates statistical significance at 10% level. The study period of each ETF pair spans from the latest inception date in each pair, whether this date concerns the active or the passive ETF in the pair, to December 31, 2016 (see Table 1 for inception dates).

Table 4 Multifactor performance regression results (continued)

Panel B: Passive ETFs														
Ticker	*Alpha*	*Prob.*	*beta*	*Prob.*	*SMB*	*Prob.*	*HML*	*Prob.*	*UMD*	*Prob.*	*CMA*	*Prob.*	*RMW*	*Prob.*	*R2*
IVV	0.003	0.314	0.999[a]	0.000	–0.002	0.633	–0.013	0.146	–0.001	0.785	–0.003	0.837	0.012	0.277	0.992
REET	–0.019	0.269	1.013[a]	0.000	0.013	0.759	0.045	0.323	–0.030	0.244	–0.137[b]	0.028	–0.001	0.990	0.880
IVV	0.003	0.314	0.999[a]	0.000	–0.002	0.633	–0.013	0.146	–0.001	0.785	–0.003	0.837	0.012	0.277	0.992
IVV	0.003	0.167	0.997[a]	0.000	0.006	0.197	0.000	0.997	–0.001	0.680	–0.021[b]	0.046	0.010	0.219	0.990
IVV	0.005[b]	0.050	0.998[a]	0.000	0.002	0.698	–0.013[c]	0.084	–0.004	0.245	–0.004	0.786	0.003	0.729	0.992
IVV	–0.003	0.167	0.997[a]	0.000	–0.009[a]	0.008	–0.016[a]	0.001	–0.001	0.684	0.022[a]	0.001	–0.012[c]	0.091	0.991
IVV	0.006[b]	0.027	0.995[a]	0.000	0.002	0.729	–0.019[a]	0.004	–0.006[b]	0.042	0.005	0.654	0.001	0.944	0.992
IVV	0.005[b]	0.050	0.998[a]	0.000	0.002	0.698	–0.013[c]	0.084	–0.004	0.245	–0.004	0.786	0.003	0.729	0.992
IWF	–0.005[b]	0.016	0.999[a]	0.000	0.007	0.125	0.007	0.296	–0.005[c]	0.072	–0.004	0.627	0.010	0.139	0.994
IWD	–0.004	0.270	0.995[a]	0.000	0.008	0.228	0.001	0.956	0.001	0.816	–0.018	0.238	0.000	0.970	0.990
IWV	–0.007[a]	0.005	0.996[a]	0.000	0.008	0.130	–0.007	0.372	0.001	0.827	0.002	0.902	0.000	0.997	0.989
IVV	–0.002	0.819	0.993[a]	0.000	–0.003	0.846	–0.008	0.712	–0.016[c]	0.065	–0.005	0.875	0.018	0.428	0.991
IVV	–0.001	0.929	0.992[a]	0.000	0.011	0.405	–0.011	0.495	–0.013[c]	0.084	–0.005	0.854	0.003	0.872	0.991
ITOT	–0.009[a]	0.000	0.995[a]	0.000	0.006[a]	0.004	–0.016[a]	0.000	–0.015[a]	0.000	–0.032[a]	0.000	0.017[a]	0.000	0.975
IVE	–0.008	0.285	1.003[a]	0.000	0.009	0.423	–0.020	0.182	0.002	0.717	–0.007	0.774	0.003	0.856	0.992
IVV	0.002	0.547	1.000[a]	0.000	–0.001	0.929	0.000	0.975	–0.005	0.228	–0.017	0.203	0.005	0.667	0.989
USRT	–0.019[a]	0.003	0.930[a]	0.000	0.045[a]	0.000	–0.063[a]	0.000	0.053[a]	0.000	0.112[b]	0.000	–0.061[a]	0.001	0.864
IDU	–0.020[a]	0.000	0.996[a]	0.000	0.021	0.471	0.004	0.897	–0.016	0.324	–0.004	0.942	0.028	0.477	0.980
Average	*0.001*	*0.387*	*0.985*	*0.000*	*0.016*	*0.388*	*0.003*	*0.393*	*–0.007*	*0.395*	*–0.039*	*0.438*	*–0.029*	*0.455*	*0.937*

Notes: This table presents the results of a six-factor performance regression model. The daily excess return of ETFs is regressed on the excess return of their benchmarks, and the Fama&French SMB (small minus big) factor, the Fama&French HML (high minus low book-to-price ratio) factor, the Carhart UMD (momentum) factor, the Fama&French CMA (conservative minus aggressive) factor and the Fama&French RMW (robust minus weak) factor. [a]Indicates statistical significance at 1% level; [b]Indicates statistical significance at 5% level; [c]Indicates statistical significance at 10% level. The study period of each ETF pair spans from the latest inception date in each pair, whether this date concerns the active or the passive ETF in the pair, to December 31, 2016 (see Table 1 for inception dates).

When it comes to the relation of active ETF performance and the value factor, ten positive and significant estimates and 12 significantly negative are reported in Table 4. This variation of significant estimates indicates that there is not a consistent relation of performance with the value factor but this relationship is rather fund-specific. A similar but weaker pattern applies to passive ETFs for which three and six significantly positive and negative HML estimations, respectively, are obtained.

The impact of the market momentum factor on the performance of active ETFs is inconsistent too. In particular, 14 positive and significant UMD estimates are found in Table 4 and 16 significantly negative. The relevant results for passive ETFs are quite weak (only one and seven significantly positive and negative momentum estimates, respectively). Therefore, we cannot make a solid inference about the impact of market momentum on returns achieved by active and passive ETFs.

When it comes to the CMA factor, the results indicate that there is not a monotonic relation between active ETF performance and this factor. There is not any significantly positive CMA estimates but there are ten significantly negative. In the case of passive ETFs, ten CMA estimates are significantly negative and only two are positive. These results show that there is a negative relation between passive ETF returns and the investment factor for more than a quarter of funds. This element partially fulfils our expectations about a negative relation between ETF performance and the CMA factor, based on the suggestions of Fama and French (2015) about a negative relation between expected investment and expected rate of return.

Finally, as far as the impact of RMW factor on performance of ETFs is concerned, the results in Table 4 reveal a negative such effect for 14 active ETFs and only for one passive ETF. On the other hand, six and nine significantly negative RMW estimates are obtained for active and passive ETFs, respectively. The negative estimates are in accordance with our expectations about a negative relationship between the performance of ETFs and the RMW factor. According to Fama and French (2015), the combination of negative CMA and RMW slopes in the performance regression model (as is the case for several ETFs in our sample) shows that the returns of ETFs resemble the returns of those firms that invest a lot despite their low profitability.

To summarise the findings of the multifactor performance regression analysis, we could say that both active and passive ETFs fail to deliver any excess-market return, with the active ETFs being more conservative than the passive in systematic risk terms. In addition, the relation of performance of the two ETF groups with the size factor seems to be positive. On the other hand, there is not an one-direction impact on ETF performance by the value, momentum, CMA and RMW factors, as a wide variation between negative and positive estimates is observed.

4.4 Risk-adjusted performance analysis

The estimations of risk-adjusted returns are provided in Table 5. The table reports the four alternative types of risk-adjusted returns computed, that is the Sharpe ratio, Treynor ratio I and II based on the betas from the single-factor and the multifactor performance regression models, respectively, and Sortino ratio.

Table 5 Risk-adjusted performance

Panel A: Active ETFs					*Panel B: Passive ETFs*				
Ticker	*Sharpe ratio*	*Treynor Ratio I*	*Terynor ratio II*	*Sortino ratio*	*Ticker*	*Sharpe ratio*	*Treynor ratio I*	*Treynor ratio II*	*Sortino ratio*
WBIC	–0.034	–0.041	–0.040	–0.045	IJH	0.030	0.029	0.029	0.043
WBID	–0.021	–0.026	–0.025	–0.029	IJH	0.030	0.029	0.029	0.043
WBIA	–0.013	–0.015	–0.015	–0.018	IJH	0.030	0.029	0.029	0.043
WBIB	–0.001	–0.002	–0.002	–0.002	IJH	0.030	0.029	0.029	0.043
DIVI	–0.038	–0.055	–0.057	–0.052	ACWI	0.000	0.000	0.000	0.001
WBIG	–0.051	–0.071	–0.066	–0.070	IVV	0.025	0.022	0.022	0.034
WBIL	–0.022	–0.030	–0.028	–0.029	IVV	0.025	0.022	0.022	0.034
WBIE	–0.024	–0.025	–0.024	–0.033	IVV	0.025	0.022	0.022	0.034
WBIF	–0.004	–0.005	–0.004	–0.005	IVV	0.025	0.022	0.022	0.034
SMCP	–0.012	–0.023	–0.028	–0.014	IJR	0.038	0.041	0.041	0.057
SYLD	0.035	0.030	0.032	0.047	IVV	0.044	0.036	0.036	0.060
FFTY	–0.001	–0.001	–0.001	–0.002	IVV	0.021	0.019	0.019	0.028
VALX	0.016	0.018	0.019	0.023	IVV	0.024	0.022	0.022	0.034
ARKK	0.004	0.006	0.007	0.006	IVV	0.025	0.022	0.022	0.034
HECO	0.031	0.054	0.059	0.029	ACWI	0.034	0.027	0.028	0.046
ARKG	–0.010	–0.017	–0.019	–0.014	IVV	0.025	0.022	0.022	0.034
FWDI	0.005	0.011	0.012	0.006	EFA	0.004	0.005	0.005	0.005
AADR	0.032	0.056	0.059	0.038	EFA	0.014	0.019	0.020	0.018
IVAL	0.008	0.012	0.013	0.012	EFV	–0.005	–0.008	–0.008	–0.007

Notes: This table presents the estimations of risk-adjusted returns of ETFs expressed by the Sharpe ratio, Teynor ratio and Sortino ratio. Two versions of Treynor ratio are estimated. The first one uses the beta estimates deriving from the single-factor performance regression model. The second version uses the beta estimates deriving from the multifactor performance regression model. The study period of each ETF pair spans from the latest inception date in each pair, whether this date concerns the active or the passive ETF in the pair, to December 31, 2016 (see Table 1 for inception dates).

Table 5 Risk-adjusted performance (continued)

Panel A: Active ETFs					*Panel B: Passive ETFs*				
Ticker	*Sharpe ratio*	*Treynor Ratio I*	*Terynor ratio II*	*Sortino ratio*	*Ticker*	*Sharpe ratio*	*Treynor ratio I*	*Treynor ratio II*	*Sortino ratio*
ARKW	0.036	0.053	0.059	0.048	IVV	0.029	0.026	0.026	0.040
PRME	–0.009	–0.018	–0.017	–0.008	REET	0.014	0.013	0.014	0.020
ARKQ	0.021	0.029	0.030	0.029	IVV	0.029	0.026	0.026	0.040
PHDG	–0.006	–0.005	–0.005	–0.007	IVV	0.059	0.048	0.048	0.079
FTHI	0.013	0.025	0.024	0.014	IVV	0.035	0.030	0.030	0.047
FWDD	0.037	0.056	0.057	0.040	IVV	0.045	0.044	0.044	0.059
SYE	0.041	0.088	0.094	0.045	IVV	0.035	0.030	0.030	0.047
FTLB	0.012	0.029	0.030	0.014	IVV	0.035	0.030	0.030	0.047
SYG	0.039	0.056	0.056	0.043	IWF	0.036	0.031	0.031	0.048
SYV	0.025	0.051	0.057	0.024	IWD	0.031	0.027	0.027	0.043
TTFS	0.075	0.073	0.072	0.106	IWV	0.063	0.055	0.056	0.088
QMOM	0.002	0.002	0.003	0.002	IVV	0.034	0.028	0.029	0.045
VAMO	–0.015	–0.046	–0.044	–0.021	IVV	0.052	0.045	0.045	0.072
HUSE	0.041	0.058	0.057	0.039	ITOT	0.062	0.050	0.051	0.085
QVAL	0.005	0.006	0.006	0.008	IVE	0.032	0.029	0.029	0.045
EMLP	0.027	0.038	0.036	0.038	IVV	0.061	0.049	0.049	0.083
PSR	0.045	0.092	0.091	0.057	USRT	0.036	0.079	0.080	0.046
UTES	0.054	0.073	0.074	0.063	IDU	0.047	0.047	0.047	0.060
Average	*0.009*	*0.015*	*0.015*	*0.010*		*0.032*	*0.030*	*0.030*	*0.044*

Notes: This table presents the estimations of risk-adjusted returns of ETFs expressed by the Sharpe ratio, Teynor ratio and Sortino ratio. Two versions of Treynor ratio are estimated. The first one uses the beta estimates deriving from the single-factor performance regression model. The second version uses the beta estimates deriving from the multifactor performance regression model. The study period of each ETF pair spans from the latest inception date in each pair, whether this date concerns the active or the passive ETF in the pair, to December 31, 2016 (see Table 1 for inception dates).

The results of the ratios considered indicate a clear performance advantage of passive ETFs, as the average terms of all ratios are higher for passive ETFs than those of active ETFs. Interestingly enough, with just one exception, all the individual risk-adjusted return ratios of passive ETFs are positive. In the case of active ETFs, 15 out of 37 funds present negative Sharpe, Treynor and Sortino ratios.

At the fund level, we can detect nine active ETFs which present superior Sharpe ratios to those of the corresponding passive ETFs. In the case of Treynor ratios I, 13 active ETFs outperform their passive rivals. Similar results are obtained in the case of Teynor ratios II, as these ratios are essentially equal to Treynor ratios I. Superiority in Treynor ratios for about one third of active ETFs is the result of active ETFs having lower systematic risk than passive ETFs rather than active ETFs delivering greater excess returns than the passive ones. Finally, when it comes to the Sortino ratios, the relevant estimates show that only seven active ETFs outperform their passive peers.

Overall, the analysis of risk-adjusted performance does not offer any new answer to whether active ETFs can beat the passive ones. The results demonstrate that the active ETFs can be outperformers only occasionally. However, the existence of specific active ETFs which perform better than the passive ones indicates that investing in active ETFs is not a priori a lost cause. On the contrary, active ETFs can be significant supplemental tools to an overall strategy focused on equity investments.

4.5 Cross-sectional performance analysis

In this section, we discuss the results presented in Table 6 of the cross-sectional regression analysis on the relationship between performance and managerial expenses charged by ETFs, liquidity expressed in bid/ask spread terms, the assets they manage and their tradability shown in their daily trading volumes. The table has three panels; one for active ETFs, one for passive ETFs and one for the two groups combined. Moreover, the results are reported successively for the eight alternative kinds of returns considered.

The first type of return used is the average daily absolute return. In the case of active ETFs, statistically significant results are obtained only for volume. In particular, the estimate for the natural logarithm of volume is equal to –0.009 being statistically significant at the 10% level. The coefficients of expense ratio and bid/ask spread are, as expected, negative but they are insignificant in statistical terms, and the coefficient of assets is slightly positive but insignificant too. In the case of passive ETFs, only the slope of expense ratios is statistically significant indicating a negative relation between performance and expenses. Finally, when the combined sample of ETFs is considered, the estimates are significant for the intercept of the model, expenses, assets and volume but not for the bid/ask spread. In the case of expense ratio and volume, the relevant coefficients are negative while the slope of assets is positive. The results about expenses and volumes are consistent with our expectations but the finding about the positive relation between performance and assets is in contrast to the findings of the literature, which suggest that the performance of a fund deteriorates as a response to its increasing size.

When we use the buy-and-hold absolute returns as the dependent variable of the model, the results are insignificant. When the alpha deriving from the single-factor model is used as a proxy for ETF performance, the relevant results are strongly significant only in the case of passive ETFs but totally insignificant for active ETFs or the combined sample. In the case of passive ETFs, the results show that the performance of these funds

is related to the costs expressed by expense ratios and bid/ask spreads in a positive manner. A positive relation with assets is revealed too, while volume seems to affect the alphas of passive ETFs in a negative way. The results on volume are in line with our expectations but the results concerning expenses and assets stand as an oxymoron, based on what is suggested by the relevant literature on traditional open-end mutual funds.

The results deriving from using the alpha of the six-factor regression model as a proxy for ETF performance are similar to the results of the single-factor alpha. More specifically, a positive relation between performance and expense ratios and bid/ask spreads is revealed. However, only the estimate of expense ratios is significant in statistical terms. Performance is also positively related to assets under management. Finally, volume is related to performance in a negative way.

The usage of the Sharpe ratio derives more 'reasonable' results. In particular, in the case of active ETFs, the results are statistically insignificant. However, in the case of passive ETFs, results on intercepts, expense ratios and bid/ask spreads are significant at 5% level or better. Based on the results, the two types of costs shouldered to passive ETF investors are negatively related to the performance offered. In the case of the combined sample, the results are similar to those obtained from using the raw daily absolute return on the left side of the model. In particular, expenses and volume offer significantly negative coefficients while assets show a positive impact on risk-adjusted performance.

The results concerning the version of the cross-sectional model having Treynor ratio I as its dependent variable are partially significant only in the case of the entire ETF sample. More specifically, expense ratios and volumes are negatively related to this type of risk-adjusted return, with the rest explanatory variables having immaterial slopes. The results obtained from using Treynor ratio II are similar to the results that are based on Treynor ratios I.

The outcomes of the model based on the Sortino ratios first reveal a negative relation between performance and volume in the case of active ETFs and when the entire sample of ETFs is taken into consideration. Moreover, the costs involved in investing in passively managed ETFs affect performance in an negative way. Finally, assets seem to have a meaningful relation with risk-adjusted performance only when the combined ETF sample is assessed. In particular, assets are positively related to performance.

Overall, the cross-sectional analysis of the relation between ETFs' performance and certain trading features of these funds first indicates that expenses rather erode the return delivered to ETF investors. With the oxymoron of the estimates concerning alphas, the relevant statistically significant coefficients of expense ratios and bid/ask spread are negative. This pattern is absolutely in line with the previous findings of the literature on mutual funds. The same pattern applies to volume, which is also negatively related to performance.

On the other hand, the size of an ETF seems to exert a positive influence on its ability to offer positive returns to its investors. This finding contradicts the common belief among academics who believe that the performance of a fund is a negative function of the assets accumulated to it. In our study, we speculate that the positive relationship between performance and assets might be the result of the belief among investors that the larger ETFs are safer and more liquid than the smaller ones. If this is true, more investing in large ETFs on behalf of investors should be the case. More investing entails increased demand for large ETFs. In turn, more demand means higher prices for ETFs. Ultimately, higher prices may mean higher returns for the corresponding ETF products.[17]

Table 6 Cross-sectional performance regression results

Variable	*Panel A: Active ETFs*		*Panel B: Passive ETFs*		*Panel C: All ETFs*	
	Coefficient	*Prob.*	*Coefficient*	*Prob.*	*Coefficient*	*Prob.*
	Dependent variable: daily absolute return					
Slope	0.039	0.346	0.155	0.041	0.053[b]	0.028
Expense ratio	–0.007	0.768	–0.078[c]	0.090	–0.027[b]	0.033
Bid/ask spread	–0.001	0.849	–0.053	0.556	0.000	0.963
Ln assets	0.006	0.256	–0.005	0.553	0.006[c]	0.074
Ln volume	–0.009[c]	0.098	–0.002	0.754	–0.008[b]	0.020
R^2	0.093		0.344		0.224	
N	37		37		74	
	Dependent variable: buy-and-hold absolute return					
Slope	12.635	0.870	66.268	0.687	89.964[c]	0.068
Expense ratio	14.783	0.757	–55.618	0.584	–30.273	0.240
Bid/ask spread	–6.555	0.639	316.215	0.121	–4.064	0.716
Ln Assets	10.325	0.302	3.262	0.860	5.895	0.359
Ln Volume	–12.230	0.230	–6.838	0.639	–11.274	0.112
R^2	0.054		0.444		0.067	
N	37		37		74	
	Dependent variable: alpha (single-factor regression model)					
Slope	0.081[b]	0.038	–0.136[a]	0.000	0.019	0.374
Expense ratio	–0.011	0.635	0.047[a]	0.001	–0.016	0.158
Bid/ask spread	0.004	0.571	0.096[a]	0.001	0.006	0.243
Ln assets	–0.001	0.774	0.012[a]	0.000	0.002	0.378
Ln volume	–0.007	0.146	–0.006[a]	0.004	–0.004	0.163
R^2	0.196		0.750		0.077	
N	37		37		74	

Notes: This table presents the results of a cross-sectional regression model via which the return of ETFs is regressed on their expense ratios, the bid/ask spreads, the natural logarithm of assets under management and the natural logarithm of average trading volume. The model is run for active and passive ETFs individually and for the total sample of active and passive ETFs. Various types of returns are used as the dependent variable of the model, which include the average daily absolute return, the buy-and-hold absolute return, the alphas deriving from the single-factor and the multi-factor performance regression models, respectively, the Sharpe ratio, the Treynor ratios based on the single-factor and the multi-factor performance regression models, respectively, and the Sortino ratio. [a]Indicates statistical significance at 1% level; [b]Indicates statistical significance at 5% level; [c]Indicates statistical significance at 10% level. The study period of each ETF pair spans from the latest inception date in each pair, whether this date concerns the active or the passive ETF in the pair, to December 31, 2016 (see Table 1 for inception dates).

Table 6 Cross-sectional performance regression results (continued)

Variable	*Panel A: Active ETFs*		*Panel B: Passive ETFs*		*Panel C: All ETFs*	
	Coefficient	*Prob.*	*Coefficient*	*Prob.*	*Coefficient*	*Prob.*
	Dependent variable: alpha (multi-factor regression model)					
Slope	0.080[b]	0.042	–0.121[a]	0.004	0.018	0.409
Expense ratio	–0.007	0.760	0.053[b]	0.032	–0.016	0.165
Bid/ask spread	0.004	0.609	0.074	0.123	0.006	0.259
Ln assets	–0.002	0.634	0.015[a]	0.001	0.003	0.324
Ln volume	–0.006	0.210	–0.010[a]	0.005	–0.005	0.160
R^2	0.181		0.529		0.083	
N	37		37		74	
	Dependent variable: Sharpe ratio					
Slope	0.047	0.246	0.214[a]	0.007	0.044[c]	0.066
Expense ratio	–0.018	0.479	–0.102[b]	0.034	–0.029[b]	0.021
Bid/ask spread	0.000	0.985	–0.207[b]	0.029	0.000	0.926
Ln assets	0.005	0.319	–0.008	0.321	0.006[b]	0.044
Ln volume	–0.008	0.116	–0.001	0.844	–0.008[b]	0.019
R^2	0.103		0.340		0.300	
N	37		37		74	
	Dependent variable: Treynor ratio (single-factor regression model)					
Slope	0.086	0.150	0.146	0.061	0.081	0.015
Expense ratio	–0.017	0.642	–0.077	0.105	–0.037[b]	0.031
Bid/ask spread	–0.001	0.916	–0.034	0.711	0.000	0.952
Ln assets	0.007	0.371	–0.005	0.594	0.007	0.121
Ln volume	–0.014[c]	0.074	–0.002	0.775	–0.011[b]	0.019
R^2	0.123		0.342		0.177	
N	37		37		74	

Notes: This table presents the results of a cross-sectional regression model via which the return of ETFs is regressed on their expense ratios, the bid/ask spreads, the natural logarithm of assets under management and the natural logarithm of average trading volume. The model is run for active and passive ETFs individually and for the total sample of active and passive ETFs. Various types of returns are used as the dependent variable of the model, which include the average daily absolute return, the buy-and-hold absolute return, the alphas deriving from the single-factor and the multi-factor performance regression models, respectively, the Sharpe ratio, the Treynor ratios based on the single-factor and the multi-factor performance regression models, respectively, and the Sortino ratio. [a]Indicates statistical significance at 1% level; [b]Indicates statistical significance at 5% level; [c]Indicates statistical significance at 10% level. The study period of each ETF pair spans from the latest inception date in each pair, whether this date concerns the active or the passive ETF in the pair, to December 31, 2016 (see Table 1 for inception dates).

Table 6 Cross-sectional performance regression results (continued)

Variable	*Panel A: Active ETFs*		*Panel B: Passive ETFs*		*Panel C: All ETFs*	
	Coefficient	*Prob.*	*Coefficient*	*Prob.*	*Coefficient*	*Prob.*
	Dependent variable: Treynor ratio (multi-factor regression model)					
Slope	0.093	0.124	0.149[c]	0.059	0.085[b]	0.011
Expense ratio	–0.017	0.639	–0.078	0.105	–0.038[b]	0.029
Bid/ask spread	–0.001	0.900	–0.036	0.702	0.000	0.965
Ln assets	0.007	0.387	–0.005	0.575	0.007	0.127
Ln volume	–0.014[c]	0.068	–0.002	0.797	–0.011[b]	0.017
R^2	0.130		0.340		0.175	
N	37		37		74	
	Dependent variable: Sortino ratio					
Slope	0.046	0.373	0.292[a]	0.006	0.050	0.103
Expense ratio	–0.027	0.397	–0.135[b]	0.033	–0.038[b]	0.019
Bid/ask spread	0.001	0.933	–0.290[b]	0.022	0.001	0.879
Ln assets	0.009	0.191	–0.010	0.372	0.010[a]	0.018
Ln volume	–0.011[c]	0.098	–0.004	0.691	–0.012[a]	0.010
R^2	0.114		0.376		0.356	
N	37		37		74	

Notes: This table presents the results of a cross-sectional regression model via which the return of ETFs is regressed on their expense ratios, the bid/ask spreads, the natural logarithm of assets under management and the natural logarithm of average trading volume. The model is run for active and passive ETFs individually and for the total sample of active and passive ETFs. Various types of returns are used as the dependent variable of the model, which include the average daily absolute return, the buy-and-hold absolute return, the alphas deriving from the single-factor and the multi-factor performance regression models, respectively, the Sharpe ratio, the Treynor ratios based on the single-factor and the multi-factor performance regression models, respectively, and the Sortino ratio. [a]Indicates statistical significance at 1% level; [b]Indicates statistical significance at 5% level; [c]Indicates statistical significance at 10% level. The study period of each ETF pair spans from the latest inception date in each pair, whether this date concerns the active or the passive ETF in the pair, to December 31, 2016 (see Table 1 for inception dates).

4.6 Market timing analysis

This section discusses the regression results on the timing skills of ETF managers. The results of the Treynor and Mazuy (1966) model are reported in Table 7. The alphas, betas and gammas of the model are displayed along with probabilities on the statistical significance of estimates and R-squared used to assess the ability of the model to explain the market timing ability of managers. The table has two panels; one for active ETFs and one for passive ETFs.

Table 7 Market timing regression results – Treynor & Mazuy model

Panel A: Active ETFs							*Panel B: Passive ETFs*						
Ticker	*Alpha*	*Prob.*	*Beta*	*Prob.*	*Gamma*	*Prob.*	R^2	*Ticker*	*Alpha*	*Prob.*	*Beta*	*Prob.*	*Gamma*	*Prob.*	R^2
WBIC	–0.004	0.849	0.523[a]	0.000	–0.041[a]	0.000	0.621	IJH	–0.010	0.154	1.002[a]	0.000	0.003	0.561	0.962
WBID	–0.009	0.679	0.562[a]	0.000	–0.032[a]	0.001	0.601	IJH	–0.010	0.154	1.002[a]	0.000	0.003	0.561	0.962
WBIA	0.003	0.892	0.669[a]	0.000	–0.039[a]	0.000	0.653	IJH	–0.010	0.154	1.002[a]	0.000	0.003	0.561	0.962
WBIB	0.000	1.000	0.651[a]	0.000	–0.033[a]	0.000	0.615	IJH	–0.010	0.154	1.002[a]	0.000	0.003	0.561	0.962
DIVI	–0.045	0.280	0.820[a]	0.000	0.004	0.820	0.251	ACWI	0.002	0.853	1.097[a]	0.000	–0.055[a]	0.000	0.735
WBIG	–0.017	0.321	0.406[a]	0.000	–0.037[a]	0.000	0.535	IVV	0.000	0.944	0.999[a]	0.000	0.000	0.949	0.992
WBIL	0.005	0.737	0.384[a]	0.000	–0.042[a]	0.000	0.527	IVV	0.000	0.944	0.999[a]	0.000	0.000	0.949	0.992
WBIE	–0.007	0.707	0.650[a]	0.000	–0.034[a]	0.000	0.692	IVV	0.000	0.944	0.999[a]	0.000	0.000	0.949	0.992
WBIF	0.017	0.413	0.509[a]	0.000	–0.051[a]	0.000	0.585	IVV	0.000	0.944	0.999[a]	0.000	0.000	0.949	0.992
SMCP	–0.048	0.453	0.747[a]	0.000	–0.015	0.468	0.234	IJR	–0.001	0.834	0.998[a]	0.000	0.003	0.042	0.996
SYLD	–0.001	0.898	1.045[a]	0.000	–0.012[a]	0.005	0.829	IVV	0.002	0.719	0.999[a]	0.000	–0.001	0.583	0.990
FFTY	0.007	0.832	1.090[a]	0.000	–0.023	0.154	0.715	IVV	0.004	0.469	1.003[a]	0.000	0.000	0.804	0.992
VALX	0.051[b]	0.048	0.968[a]	0.000	–0.058[a]	0.000	0.660	IVV	0.004	0.287	1.000[a]	0.000	0.000	0.796	0.992
ARKK	0.022	0.632	0.897[a]	0.000	–0.052[a]	0.009	0.383	IVV	0.004	0.197	1.001[a]	0.000	0.000	0.943	0.992
HECO	–0.064[a]	0.042	0.277[a]	0.000	0.391[a]	0.000	0.105	ACWI	0.007	0.476	1.068[a]	0.000	–0.055[a]	0.000	0.675
ARKG	–0.003	0.966	0.990[a]	0.000	–0.020	0.557	0.287	IVV	0.004	0.197	1.001[a]	0.000	0.000	0.943	0.992
FWDI	0.000	0.989	0.703[a]	0.000	0.016	0.108	0.172	EFA	0.002	0.896	0.890[a]	0.000	0.000	0.947	0.568
AADR	0.023	0.264	0.646[a]	0.000	–0.006	0.302	0.296	EFA	0.000	0.998	0.900[a]	0.000	–0.003	0.637	0.574
IVAL	0.019	0.559	0.781[a]	0.000	–0.006	0.645	0.502	EFV	0.022	0.423	0.864[a]	0.000	–0.018	0.122	0.649

Notes: This table presents the results of the Treynor & Mazuy (1966) Model on the timing ability of ETF managers. The ETFs' daily excess return is regressed on the excess return of their benchmarks and the squared excess returns of benchmarks. The timing ability implies that the managers of ETFs can respond to the movements of the stock market and revise the portfolios they manage in an efficient and timely manner. The timing ability is assessed via the regression's gamma. [a]Indicates statistical significance at 1% level; [b]Indicates statistical significance at 5% level; [c]Indicates statistical significance at 10% level. The study period of each ETF pair spans from the latest inception date in each pair, whether this date concerns the active or the passive ETF in the pair, to December 31, 2016 (see Table 1 for inception dates).

Table 7 Market timing regression results – Treynor & Mazuy model (continued)

Panel A: Active ETFs							*Panel B: Passive ETFs*						
Ticker	*Alpha*	*Prob.*	*Beta*	*Prob.*	*Gamma*	*Prob.*	R^2	*Ticker*	*Alpha*	*Prob.*	*Beta*	*Prob.*	*Gamma*	*Prob.*	R^2
ARKW	0.080[c]	0.066	0.917[a]	0.000	–0.032	0.154	0.392	IVV	0.004	0.218	0.998[a]	0.000	0.000	0.837	0.992
PRME	0.001	0.988	0.498[a]	0.000	0.042	0.109	0.241	REET	–0.029	0.182	1.025[a]	0.000	0.019	0.116	0.876
ARKQ	0.061	0.125	0.866[a]	0.000	–0.068[a]	0.001	0.405	IVV	0.004	0.218	0.998[a]	0.000	0.000	0.837	0.992
PHDG	–0.019[c]	0.059	0.639[a]	0.000	0.004	0.373	0.301	IVV	0.004	0.115	0.998[a]	0.000	–0.001	0.433	0.990
FTHI	0.010	0.691	0.465[a]	0.000	–0.039[b]	0.010	0.186	IVV	0.006[b]	0.027	0.999[a]	0.000	–0.001	0.599	0.991
FWDD	0.033[b]	0.038	0.858[a]	0.000	–0.016[a]	0.002	0.176	IVV	0.000	0.927	0.994[a]	0.000	–0.002[c]	0.069	0.991
SYE	0.042	0.130	0.361[a]	0.000	–0.036[a]	0.010	0.209	IVV	0.006	0.024	0.993[a]	0.000	0.000	0.845	0.991
FTLB	0.048[b]	0.055	0.371[a]	0.000	–0.049[a]	0.001	0.189	IVV	0.006[b]	0.027	0.999[a]	0.000	–0.001	0.599	0.991
SYG	0.043	0.124	0.604[a]	0.000	–0.037[a]	0.005	0.353	IWF	–0.004	0.122	0.998[a]	0.000	–0.003[a]	0.008	0.995
SYV	0.080[b]	0.026	0.457[a]	0.000	–0.073[a]	0.000	0.157	IWD	–0.002	0.572	0.996[a]	0.000	–0.002	0.395	0.990
TTFS	0.010	0.199	0.962[a]	0.000	–0.005	0.227	0.623	IWV	–0.006[b]	0.014	0.997[a]	0.000	–0.001	0.452	0.989
QMOM	–0.017	0.639	0.795[a]	0.000	–0.015	0.523	0.326	IVV	0.000	0.953	1.011[a]	0.000	0.007[a]	0.000	0.990
VAMO	0.018	0.624	0.168[a]	0.000	–0.068[a]	0.002	0.101	IVV	–0.006	0.374	0.997[a]	0.000	0.006[c]	0.076	0.990
HUSE	0.010	0.683	0.651[a]	0.000	–0.014	0.153	0.221	ITOT	–0.013[a]	0.000	0.999[a]	0.000	0.001	0.387	0.976
QVAL	–0.036	0.212	1.000[a]	0.000	0.012	0.347	0.694	IVE	–0.006	0.474	0.996[a]	0.000	0.001	0.782	0.991
EMLP	0.019	0.313	0.672[a]	0.000	–0.018	0.112	0.431	IVV	0.002	0.547	1.002[a]	0.000	–0.001	0.668	0.989
PSR	0.006	0.519	0.846[a]	0.000	–0.003[b]	0.010	0.167	USRT	–0.003	0.640	0.980[a]	0.000	–0.009[a]	0.000	0.856
UTES	0.020	0.601	0.750[a]	0.000	0.014	0.327	0.441	IDU	–0.023	0.206	1.002[a]	0.000	0.005	0.704	0.980
Average	*0.010*	*0.477*	*0.681*	*0.000*	*–0.013*	*0.147*	*0.402*		*–0.001*	*0.443*	*0.995*	*0.000*	*–0.003*	*0.531*	*0.933*

Notes: This table presents the results of the Treynor & Mazuy (1966) Model on the timing ability of ETF managers. The ETFs' daily excess return is regressed on the excess return of their benchmarks and the squared excess returns of benchmarks. The timing ability implies that the managers of ETFs can respond to the movements of the stock market and revise the portfolios they manage in an efficient and timely manner. The timing ability is assessed via the regression's gamma. [a]Indicates statistical significance at 1% level; [b]Indicates statistical significance at 5% level; [c]Indicates statistical significance at 10% level. The study period of each ETF pair spans from the latest inception date in each pair, whether this date concerns the active or the passive ETF in the pair, to December 31, 2016 (see Table 1 for inception dates).

Table 8 Market timing regression results – Henriksson & Merton model

Panel A: Active ETFs							*Panel B: Passive ETFs*						
Ticker	*Alpha*	*Prob.*	*Beta*	*Prob.*	*Gamma*	*Prob.*	R^2	*Ticker*	*Alpha*	*Prob.*	*Beta*	*Prob.*	*Gamma*	*Prob.*	R^2
WBIC	–0.111[a]	0.000	0.471[a]	0.000	0.144[a]	0.005	0.617	IJH	–0.027[a]	0.038	0.986[a]	0.000	0.042	0.125	0.962
WBID	–0.117[a]	0.000	0.517[a]	0.000	0.158[a]	0.007	0.606	IJH	–0.027[a]	0.038	0.986[a]	0.000	0.042	0.125	0.962
WBIA	–0.098[a]	0.005	0.624[a]	0.000	0.131[b]	0.032	0.651	IJH	–0.027[a]	0.038	0.986[a]	0.000	0.042	0.125	0.962
WBIB	–0.094[a]	0.004	0.604[a]	0.000	0.130[b]	0.017	0.614	IJH	–0.027[a]	0.038	0.986[a]	0.000	0.042	0.125	0.962
DIVI	–0.102[c]	0.077	0.759[a]	0.000	0.122	0.266	0.253	ACWI	–0.002	0.907	1.147[a]	0.000	–0.033	0.266	0.724
WBIG	–0.099[a]	0.000	0.375[a]	0.000	0.105[b]	0.019	0.536	IVV	–0.004	0.135	0.993[a]	0.000	0.016[a]	0.000	0.992
WBIL	–0.069[a]	0.009	0.363[a]	0.000	0.082[b]	0.044	0.518	IVV	–0.004	0.135	0.993[a]	0.000	0.016[a]	0.000	0.992
WBIE	–0.118[a]	0.000	0.592[a]	0.000	0.175[a]	0.000	0.693	IVV	–0.004	0.135	0.993[a]	0.000	0.016[a]	0.000	0.992
WBIF	–0.093[a]	0.004	0.485[a]	0.000	0.144[a]	0.008	0.581	IVV	–0.004	0.135	0.993[a]	0.000	0.016[a]	0.000	0.992
SMCP	–0.021	0.840	0.783[a]	0.000	–0.087	0.648	0.234	IJR	0.001	0.881	0.997[a]	0.000	0.003	0.688	0.996
SYLD	–0.010	0.566	1.042[a]	0.000	0.005	0.827	0.829	IVV	–0.003	0.578	0.996[a]	0.000	0.008	0.326	0.990
FFTY	–0.014	0.773	1.097[a]	0.000	0.005	0.953	0.714	IVV	0.000	0.969	1.000[a]	0.000	0.007	0.530	0.992
VALX	–0.027	0.492	0.934[a]	0.000	0.076	0.271	0.655	IVV	–0.007	0.182	0.992[a]	0.000	0.022[a]	0.006	0.992
ARKK	–0.026	0.736	0.892[a]	0.000	0.023	0.859	0.378	IVV	–0.004	0.222	0.993[a]	0.000	0.019	0.011	0.992
HECO	0.040	0.295	0.808[a]	0.000	–0.057	0.409	0.120	ACWI	0.000	0.995	1.097[a]	0.000	–0.022	0.321	0.666
ARKG	0.029	0.780	1.032[a]	0.000	–0.090	0.598	0.286	IVV	–0.004	0.222	0.993[a]	0.000	0.019[b]	0.011	0.992
FWDI	–0.011	0.811	0.676[a]	0.000	0.048	0.539	0.172	EFA	0.038	0.149	0.924[a]	0.000	–0.070	0.115	0.569
AADR	0.088[a]	0.007	0.702a	0.000	–0.138[a]	0.009	0.296	EFA	0.046	0.062	0.943[a]	0.000	–0.094[b]	0.025	0.574
IVAL	0.066	0.249	0.820[a]	0.000	–0.103	0.310	0.502	EFV	0.028	0.554	0.887[a]	0.000	–0.036	0.634	0.642

Notes: This table presents the results of the Henriksson & Merton (1981) Model on the timing ability of ETF managers. The ETFs' daily excess return is regressed on the excess return of their benchmarks and an indicator factor that equals 1 if the benchmark's excess return is positive and zero otherwise. The timing ability implies that the managers of ETFs can respond to the movements of the stock market and revise the portfolios they manage in an efficient and timely manner. The timing ability is assessed via the regression's gamma. [a]Indicates statistical significance at 1% level; [b]Indicates statistical significance at 5% level; [c]Indicates statistical significance at 10% level. The study period of each ETF pair spans from the latest inception date in each pair, whether this date concerns the active or the passive ETF in the pair, to December 31, 2016 (see Table 1 for inception dates).

Table 8 Market timing regression results – Henriksson & Merton model (continued)

Panel A: Active ETFs							*Panel B: Passive ETFs*						
Ticker	*Alpha*	*Prob.*	*Beta*	*Prob.*	*Gamma*	*Prob.*	R^2	*Ticker*	*Alpha*	*Prob.*	*Beta*	*Prob.*	*Gamma*	*Prob.*	R^2
ARKW	0.041	0.531	0.905[a]	0.000	0.035	0.753	0.389	IVV	–0.008[c]	0.098	0.989[a]	0.000	0.024[a]	0.001	0.992
PRME	0.006	0.960	0.492[a]	0.000	0.023	0.893	0.250	REET	–0.009	0.848	1.031[a]	0.000	–0.015	0.813	0.876
ARKQ	–0.015	0.801	0.834[a]	0.000	0.067	0.504	0.399	IVV	–0.008[c]	0.098	0.989[a]	0.000	0.024[a]	0.001	0.992
PHDG	–0.091[a]	0.000	0.565[a]	0.000	0.135[a]	0.000	0.334	IVV	–0.003	0.396	0.995[a]	0.000	0.012[c]	0.071	0.990
FTHI	–0.106[a]	0.004	0.394[a]	0.000	0.172[a]	0.004	0.174	IVV	–0.002	0.597	0.993[a]	0.000	0.013	0.108	0.991
FWDD	0.069[b]	0.017	0.906[a]	0.000	–0.094[c]	0.055	0.169	IVV	–0.006[c]	0.068	0.993[a]	0.000	0.008[c]	0.078	0.991
SYE	0.062	0.171	0.418[a]	0.000	–0.095	0.167	0.207	IVV	0.007[b]	0.037	0.995[a]	0.000	–0.003	0.555	0.991
FTLB	0.030	0.462	0.388[a]	0.000	–0.022	0.750	0.186	IVV	–0.002	0.597	0.993[a]	0.000	0.013	0.108	0.991
SYG	0.073	0.120	0.658[a]	0.000	–0.104	0.192	0.351	IWF	–0.006	0.142	0.999[a]	0.000	0.000	0.997	0.994
SYV	0.096	0.186	0.543[a]	0.000	–0.120	0.287	0.145	IWD	–0.009[b]	0.036	0.992[a]	0.000	0.010[b]	0.018	0.990
TTFS	0.019	0.121	0.974[a]	0.000	–0.024	0.245	0.621	IWV	–0.014[a]	0.001	0.992[a]	0.000	0.012[c]	0.090	0.989
QMOM	–0.033	0.638	0.788[a]	0.000	0.016	0.889	0.323	IVV	–0.021[a]	0.000	0.989[a]	0.000	0.029[c]	0.055	0.990
VAMO	–0.093[c]	0.074	0.134[a]	0.001	0.126	0.143	0.185	IVV	–0.022[b]	0.039	0.984[a]	0.000	0.036[b]	0.011	0.991
HUSE	0.118[a]	0.001	0.761[a]	0.000	–0.221[a]	0.000	0.214	ITOT	–0.022[a]	0.000	0.992[a]	0.000	0.016[a]	0.000	0.976
QVAL	–0.098[b]	0.028	0.938[a]	0.000	0.143[b]	0.050	0.697	IVE	–0.006	0.540	0.997[a]	0.000	0.000	0.977	0.991
EMLP	–0.001	0.980	0.662[a]	0.000	0.019	0.691	0.429	IVV	–0.002	0.464	0.998[a]	0.000	0.010[b]	0.045	0.989
PSR	–0.015	0.392	0.846[a]	0.000	0.030	0.238	0.159	USRT	0.015	0.221	0.965[a]	0.000	–0.065[a]	0.001	0.866
UTES	0.038	0.589	0.742[a]	0.000	–0.007	0.950	0.439	IDU	–0.027	0.280	0.992[a]	0.000	0.018	0.553	0.980
Average	*–0.019*	*0.317*	*0.690*	*0.000*	*0.026*	*0.341*	*0.403*		*–0.005*	*0.294*	*0.994*	*0.000*	*0.005*	*0.214*	*0.933*

Notes: This table presents the results of the Henriksson & Merton (1981) Model on the timing ability of ETF managers. The ETFs' daily excess return is regressed on the excess return of their benchmarks and an indicator factor that equals 1 if the benchmark's excess return is positive and zero otherwise. The timing ability implies that the managers of ETFs can respond to the movements of the stock market and revise the portfolios they manage in an efficient and timely manner. The timing ability is assessed via the regression's gamma. [a]Indicates statistical significance at 1% level; [b]Indicates statistical significance at 5% level; [c]Indicates statistical significance at 10% level. The study period of each ETF pair spans from the latest inception date in each pair, whether this date concerns the active or the passive ETF in the pair, to December 31, 2016 (see Table 1 for inception dates).

In the case of active ETFs, the majority of alphas are statistically insignificant. However, five of them are significantly positive and two are significantly negative. Betas are all significant and just two of them exceed unity implying an aggressive investment philosophy of the respective active ETFs. When it comes to the ability of active ETF managers to efficiently time the market, the relevant results in Table 7 are rather discouraging. The average gamma estimate is negative. Moreover, the majority of the single gammas are negative too, while most of them are statistically significant at 5% or better. Only five estimates are positive but insignificant. Based on these results, we can infer that active ETF managers do not possess any spectacular market timing skill.

In the case of passively managed ETFs, alphas and betas do not deviate from zero and unity, respectively, while the gammas of these funds are rather insignificant. Just five gamma estimates are significantly negative and two are positive. However, the absolute value of these significant estimates is very low. These results lead to the conclusion that the passive ETFs do not time the market. That said, we should point out that, by their nature, passive ETFs are obliged to be fully invested in the underlying indices and, usually, at the same weights. Consequently, the room for passive ETF managers to apply market timing techniques is rather limited. Therefore, in essence, passive ETF managers are not to blame for not displaying material market timing skills.

The results of the Henriksson and Merton (1981) model are shown in Table 8. Once again, the results concerning the above-market returns indicate that, on average, active ETFs are not capable of producing any material excess return relative to the market. There are only three alphas that are positive and statistically significant. Betas of active ETFs are similar to those derived from the Treynor and Mazuy (1966) model. Interestingly enough, the results on gammas are somehow different to those obtained from the model of Treynor and Mazuy (1966). In particular, there are 11 gamma estimates which are significantly positive and just two which are significantly negative. The rest estimates are not indistinguishable from zero. Based on these results, we can infer that some active ETF managers may possess a level of market timing expertness.

In the case of passive ETFs, alphas and betas are, more or less, similar to those obtained from the previous model. On the other hand, contrary to the Treynor and Mazuy (1966) model, 15 gamma estimates are positive and significant in statistical terms, indicating that these funds apply successful market timing techniques. Given the passive nature of these ETFs, we could possibly assume that market timing implies that passive ETF managers are successful in adapting their portfolios to the rebalances made to the synthesis of the underlying index without delays or, ideally, beforehand, that is, before the deletion from or the addition of a stock to an index before it actually takes place.

The outcomes of the third model used to evaluate the market timing skills of ETF managers are displayed in Table 9. We remind that the main difference of this model from the previous two is that this model further includes a cubic excess-market return component, seeking to capture the response of ETF managers to the market volatility.

Alphas, betas and gammas of active ETFs are similar to those derived from the Treynor and Mazuy (1966) model. In particular, the majority of active ETFs' alphas are insignificant, betas are lower than unity, and gammas, with just one exception, are either significantly negative or insignificant. When it comes to the factor relating to the market volatility, the average delta is negative, indicating that the active ETF managers, on average, fail to time the volatility of the market. This failure is verified by the majority of single deltas, which are significantly negative (19 out of 37 estimates) or insignificant (15 estimates).

Table 9 Market timing regression results – Jagannathan & Korajczyk model

Panel A: Active ETFs										*Panel B: Passive ETFs*									
Ticker	*Alpha*	*Prob.*	*Beta*	*Prob.*	*Gamma*	*Prob.*	*Delta*	*Prob.*	R^2	*Ticker*	*Alpha*	*Prob.*	*Beta*	*Prob.*	*Gamma*	*Prob.*	*Delta*	*Prob.*	R^2
WBIC	0.006	0.778	0.589[a]	0.000	–0.056[a]	0.000	–0.019[a]	0.000	0.626	IJH	–0.009	0.183	1.005[a]	0.000	0.002	0.804	–0.001	0.818	0.962
WBID	0.006	0.804	0.649[a]	0.000	–0.055[a]	0.000	–0.021[a]	0.002	0.610	IJH	–0.009	0.183	1.005[a]	0.000	0.002	0.804	–0.001	0.818	0.962
WBIA	0.014	0.546	0.748[a]	0.000	–0.059[a]	0.000	–0.022[a]	0.000	0.661	IJH	–0.009	0.183	1.005[a]	0.000	0.002	0.804	–0.001	0.818	0.962
WBIB	0.006	0.809	0.679[a]	0.000	–0.042[a]	0.000	–0.008[c]	0.054	0.616	IJH	–0.009	0.183	1.005[a]	0.000	0.002	0.804	–0.001	0.818	0.962
DIVI	–0.023	0.585	0.916[a]	0.000	–0.040	0.145	–0.031[a]	0.005	0.263	ACWI	0.000	0.982	1.090[a]	0.000	–0.049[a]	0.000	0.002	0.479	0.732
WBIG	–0.014	0.445	0.455[a]	0.000	–0.044[a]	0.000	–0.012[c]	0.070	0.547	IVV	0.000	0.817	0.997[a]	0.000	0.000	0.895	0.001	0.349	0.992
WBIL	0.009	0.611	0.421[a]	0.000	–0.048[a]	0.000	–0.009[b]	0.020	0.535	IVV	0.000	0.817	0.997[a]	0.000	0.000	0.895	0.001	0.349	0.992
WBIE	–0.004	0.833	0.703[a]	0.000	–0.042[a]	0.000	–0.013[a]	0.001	0.695	IVV	0.000	0.817	0.997[a]	0.000	0.000	0.895	0.001	0.349	0.992
WBIF	0.021	0.332	0.581[a]	0.000	–0.059[a]	0.000	–0.015[a]	0.002	0.595	IVV	0.000	0.817	0.997[a]	0.000	0.000	0.895	0.001	0.349	0.992
SMCP	–0.054	0.452	0.692[a]	0.000	–0.008	0.751	0.011	0.358	0.236	IJR	–0.001	0.701	0.996[a]	0.000	0.003[b]	0.039	0.000	0.613	0.996
SYLD	–0.004	0.723	1.070[a]	0.000	–0.008	0.171	–0.013[a]	0.000	0.833	IVV	0.001	0.750	0.995[a]	0.000	0.000	0.870	0.001	0.252	0.990
FFTY	0.011	0.725	1.172[a]	0.000	–0.036[c]	0.051	–0.018	0.014	0.718	IVV	0.004	0.493	0.998[a]	0.000	0.000	0.960	0.001	0.207	0.992
VALX	0.054	0.056	1.044[a]	0.000	–0.065[a]	0.002	–0.022[b]	0.050	0.667	IVV	0.004	0.329	0.999[a]	0.000	0.001	0.689	0.000	0.629	0.992
ARKK	0.026	0.594	0.977[a]	0.000	–0.060[b]	0.019	–0.021[c]	0.083	0.388	IVV	0.004	0.201	1.000[a]	0.000	0.000	0.839	0.000	0.771	0.992
HECO	–0.020	0.347	0.841[a]	0.000	0.155[a]	0.000	–0.157[a]	0.000	0.112	ACWI	0.006	0.580	1.063[a]	0.000	–0.050[a]	0.000	0.002	0.532	0.673
ARKG	–0.002	0.976	1.018[a]	0.000	–0.023	0.510	–0.007	0.676	0.288	IVV	0.004	0.201	1.000[a]	0.000	0.000	0.839	0.000	0.771	0.992
FWDI	0.004	0.888	0.718[a]	0.000	0.010	0.455	–0.003	0.400	0.173	EFA	–0.003	0.845	0.872[a]	0.000	0.009	0.268	0.005[b]	0.033	0.569
AADR	0.015	0.506	0.604[a]	0.000	0.007	0.413	0.008[a]	0.000	0.296	EFA	–0.006	0.685	0.877[a]	0.000	0.008	0.281	0.006[a]	0.007	0.574
IVAL	0.031	0.374	0.795[a]	0.000	–0.017	0.239	–0.002	0.723	0.503	EFV	0.009	0.746	0.846[a]	0.000	0.002	0.888	0.004	0.320	0.649

Notes: This table presents the results of the Jagannathan & Korajczyk (1986) Model on the timing ability of ETF managers. The ETFs' daily excess return is regressed on the excess return of their benchmarks and the squared and cubic excess returns of benchmarks. The timing ability implies that the managers of ETFs can respond to the movements of the stock market and revise the portfolios they manage in an efficient and timely manner. The timing ability is assessed via the regression's gamma whereas delta coefficient assessed the ability of managers to time the volatility of stock market. [a]Indicates statistical significance at 1% level; [b]Indicates statistical significance at 5% level; [c]Indicates statistical significance at 10% level. The study period of each ETF pair spans from the latest inception date in each pair, whether this date concerns the active or the passive ETF in the pair, to December 31, 2016 (see Table 1 for inception dates).

Table 9 Market timing regression results – Jagannathan & Korajczyk model (continued)

Panel A: Active ETFs										*Panel B: Passive ETFs*									
Ticker	*Alpha*	*Prob.*	*Beta*	*Prob.*	*Gamma*	*Prob.*	*Delta*	*Prob.*	R^2	*Ticker*	*Alpha*	*Prob.*	*Beta*	*Prob.*	*Gamma*	*Prob.*	*Delta*	*Prob.*	R^2
ARKW	0.081[c]	0.068	0.985[a]	0.000	–0.037	0.146	–0.020	0.201	0.397	IVV	0.004	0.239	0.994[a]	0.000	0.000	0.974	0.001	0.246	0.992
PRME	0.010	0.877	0.461[a]	0.000	0.030	0.240	0.017	0.321	0.250	REET	–0.024	0.348	1.077[a]	0.000	–0.007	0.650	–0.016[b]	0.056	0.877
ARKQ	0.065	0.107	0.910[a]	0.000	–0.076[a]	0.001	–0.012[c]	0.061	0.407	IVV	0.004	0.239	0.994[a]	0.000	0.000	0.974	0.001	0.246	0.992
PHDG	–0.007	0.532	0.707[a]	0.000	–0.036[a]	0.000	–0.031[a]	0.000	0.370	IVV	0.002	0.518	0.995[a]	0.000	–0.001	0.581	0.001	0.207	0.990
FTHI	0.013	0.636	0.505[a]	0.000	–0.050[b]	0.010	–0.015	0.143	0.186	IVV	0.005[c]	0.060	0.997[a]	0.000	–0.001	0.757	0.000	0.550	0.992
FWDD	0.038[b]	0.024	0.869[a]	0.000	–0.025[a]	0.001	–0.003	0.151	0.177	IVV	–0.001	0.748	0.993[a]	0.000	–0.001	0.465	0.000	0.172	0.991
SYE	0.042	0.125	0.330[a]	0.000	–0.031[b]	0.041	0.010	0.112	0.211	IVV	0.005[c]	0.074	0.989[a]	0.000	0.000	0.905	0.001[b]	0.029	0.991
FTLB	0.047[c]	0.068	0.339[a]	0.000	–0.043[a]	0.005	0.011	0.166	0.188	IVV	0.005[c]	0.060	0.997[a]	0.000	–0.001	0.757	0.000	0.550	0.992
SYG	0.043	0.127	0.555[a]	0.000	–0.031[b]	0.022	0.013[b]	0.027	0.355	IWF	–0.004	0.130	0.993[a]	0.000	–0.002	0.446	0.001	0.149	0.995
SYV	0.080[b]	0.045	0.456[a]	0.000	–0.073[a]	0.002	0.000	0.966	0.157	IWD	–0.002	0.522	0.996[a]	0.000	–0.002	0.472	0.000	0.858	0.990
TTFS	0.010	0.205	0.976[a]	0.000	–0.006	0.141	–0.005[a]	0.009	0.627	IWV	–0.007[a]	0.012	1.001[a]	0.000	–0.001	0.629	–0.001	0.184	0.989
QMOM	0.010	0.802	0.875[a]	0.000	–0.086[b]	0.024	–0.047[a]	0.005	0.334	IVV	–0.001	0.822	1.008[a]	0.000	0.009[a]	0.000	0.001	0.381	0.990
VAMO	0.020	0.583	0.185[a]	0.000	–0.073[a]	0.001	–0.006	0.680	0.102	IVV	–0.004	0.548	1.005[a]	0.000	0.003	0.401	–0.002	0.254	0.990
HUSE	0.003	0.906	0.602[a]	0.000	0.005	0.717	0.018[a]	0.002	0.219	ITOT	–0.014[a]	0.000	1.005[a]	0.000	0.001	0.340	–0.002[a]	0.001	0.976
QVAL	–0.030	0.321	1.067[a]	0.000	–0.002	0.902	–0.019[c]	0.070	0.699	IVE	–0.008	0.377	0.993[a]	0.000	0.003	0.518	0.001	0.534	0.991
EMLP	0.019	0.318	0.661[a]	0.000	–0.017	0.170	0.004	0.488	0.431	IVV	0.002	0.560	1.000[a]	0.000	–0.001	0.793	0.001	0.502	0.989
PSR	0.015	0.123	0.893[a]	0.000	–0.014[a]	0.000	–0.002[a]	0.000	0.348	USRT	–0.017[b]	0.011	0.981[a]	0.000	0.004[a]	0.000	0.000[b]	0.016	0.862
UTES	0.022	0.569	0.759[a]	0.000	0.010	0.617	–0.003	0.781	0.441	IDU	–0.025	0.176	0.993[a]	0.000	0.009	0.615	0.003	0.715	0.980
Average	*0.015*	*0.482*	*0.724*	*0.000*	*–0.028*	*0.157*	*–0.012*	*0.179*	*0.412*		*–0.003*	*0.431*	*0.993*	*0.000*	*–0.001*	*0.615*	*0.000*	*0.403*	*0.933*

Notes: This table presents the results of the Jagannathan & Korajczyk (1986) Model on the timing ability of ETF managers. The ETFs' daily excess return is regressed on the excess return of their benchmarks and the squared and cubic excess returns of benchmarks. The timing ability implies that the managers of ETFs can respond to the movements of the stock market and revise the portfolios they manage in an efficient and timely manner. The timing ability is assessed via the regression's gamma whereas delta coefficient assessed the ability of managers to time the volatility of stock market. [a]Indicates statistical significance at 1% level; [b]Indicates statistical significance at 5% level; [c]Indicates statistical significance at 10% level. The study period of each ETF pair spans from the latest inception date in each pair, whether this date concerns the active or the passive ETF in the pair, to December 31, 2016 (see Table 1 for inception dates).

The results of passive ETFs are similar to those described in Table 7. Alphas are insignificant, betas approximate unity and gammas are insignificant. Insignificant are the delta estimates too, indicating the inability of passive ETF managers to protect their portfolios from the turbulence in the underlying markets. However, this is a key element when going passive, namely, a passive investment tracks the upswings of the market but is vulnerable to the descending movements of the market, especially when downfalls are sharp and sound.

A summary of the results of our regression analysis on the ability of active and passive ETFs to apply efficient market timing techniques could be that the both ETF types actually fail to do so. The majority of the relevant estimates indicate that both active and passive ETFs fail to predict the upwards or the downward movements of the market [with the exception of the results from the Henriksson and Merton (1981) model, which say that some active and passive ETFs can do so]. They also fail to adjust their portfolios in response to market volatility. This finding comes as no surprise in the case of passive ETFs. In the case of active ETFs, the failure to apply efficient market timing is not surprising either, given the findings of the previous literature on this subject. However, one could expect that after their first years, the trading experience amassed to active ETF managers over the last nine years would help them be more efficient market timers.

5 Conclusions

This study is an expansion to our previous work on actively managed ETFs and offers new empirical insights with respect to the question of whether active management can add value for investors. Standard research issues are examined for a sample of 37 pairs of active and passive ETFs. The issues investigated concern the performance of these funds and the ability of active funds to beat the market and/or the passive peers. We also assess the relation of performance with some key trading features of ETFs, namely expenses, size and tradability. Finally, the capability of managers to apply efficient market timing techniques is evaluated too.

The results obtained are in line with those in the previous studies on actively versus passively managed ETF products. In particular, in most of the cases, active ETFs cannot beat the benchmarks or their passive counterparts. In addition, the majority of active ETFs are more volatile than the passive ones in terms of total risk but less risky when systematic risk is considered. Furthermore, we detected some cases in which active ETFs are performing better than the passive peers, also being less volatile than them. The latter finding indicates that investing in active ETFs is not a lost cause beforehand. On the contrary, one could incorporate active ETFs in an overall investment portfolio to mitigate risk and, possibly, enhance performance.

In a multifactor performance regression analysis, we verify that the both ETF types cannot achieve any material above-market return and that active ETFs are less aggressive than the passive ETFs in systematic risk terms. Moreover, we found that the relation of performance of the active and passive ETF groups with the size factor is positive. However, there is not an one-direction impact on performance by the value, momentum, CMA and RMW factors, as a wide variation between negative and positive estimates is observed.

When it comes to the trading features of ETFs and their possible impact on the performance of active and passive ETFs, the applied cross-sectional regression analysis provides strong evidence that performance is negatively related to expenses and volume but positively to the size of funds, as it is expressed by the magnitude of the assets entrusted to them. The first two findings live up to our expectations. However, the positive relationship between performance and assets stands as a contradiction to the common belief among academics that the performance of a fund is a reverse function of the assets invested in it.

Finally, as far as the market timing is concerned, the results verify the existing findings in the literature which show that the ETF managers fail to time the market [with the exception of the Henriksson and Merton (1981) model, which shows that some active and passive ETFs can apply efficient market timing]. The ETF managers cannot time market volatility either. The finding do not surprise us in the case of passive ETFs. However, in the case of active ETFs, we expected that, after about nine years in the business, active ETF managers would be more experienced and able to respond to the ascending and descending trends of the stock markets.

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Notes

1 Among hundreds of empirical academic studies against active portfolio management, one may refer to Malkiel (2005) and Fama & French (2010) for evidence on the failure of active managers to outperform the market and produce a consistent alpha.

2 The numbers of active ETFs are from the report "Actively-managed ETFs on track to lure more fund flows" published by Stephen Foley on the website of Financial Times on December 15, 2016.

3 Meziani (2015) provides two diagrams showing the growth in the number of active ETFs and the assets entrusted to them since their launch in 2008 and up to 2015. The author also describes several issues that halted the flourish of active ETFs during the early years of their operation.

4 Based on the report "Assets invested in ETFs/ETPs listed in U.S. reach record $2.471 trillion by November 2016" by Deborah Fuhr (http://www.nasdaq.com/article/assets-invested-in-etfsetps-listed-in-us-reach-record-2471-trillion-by-november-2016-cm724412).

5 Refer to "Active ETFs – a new arena for asset managers in Asia?" at: http://www.gbm.hsbc.com/insights/growth/active-etfs-a-new-arena-for-asset-managers-in-asia.

6 Refer to "Biggest Active ETFs By Asset Class" at: http://www.etf.com/sections/features-and-news/biggest-active-etfs-asset-class?nopaging=1.

7 We have also calculated the absolute returns with dividend-adjusted trade price data without returns differing significantly from the dividend-free returns. For simplicity purposes, we only report the returns which are not adjusted for dividends.

8 We note that the passively managed ETFs track specific market indices, which are defined in their prospectuses. On the other hand, active ETFs release "summary fact" documents which report their performance in comparison to specific indices. These indices have been considered in assembling the pairs of active and passive ETFs to be examined in this study.

9 The holding period considered for each single ETF varies. Specifically, the period assessed for each ETF spans up to December 31, 2016 but the starting date of each ETF's buy-and-hold strategy differs depending on the date of the launch of each ETF.

10 Passively managed ETFs track a specific market index, and, to a large extent, their performance can, usually, be explained by the return of the underlying index. Active ETFs also refer to a market index. Therefore, we start the regression analysis by assessing whether their benchmark is sufficient enough to explain performance. Then, the multifactor analysis is applied trying to identify other standard markets factors which could contribute to performance explanation.

11 Big means that a firm is above the median market cap on the NYSE at the end of the previous day while small firms are below the median NYSE market cap.

12 The historical daily data of risk-free rate, Fama and French three factors, momentum factor, RMW factor and CMA factor are available on the website of Kenneth French on http://mba.tuck.dartmouth.edu/pages/faculty/ken.french/data_library.html.

13 Refer to Edelen et al. (2013) for a recent study on mutual funds' trading costs and performance.

14 The tickets, names, inception dates, expense ratios and bid/ask spread have been found on etf.com. Benchmarks have been found in the prospectuses of ETFs. The volumes and trading frequencies have been computed with data found on Nasdaq.com.

15 As shown in Table 1, it happens that an active and a passive ETF comprising a pair have no common inception dates to each other. In this case, the starting point of the study period is the latest of the two dates.

16 Full replication can also explain why the R-squares of active ETFs differ significantly from those of passive ETFs. As we will see, this is the case for the multi-factor performance regressions analysis too.

17 We note that we have also performed all the cross-sectional regressions above adding to the model a dummy variable with a value of one for active ETFs and zero for passive ETFs. The estimates of the dummy variable are insignificant in all cases. The same applies to most of the estimates of the explanatory variables.