ERASMUS UNIVERSITY ROTTERDAM
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The Rise of the Active Exchange Traded Fund

A performance analysis of a new phenomenon

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Preface and Acknowledgements

Exchange Traded Funds (ETFs) are still an unfamiliar product for most private investors. For me, as student, it was a whole new territory. I was intrigued to this subject owing to the news of the acquisition of Barclays Global Investors by BlackRock on June 12th, 2009. One of the business units of BGI was iShares, the world's largest issuer of ETFs. Thanks to this acquisition, BlackRock has become the biggest asset manager. Furthermore, it was assumed that the influence of BlackRock would entail the issuance of active ETFs by iShares and, moreover, BlackRock could compete with its arch-rival, Pacific Investment Management Company (PIMCO), in the exchange traded fixed income market. At this moment it is unsure how the recent developments will crystallize out, but it is certain that in the next period the new frameworks for (investment) banking, asset management and risk management will be founded. Exchange Traded Funds could be a leading edge in the response to the ongoing debate about bonuses, management fees and other expenses.

Finally, I am greatly indebted to my supervisor, Professor Willem Verschoor, for his insights and remarks to improve this master thesis.

> *"Most investors, both institutional and individual, will find that the best way to own common stocks is through an index fund that charges minimal fees. Those following this path are sure to beat the net results (after fees and expenses) delivered by the great majority of investment professionals."*
>
> - Warren Buffett's 1997 Investment Letter to the Shareholders of Berkshire Hathaway

Floris Vossestein, 19 January 2010

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Abstract

This thesis analyses the performance of actively-managed Exchange Traded Funds. Active ETFs are a new phenomenon and they were only incepted in April 2008. Besides pioneering research on this new product this thesis adds to the existing literature on the ongoing debate about active vs. passive management. The sample covers the period May 2008 till October 2009 and five active ETFs are examined. The empirical results uncover that, as endorsed by results from the mutual fund industry, active ETFs do underperform both their corresponding passive ETFs and their underlying benchmarks. The risk-adjusted performance, as expressed by Jensen's alpha, indicates no significant excess returns for both active and passive ETFs, which is an expectable conclusion for the latter, but not for the active ETFs, who aim to beat the market. A rating performance analysis shows that active ETFs have a worse performance than their passive equivalents; however these results are not unanimous. Finally, the tracking error of active ETFs is, as expected, higher than the tracking error of its passive counterparts. Actively-managed ETFs do not try to replicate the performance of their underlying benchmark.

JEL classifications: *G11, G15*

Keywords: *exchange traded funds, performance evaluation,* and *market trend*

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1. Introduction

> *"If you just look at the mutual fund industry, 85% of the assets are active and only 15% are passive on the retail level. We tend to think that there's going to be a lot of interest in the actively managed ETFs when, and if, they come around."*
> *- Bruce Bond, Founder and CEO of PowerShares in an interview in December 2007*[1]

Exchange Traded Funds (hereafter ETFs) are one of the innovative new products that were invented by the financial industry in the last two decades. The central idea behind the development of ETFs was to trade an entire portfolio in a single transaction. The first developments and breakthroughs were realized in the late 1970s and early 1980s, when program trading made it possible to trade bundles of different stocks. Subsequently, futures products on whole indices (e.g. S&P 500 Index) were launched until the regulatory bodies (i.e. CFTC) claimed that these products should not trade on a stock exchange.

Finally, in 1993 the first 'real' ETF was launched in the United States, the SPDR. The SPDR (pronounced "spider"), which tracks the performance of the S&P 500 Index, was developed by the AMEX® and it is structured as a unit investment trust. Thereupon more ETFs were launched and especially in the first decade, between 1993 and 2000, the growth in number of and amount of assets in ETFs was relatively high, but still the product was not yet a widespread phenomenon. Only the last few years ETFs have gained in popularity among a wide group of investors. Figures by the Investment Company Institute (2009)[2] support this trend[3] and even institutional investors are increasingly investing in ETFs in the aftermath of the financial crisis in 2008.[4]

ETFs have made available a lot of new investment opportunities. Investors can obtain exposure to stock market indices of different countries, regions (e.g. emerging economies), industry sectors and styles through a single product. Besides equity also fixed income, currency and commodity indices are available as an ETF. ETFs are open-end index funds that are listed and traded on the stock exchange.[5]

ETFs own some characteristics that make them valuable alternatives for futures, portfolios of shares, synthetic derivative portfolios and open-end index mutual funds. Their listing on a stock exchange

[1] SeekingAlpha, December 14, 2007: see the appendix for the full link.
[2] 2009 Investment Company Fact Book - A Review of Trends and Activity in the Investment Company Industry
[3] The Compounded Annual Growth Rate (CAGR) in the number of ETFs between 1993 and year-end 2008 is 51 percent, and the corresponding CAGR in assets under management is 55 percent. Index mutual funds in the U.S. exhibited a lower CAGR in the total number of funds (+11 percent) and assets under management (+21 percent) over the period 1993 – 2008.
[4] FondsNieuws, November 23, 2009: see the appendix for the full link.
[5] The Securities and Exchange Commission defines ETFs as investment companies that are legally classified as open-end companies or Unit Investment Trusts (UITs), but that differ from traditional open-end companies and UITs in several respects: (see *www.sec.gov/answers/etf.htm* for the full list). Thus, closed-end funds, Holding Company Depository Receipts (HOLDRS) and notes, sometimes mistakenly referred to, are not ETFs.

provides the ability to trade and settle intraday (flexibility), thereby increasing the liquidity and the possibility to carry out short-term investment strategies. Secondly, ETFs generally have a lower expense ratio (TER) than equivalent passive mutual funds. However, investors should be aware that ETFs are traded through a brokerage firm who charges a certain trading fee. Furthermore, ETFs allow the investor to compose its own diversification strategy by investing in broad market indices or by combining several niche markets (e.g. BRIC, gold, mining industry) and a broad index in a core-satellite approach. Finally, ETFs are more tax efficient, because their in-kind creation and redemption of shares does not create a tax event in the United States.

Active ETFs were introduced in 2008, after the Securities and Exchange Commission (SEC) granted an exemption to the Investment Company Act of 1940, the law which governs investment companies in the U.S. Fund sponsors could offer fully transparent active ETFs, but they were obliged to several requirements. For instance, the ETFs must disclose the identities and weightings of all assets held by the ETF on a daily (trading days) basis and this information must be readily accessible on their public website.

The central idea behind actively-managed ETFs is to combine the best of both worlds. The transparency, cost effectiveness, flexibility, diversification and liquidity from the traditional passive trackers, but acquiring the option to outperform the benchmark and generate alpha. To beat the benchmark the manager can overweigh or underexpose certain positions.

Actively-managed ETFs are a rather new phenomenon and the existing literature does not cover any research on the performance of active ETFs. In a working paper on the Social Science Research Network (SSRN), Rompotis (2009a) is the first to investigate the performance of these new ETFs. Nonetheless, the performance of mutual funds has been extensively discussed and in addition, passive ETFs have been investigated. In conclusion, our study will add to the existing point of views in the actively managed versus passively managed debate and it will expand the discovery work of the characteristics of ETFs.

Prior work, in the field of the mutual fund industry by Blake et al. (1993), Malkiel (1995) and Gruber (1996), shows that actively-managed funds do generally not outperform the market indices or their passively-managed equivalents. Some newer studies, by Harper et al. (2006) and Rompotis (2009a), take ETFs or closed-end funds (CEFs) into account and they conclude as well that a passive strategy is superior to an active strategy when looked at the risk-return relationship.

Index mutual funds and passive ETFs both try to replicate the return and risk of an underlying benchmark at the lowest cost possible. Poterba & Shoven (2002) and Rompotis (2008, 2009b) show that

the returns or risk between both alternatives does not differ significantly and both investment vehicles underperform their corresponding benchmark index. Agapova (2009) finds that their coexistence can be explained by a 'clientele' effect. Moreover, Guedj & Huang (2008) reach a similar conclusion when they address liquidity-need and risk-averseness of the investor. Finally, some older studies, by Elton et al. (2002) and Gastineau (2004), find that the performance of passive ETFs is lower than the performance of index mutual funds. However, the main cause lies in the non-reinvestment of dividends, a restriction that was lifted by the SEC recently.

Some of the characteristics of ETFs have been explored by Bernstein (2002), Engle & Sarkar (2006) and Aber, Li & Can (2009). One of the main issues is the overvaluation of ETFs. ETFs sell at a premium to their Net Asset Value (NAV). This behaviour is more observed for international ETFs as opposed to domestic (U.S.) ETFs. Johnson (2009) and Rompotis (2006) look at the tracking error and they find that (besides the expected expense ratios) it is affected by trading volume, the premium on the NAV and the difference in trading hours.

Active ETFs are not yet widespread investment vehicles and therefore this paper adds to the emerging literature on actively-managed ETFs by expanding the comparison between active and passive ETFs. A working paper by Rompotis (2009a) analyses three active ETFs over a six-month period. In our study we expand this time series and we investigate among other things the performance under different market trends (bull or bear market). Furthermore, like Rompotis (2009a), we focus only at the currently trading active ETFs that are listed in the United States.

Rompotis (2009a) finds that actively-managed ETFs underperform both the equivalent passive ETFs as well as their benchmark indices. The rating performances, like for instance Sharpe and Treynor, are inferior if compared to their passive counterparts and moreover, the tracking errors of active ETFs are higher. These results are in line with prior studies and we expect to reach the same conclusions over a longer time interval.

Our results show that active ETFs exhibit generally a lower average daily return than their passive equivalents and benchmark indices. Furthermore, if the level of risk is taken into account, the risk-adjusted performance analysis indicates that both active and passive ETFs fail to provide investors with positive excess returns. Because our time series covers the financial crisis of 2008 and consequently an intensified volatility we have split our sample in two distinctive periods, called bear and bull respectively, with the bottom of the market as turning point. However, this does not change the common conclusions that were derived from the full sample. Secondly, we calculate several performance ratings (e.g. Sharpe, Treynor). However, the aforementioned underperformance by active

ETFs is not unanimous in this analysis. Total Returns exhibit the most resemblances among our results, indicating that active ETFs deliver a poorer performance than their passive equivalents. The only exception is the real estate active ETF. Finally, our last analysis directs at tracking error. Our figures are in line with the expected results, that the tracking error for actively-managed ETFs is higher than for its passive equivalents. Moreover, these conclusions do no change when taking into account different market trends.

In conclusion, our empirical results about the performance of actively-managed ETFs are in line with prior work of Rompotis (2009a). Furthermore, we endorse the results of other studies that focus on the active vs. passive management debate, but use mutual fund data instead.

Further research may focus on a direct comparison between active ETFs and actively-managed mutual funds. ETFs mainly address the narrower and less liquid indices or portfolios, as a consequence, at the moment it is not (yet) possible to match an active ETF with an actively-managed mutual fund which are subject to the same benchmark. ETFs have to disclose their holdings on a daily basis, whereas mutual funds are obliged to file their portfolio holdings every three months. It is worthwhile to analyse whether this policy makes it possible for an active ETF to generate the same alpha as a conventional mutual fund. The transparency policy of an ETF can make it conceivable that the most successful portfolio managers are less inclined to manage an ETF, because their strategy to generate consistent alphas is showed to the world. Future research will shed light on these remaining questions.

The remainder of this paper is organized as follows. In Section 2 we will give an overview of the ETF industry at present and we will discuss the differences between active and passive ETFs as well as recent developments in the market. Chapter 3 is providing insight into the most recent developments in the market. Section 4 will present an exposition of the current literature on exchange traded funds, comparable prior research on the mutual fund industry and performance measurement techniques. Our data and some descriptive statistics can be found in Section 5 whereupon the methodology is described in chapter 6. Ultimately our empirical results will be presented in Section 7 and Section 8 will summarize and conclude.

2. An overview of the ETF industry

2.1 The rise of Exchange Traded Funds[6]

> *"Buy index funds and ETFs. That might not seem like enough action to a 25-year-old, but it's the smartest thing to do."* [7]
> *- Charles R. Schwab, founder and former CEO of the Charles Schwab Corporation*

ETFs are considered to be the leading financial innovation of the last twenty years. The central idea behind the development of ETFs was to trade an entire portfolio in a single transaction. In the late 1970s and early 1980s the innovation of program trading made it possible to trade, for instance, all the stocks in the S&P 500. Furthermore, the Chicago Mercantile Exchange introduced S&P 500 index futures contracts (April 21, 1982), which made arbitrage between the portfolio price and futures price available. The result of these innovations was that portfolio trading, either in cash or in futures, was an attractive activity for trading desk and institutional investors.

However, private, small investors could not yet benefit from these developments. The futures contracts had a relatively large notional value ($250 x futures price) and even the introduction of "mini" contracts ($50 x futures price) did not solve all inefficiencies for an individual investor. The margin requirements still made it a relatively expensive product. There was a demand for a security, quoted on the stock exchange and regulated by the Securities and Exchange Commission (SEC), which could be used by individual investors. The Index Participation Shares (IPSs) were the first to be invented.

Index Participation Shares (IPSs) are the predecessor of the ETF. IPSs started trading in 1989 on both the Philadelphia Stock Exchange (PSE) and the American Stock Exchange (AMEX). Especially the S&P 500 IPS was a very popular investment instrument. The Chicago Mercantile Exchange and the Chicago Futures Trading Commission filed a lawsuit arguing that IPSs were futures contracts and as such they should not be traded on a security exchange. A federal court put a stop to their use and investors were demanded to liquidate their positions.

While the United States was looking for an alternative to replace the IPSs, the Canadian Toronto Stock Exchange (TSE) began trading a similar product called Toronto Stock Exchange Index Participations (TIPs).[8] The TIPs drew substantial amounts of money into Canada from international index investors. A

[6] The history discussion about ETFs is based on the work of Gary L. Gastineau in chapter 22 "Exchange Traded Funds and Their Competitors" in the Handbook of Financial Instruments (2002) – edited by Frank J. Fabozzi Furthermore, product data and descriptions were derived from the sponsor's website, like for example www.spdrs.com, www.sectorspdr.com, www.ishares.com and www.powershares.com. Appendix A.1 provides a more extensive list.
[7] Money Magazine, July 6, 2007: see the appendix for the full link.
[8] The abbreviation TIPs should not be misinterpret as TIPS; Treasury Inflation-Protected Securities

unique characteristic was the low expense ratio. At some points in time the expense ratio was actually negative. This was caused by the ability of the trustee (here: State Street Bank) to lend the stock in the TIPs portfolio (TSE 35 index and TSE 100 index) to other investors and sometimes the demand for stock loans on shares of large companies in Canada was at a considerable level. Contrary to the efficiency for the investor the TIPs emerged to be costly for TSE and subsequently the decision to stop offering TIPs and to liquidate all open positions was made early in 2000. Alternatively, investors were offered to roll into a Barclays Global Investors (BGI) 60 stocks index, but many declined.

In the mean time, two new portfolio share products were invented in the United States: Supershares and Standard & Poor's Depository Receipts or SPDRs. The first were too complex for customers and Supershares never traded actively. In short, Supershares[9] were developed by Leland, O'Brien, Rubinstein Associates (LOR) and they were structured as a trust and a mutual fund. Supershares were an advanced product, its structure allowed to divide the product in various components, some of them with option characteristics, but its complexity and the high costs (compensation fee for the creators and sponsors) made that the trust was liquidated in 1996.

The SPDRs (pronounced: 'spiders') were developed by AMEX and they are structured as a unit trust. This unit investment trust holds an S&P 500 portfolio and its shares are listed on the stock exchange. A difference between conventional unit trusts is that the portfolio of the SPDR could be changed as the underlying index changes. Originally a unit investment trust offers an unmanaged (fixed) portfolio for a bound lifetime. With the experience of Supershares in memory the AMEX was uncertain of the demand from investors and the simplicity and relatively low costs of a unit trust made it unnecessary to roll out a costly infrastructure.

The trading volumes and asset size for SPDRs were respectable, but it would take years before the asset growth would be truly exponential. SPDRs were relatively simple, but more complex than the previous launched Index Participation Shares. The process of share creation and redemption was too complicated for laymen, but once they recognized the investment characteristics and tax efficiency the demand went through the roof. In fact, the S&P 500 SPDR (NYSE:SPY) is the second biggest index fund with almost 90 billion dollar in market capitalization (November 3, 2009). Its superior, the Vanguard 500 Index, is a mutual fund with total net assets of 135 billion dollar (September 30, 2009).

[9] Supershares are sometimes referred to as SuperTrust. The original idea of supershares was developed by Hakansson (1976), who explored the idea of a new financial instrument (Purchasing Power Fund) made up of supershares that provided payoffs only for a pre-specified level of market return. The Supershares by LOR were a simplified version of the Purchasing Power Fund.

The aforementioned SPDR on the S&P 500 Index was incepted in January 1993 and it was launched by State Street Global Advisors (SSGA). In April 1995 a SPDR for the S&P 400 Midcap Index was launched under the ticker MDY and subsequently more spiders and trackers were developed and listed.

Morgan Stanley made it possible to invest outside the United States through foreign index funds, World Equity Benchmark Shares (WEBS)[10], which basically were U.S. based funds with stock holdings of non U.S. listed companies. Besides the international aspect these WEBS were structured as a mutual fund instead of unit investment trusts. The difference means that mutual fund structured index trackers can reinvest their dividends immediately. This feature allows the funds to hold slightly less cash than unit investments trust structured funds, but the effect should not be exaggerated.

An index tracker for the Dow Jones Industrial Average, named DIAMONDS (NYSE:DIA), was incepted in January 1998 and the NASDAQ 100 Index tracker[11] (NASDAQ:QQQQ) was launched in March 1999. Both are structured as a unit investment trust. The latter deserves more attention, as it is a more successful in terms of market capitalization. Over sixteen billion U.S. dollar is invested in the NASDAQ 100 Trust. It is a powerful illustration of the utilization of ETFs. The NASDAQ 100 Trust serves as a proxy for the technology sector and as a volatile trading vehicle on both sides of the market. The initial heavy trading volumes attracted even more investors, as bid-ask spreads were narrow even for small orders.

Another new innovation was the introduction of Select SPDRs in December 1998. These Select SPDRs use a mutual fund structure and they were developed by Merrill Lynch. All stocks in the S&P 500 are allocated to a different sector: Consumer Discretionary (NYSE:XLY), Consumer Staples (NYSE:XLP), Energy (NYSE:XLE), Financial (NYSE:XLF), Health Care (NYSE:XLV), Industrial (NYSE:XLI), Materials (NYSE:XLB), Technology (NYSE:XLK) and Utilities (NYSE:XLU). An interesting point is that the investment amount in the sectors is not proportional to the sector capitalization weights. Especially the Financial Sector spider and the Energy Sector spider enjoy the greatest popularity among investors.[12] These Select SPDRs could be seen as a way to express the market view on specific segments.

In April 2000 Barclays Global Investors (BGI)[13] launched the iShares FTSE 100 fund. Ever since, iShares is the name under which BGI, a major institutional portfolio manager, brands it family of retail financial exchange traded products. As of the end of Q3 2009 iShares accounted for more than 25 percent of

[10] Nowadays known as iShares MSCI World Series
[11] PowerShares QQQ™, formerly known as "QQQ" or the “NASDAQ- 100 Index Tracking Stock®”
[12] See Appendix A.3
[13] As a consequence of the acquisition by BlackRock, the name BGI will cease to exist. In an earlier phase, it was proposed to rename the new entity to BlackRock Global Investors starting December 1 (2009), but that proposition changed.

U.S.-based exchange-traded funds and about 53.4 percent of U.S. ETF assets.[14] Most of these assets are in funds with expense ratios of 32 basis points or less.[15]

Besides equity EFTs other types were introduced (see §2.3). Nuveen Investments was the first sponsor to file an exemptive request with the SEC to launch fixed-income index funds. Furthermore, in January 2007 the first Shari'ah complaint ETF was launched and on June 29 (2009) the first Shari'ah complaint ETF came available for U.S. investors.[16] The inception of new ETFs (in the U.S.) is regulated by the SEC and the Investment Company Act of 1940 is the basis framework to which the investment vehicles must comply. Regularly, fund sponsors file for exemptive reliefs to allow the launch of new products on the market. All new types and trend will be discussed next.

[14] At the end of Q3 2009 the US ETF industry had 721 ETFs, assets of $631.35 bn, from 24 providers on three exchanges. iShares had 182 ETFs and $337.25 bn in assets under management. The number two is State Street Global Advisors with 87 ETFs and $127.34 bn in AUM or in other words a market share of 20.2% (source BGI ETF Landscape Industry Review October 2009).

[15] According to Morningstar (in March 2009) the average Total Expense Ratio (TER) for equity ETFs in the U.S. is 32 bps versus 37 bps in Europe. These numbers are 78 (87) bps per annum for the average equity index tracking fund in the U.S. (Europe) and 141 (175) bps for the average active equity fund in the U.S. (Europe) (source BGI ETF Landscape Industry Review October 2009).

[16] Dow Jones Islamic Market International Index Fund (NYSE:JVS)

2.2 The Creation and Redemption Process of an ETF

> *"Banks, especially the major players, have to play an important part in the distribution of Exchange Traded Funds (ETFs)"*[17]
> *- Roel Thijssen, Head of iShares Benelux at BlackRock*

First of all, an ETF differs substantially from a mutual fund and as mentioned before one key difference lies in the creation and redemption of ETF shares. An ETF is created by a sponsor (i.e. an investment bank or a fund company like iShares), who chooses the investment objective of the ETF and which securities will compose the creation units. After approval from a regulatory body, the SEC, the ETF sponsor enlists Authorized Participants, which are market makers and institutional investors. The APs will deposit the (daily) creation basket (consisting of securities and/or cash) with the ETF in return for a creation unit that consists of a specific number of ETF shares (usually 50,000). The AP can keep the ETF shares as part of its own investment objective, or sell all or part of them on a stock exchange. The ETFs are listed on a stock exchange and investors can purchase them similar to the process of purchasing shares in publicly traded companies.

The redemption process of an ETF is exactly the opposite. The redemption basket mirrors the creation basket and a creation unit is liquidated when an AP returns a block of ETF shares (usually 50,000). The ETF sponsor will give the AP in return the (daily) redemption basket, the securities and/or cash within the ETF portfolio.

The creation process is graphically described in Figure 1. The AP already owns a certain amount of securities or buys them on the stock exchange to meet the creation basket requirements. As ETF shares are created in blocks, the AP may not be able to sell all ETF shares and will hold a small amount in stock. ETFs can be sold over-the-counter (OTC) to (other) large institutional investors; this is shown at the top right-hand corner of Figure 1. In most cases they are sold through a stock exchange. The creation and redemption process is a continuous process during trading hours, which helps ETF's market price to be in line with its underlying Net Asset Value (NAV).

The aforementioned discrepancy between the price of an ETF share and its NAV are caused by supply and demand fluctuations on a stock exchange. However, substantial imbalances tend to be short-lived as two primary characteristics of the ETF structure will try to eliminate the deviations between price and NAV. The portfolio transparency, as ETFs are required to disclose their portfolio holdings daily and the flexibility for authorized participants to create and redeem ETF shares during the trading day, which occurs at NAV.

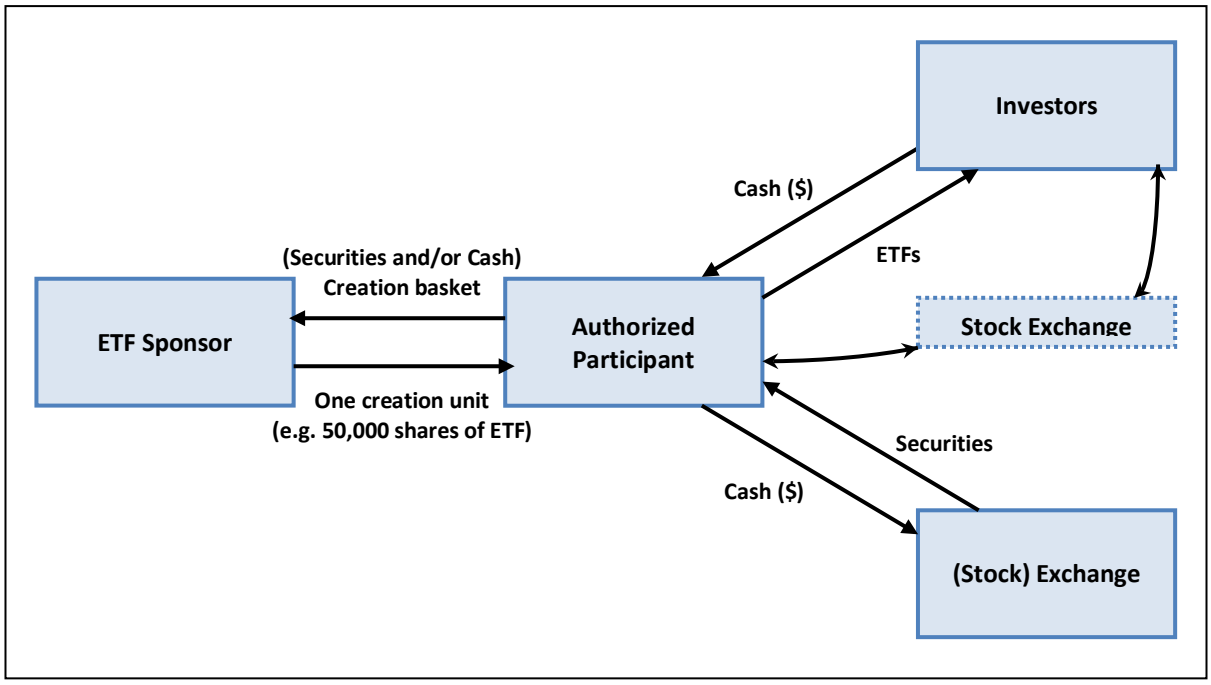
[17] FondsNieuws, December 25, 2009: see the appendix for the full link.

Firstly, investors who observe any deviation between the price of an ETF share and its NAV may decide to trade on it by either buying the ETF share or the underlying securities (creation basket) of the ETF, which were revealed at the end of the previous trading day. This arbitrage will narrow the discrepancies between the ETF's share price and its NAV.

Secondly, the authorized participant is able to buy or sell creation units to realize a profit when a discrepancy between the ETF's market price and its NAV occurs. For instance, when the share price of an ETF is above its NAV, the AP may find it lucrative to deposit the creation basket of securities (and/or cash) at the ETF sponsor in exchange for ETF shares that he may sell. When the opposite price-value relationship holds, the ETF share price is below the NAV, the AP can realize a profit when he redeems ETF shares at the ETF sponsor in exchange for the original creation basket. Subsequently, the AP will sell the single securities from the portfolio (creation basket) on a stock exchange. The consequence is that the market price of an ETF share stays close to its NAV.

Figure 1 – Creation of an ETF

This figure shows the creation (and redemption) process of an ETF. The ETF sponsor determines the investment objectives in case of an active ETF or chooses a certain index that will be replicated by the ETF. The Authorized Participant will deposit the creation basket (consisting of securities and/or cash) with the ETF sponsor in return for a creation unit that consists of a certain amount of ETF shares. The size of creation units runs from 25,000 to 200,000 shares. Thereupon the AP can either keep the ETF shares or sell them all or partly to other investors. The can be placed over-the-counter (OTC) or via a stock exchange as is depicted at the top right-hand side of the figure. To fulfil the creation basket requirements, the AP may obtain the securities from the stock exchange, which is reflected in bottom right-hand side of Figure 1. The redemption of ETF shares takes place in the opposite direction, in which the AP has to deliver the right amount of ETF shares (round number of creation units).



2.3 Different types of ETFs

> *"We believe there is investor interest in genocide-free investing, […] "Creating this new fund could provide investors with an additional reputable socially responsible iShares ETF and address investor concerns on this issue,"*[18]
> *- Noel Archard, head of BGI's iShares product research and development*

After the inception of broad market index ETFs, like the S&P 500, CAC, DAX and FTSE 100, sponsors looked for other opportunities and ETFs with different kinds of exposure were created. For instance, the sector SPDRs were the first ETFs to gain exposure to different economic sectors in the U.S. Irrespective the structure of the ETF (passive or active), the following types of ETFs exist: Infrastructure, Fixed Income, Commodity, Private Equity, Real Estate, Dividend, Fundamental, Sectors, Inverse/Leveraged, Global, Emerging Markets and Shari'ah ETFs.[19]

Most of them speak for themselves, but some are quite interesting to look at in more depth. For example, infrastructure ETFs were launched in January 2007 and they provide exposure to different infrastructure clusters: energy (oil and gas storage and transportation), transportation (airport services, highways and railroads) and utilities (electric, gas, water, multi-utilities).

Another type of ETFs is the inverse/leveraged ETF. Herewith you can magnify the performance of the ETF. They are quite similar to RBS' Turbos or ING's Sprinters, but they are designed to lever the performance with a factor 2-3 and not more. Inverse ETFs anticipate on a drop in prices. Inverse/Leveraged ETFs are lot more risky than normal ETFs.[20]

Commodities are widely used to hedge a portfolio against inflation or adverse events on the stock market. Typically they have a low correlation to equity indices. Investors who are not able (restrictions) to trade in commodity futures can trade commodity ETFs. In the U.S. commodity ETFs are not regulated by the SEC, but by the Commodity Futures Trading Commission (CFTC). There are also commodity ETFs who do not invest in futures, but solely in the raw physical product. As far as we know they are not regulated by the SEC or CFTC.

[18] Reuters, November 12, 2009: see the appendix for the full link.
[19] We are aware that these type indicators are mixed. Thus, some types indicate asset classes (equity, fixed income, commodities, and currencies) where others indicate certain sectors or strategies. Furthermore, the listing is not exhaustive, but solely based on the specifications in the ETF Landscape Review by Barclays Global Investors.
[20] For instance, if today the index quotes 100, tomorrow it will stand at 110 (+10%) and the day after tomorrow the index will drop to the initial 100 (-9.09%) your return would be zero (0%). However, if you had invested in a leveraged ETF who pays twice the daily return on the index your capital would change from the initial 100 to 120 tomorrow (2x10%) and finally to 98.18 the day after tomorrow (-18.2%) resulting in a total return of minus 1.8 percent.

Private Equity ETFs exist since October 2006. The PowerShares Global Listed Private Equity Portfolio (PSP:US) was the first ETF in the market. It is a passive ETF who seeks to replicate the performance of the Red Rocks Listed Private Equity Index (LSTPE). This index consists of stocks and securities of listed private equity companies that are selected by Red Rocks Capital. The PSP ETF holds for instance more than five percent of its assets in HAL Trust and 3i Group.

The largest and oldest Dividend ETF is the iShares Dow Jones Select Dividend Index (DVY) launched in November 2003. It is passive ETF that tracks the performance of the Dow Jones U.S. Select Dividend Index. This index consists of the top 100 U.S. companies that have the highest dividend yield and highest dividend quality (stable remittances). The index is dividend-weighted.

Finally, besides Shari'ah ETFs, like the Dow Jones Islamic Market International Index Fund (NYSE:JVS) by Javelin Investment Management, also other religions are served by special investment products. FaithShares introduced five ETFs that comply with Christian values. These five products focus on special movements within Christianity: Baptism, Catholicism, Lutheranism, Methodism and 'general' Christianity.[21] As far as we know no ETF exists especially for Judaism, but one may expect this and more specific Islamic ETFs (i.e. Sunnite and Shiah) in the near future.

[21] The products by FaithShares are also covered in Chapter 3.

2.4 Differences between active and passive ETFs

"Active management is the next step in the evolution of exchange traded funds (ETFs)"
– Dan Draper, Global Head of Lyxor Exchange Traded Funds (SocGen)[22]

ETFs are open-ended index funds that are listed on stock exchanges and can be traded at any time during the day on the secondary market. ETFs provide daily portfolio transparency as they are obliged by regulation to report their holdings on a daily basis. Furthermore, ETFs attempt to replicate a certain stock market index.

Initially ETFs were only passive investment vehicles, but since March 2008 actively-managed ETFs exist. The SEC had granted an exemption to the Investment Company Act of 1940, the law which governs investment companies in the U.S. These active ETFs try to beat the market while passive ETFs are just structured to track a specific public market index. The rationale for active ETFs was to combine the best characteristics of passive ETFs with the option to beat the benchmark.

The aforementioned ETF sponsor (§2.2) chooses the index and the tracking method in case of a passive index-based ETF. Index-based ETFs can track their target benchmark in two different ways. A replicate index-based ETF holds every security in the target index, by investing all its assets (cash) proportionally in the securities of the benchmark. Another option is to choose a representative sample of securities in the target index and invest only in those, a so-called sample index-based ETF. Representative sampling is very practical in case of target indices that consist of thousands of securities like, for instance, the Russell 3000 Index.

The sponsor of an active ETF is not restricted to a target index. After determining the fund's investment objective it will trade in securities at its own discretion, comparable to an actively-managed mutual fund. The portfolio securities of an active ETF could be traded frequently, however in practice most managers tend to trade on a weekly or monthly basis. Besides transaction costs a manager wants to minimize the risk of front-running by other market participants, a risk that is present due to the great transparency.

Bear Stearns (~~NYSE:BSC~~)[23] was the pioneer of the actively-managed ETF by launching an active fixed income ETF, the Bear Stearns Current Yield Fund (~~NYSE:YYY~~) on March 25, 2008. It was a turbulent time for Bear Stearns as the 85 year old bank was brought to its knees by its exposure to subprime mortgages and JP Morgan was about to take over control. The Current Yield Fund was granted only a short life. In

[22] FondsNieuws, October 26, 2009: see the appendix for the full link.
[23] The strike-troughed ticker refers to a stock that ceased trading on the exchanges.

September 2008 the liquidation decision was made and on October 1, 2008, its shares ceased trading on the AMEX.

Invesco PowerShares was second in line to introduce active ETFs. On April 11, 2008, it introduced four active ETFs, three equity ETFs and one bond ETF: the Active AlphaQ Fund, the Active Alpha Multi Cap Fund, the Active Mega Cap Fund and the Active Low Duration Fund respectively. In November 2008 they added another ETF, the Active U.S. Real Estate Fund, a real estate ETF who invests in Real Estate Investment Trusts (REITs). A more extensive description of these five ETFs can be found in chapter 5, as they form the five actively-managed ETFs under examination.

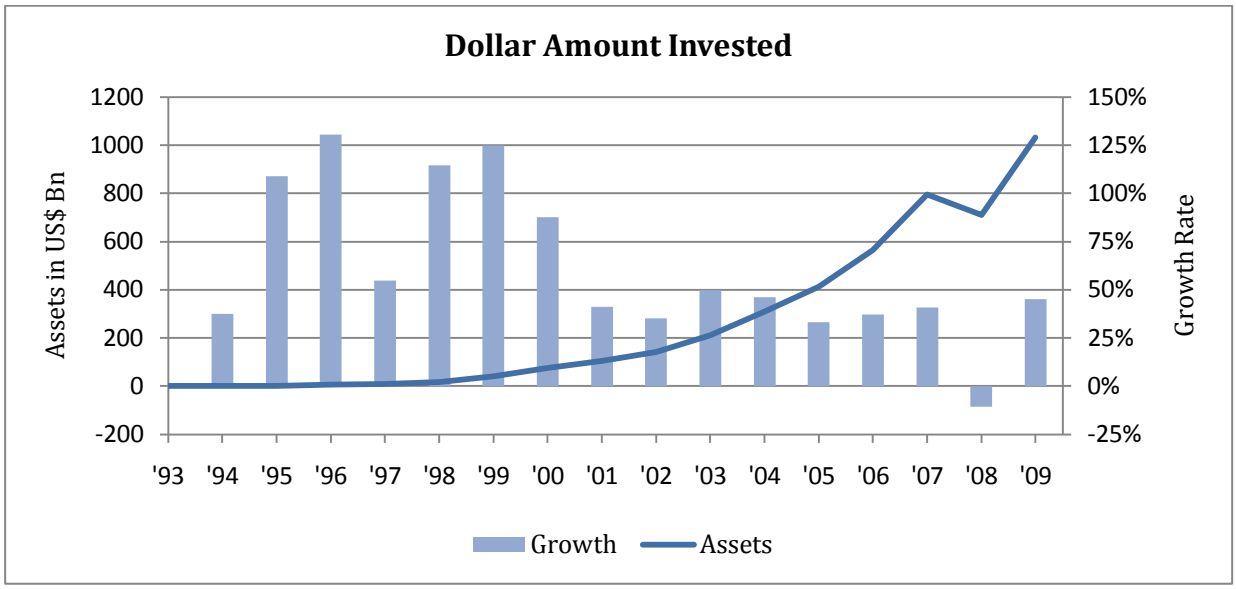
3. Recent developments and trends in the ETF industry

> *"There are tons of people who are late to trends by nature and adopt a trend after it's no longer in fashion. They exist in mutual funds. They exist in clothes. They exist in cars. They exist in lifestyles."*[24]
> *- Jim Cramer, host of CNBC's "Mad Money" and co-founder of TheStreet.com*

The first ETF was launched in the United States in 1993, the SPDR, and the market has since grown markedly. Especially in the first decade, between 1993 and 2000, the growth in number of and amount of assets in ETFs was relatively high, but the product was not yet a widespread phenomenon. The main reasons are the unfamiliarity with this new investment vehicle of investors and the simple fact that ETFs were not yet widespread and hence, it is labelled as exotic.

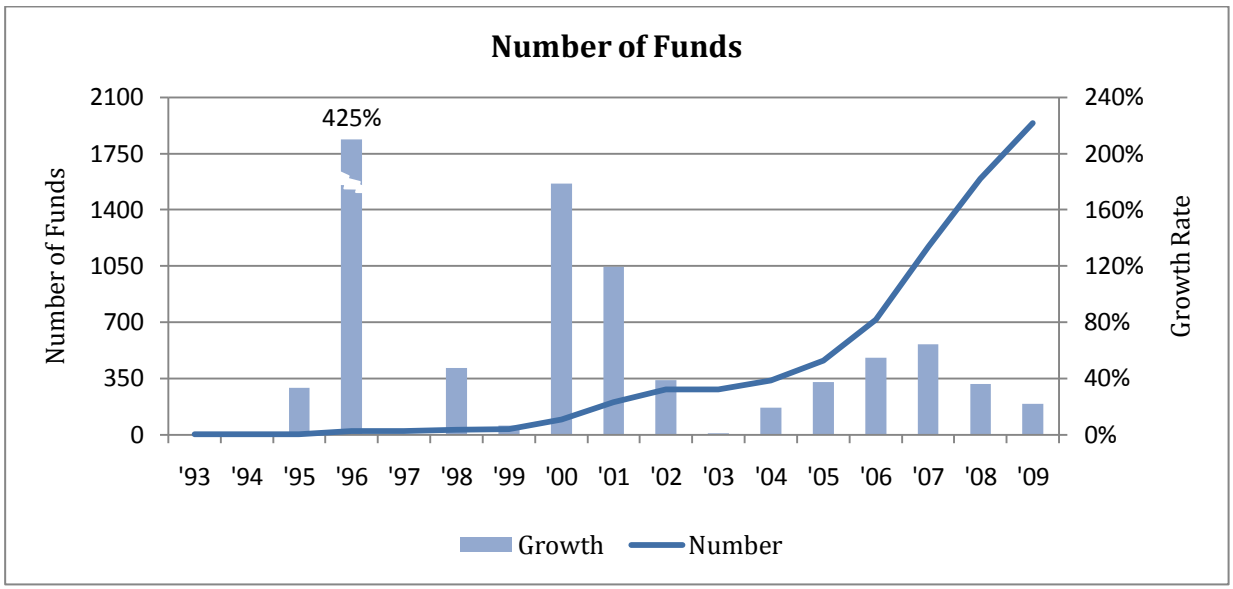
Figure 1 and Figure 2 show the development of the ETF industry in assets under management and number of funds respectively. [25] Ever since 1993 the dollar amount invested increased, except in the year 2008, when due to the credit crisis the stock markets crashed. However, the net new fund flows to ETFs was not negative in the year 2008, compared to the mutual fund industry where serious dollar amounts were withdrawn.[26]

Figure 2 – Dollar Amount Invested in ETFs (1993 – 2009)
This figure (line) presents the assets under management by ETFs, denominated in U.S. Dollars over the period 1993 – 2009. At year-end 2009 the amount hit an all-time high of $ 1,032 Bn. The histogram displays the annual growth rate in assets under management. Furthermore, this figure reports only the results for ETFs and no other exchange-traded products (ETPs) are included.



[24] Source: BrainyQuote.com
[25] While finalizing this thesis, these figures have been updated from end of Q3 to end of year 2009. (Source: BlackRock ETF Landscape Industry Preview Year End 2009)
[26] In 2008 global mutual funds net outflow was $117.1 bn compared to a global ETF funds net inflow of $270.4 bn. (Source: BGI ETF Landscape Industry Review October 2009)

Figure 3 – Number of ETF Funds (1993 – 2009)
This figure (line) shows the number of ETFs over the period 1993 – 2009. At year-end 2009 the number of ETFs had reached 1,939 funds. The histogram displays the annual growth rate in number of funds. The number of funds represents the net number of available funds at the end of each year. Each year several new ETFs are launched as well as eliminated. Furthermore, this figure reports only the results for ETFs and no other exchange-traded products (ETPs) are included.



In July 2009 there were 1,707 ETFs listed compared to 66,472 mutual funds. A direct comparison cannot be made for two reasons. First, the number of mutual funds also includes closed-end funds and not only passive index mutual funds. Secondly, the mutual funds might not be unique. Generally, each ETF tracks a different index, and there are few ETFs that track precisely the same index. However, mutual fund companies offer certain funds that are sometimes very similar to the funds of another mutual fund family. For instance, there are quite a few index mutual funds that track the performance of the S&P 500, while firstly the SPDR (SPY) was the only ETF, and iShares offered another equivalent ETF (IVV) only since May 2000. One of the reasons for the coexistence of multiple more or less equivalent index mutual funds is the restrictive distribution channel and the discrimination among investors.[27]

Overall, ETFs offer a more diversified range of products than (Index) Mutual Funds. Niche markets become relatively liquid through the use of an ETF. As discussed in §2.3 several investment styles or principles can be incorporated. In April 2009 FaithShares Advisors filed with the SEC to launch several

[27] For example, Vanguard offers three mutual funds to invest in the S&P 500 Index. The Vanguard 500 Index Fund (VFINX), the Vanguard Institutional Index Fund (VINIX) and the Vanguard Institutional Index Fund Plus (VIIIX). All with different minimum initial investment requirements and expense ratios. For example, to join the VIIIX Fund the minimum investment is at least $ 200m, the VINIX starts from $ 5m, but it has a twice as high expense ratio than the former.

religious funds; Baptists, Catholic, Christian, Lutheran and Methodist Value Funds.[28] Other social responsible trackers are listed already. For example the iShares FTSE KLD Select Social Index Fund (KLD) as well as one for clean energy, the PowerShares WilderHill Clean Energy Portfolio (PBW). New ETFs in alternative energy and sustainability are proposed regularly, i.e. iShares announced on November 13, 2009, to launch a genocide-free ETF. [29] However, a lot of these initiatives track an already existing social responsibility index and are therefore not actively managed.

The year 2009 can be characterized as the year where the actively-managed ETF found widespread recognition from fund sponsors. Where Bear Stearns and PowerShares pioneered the listing of active ETFs in 2008 most sponsors have currently filed with the SEC or another regulatory body to launch new active ETFs or have already listed their products. Table 1 gives an overview of the currently trading active ETFs in the United States. At the moment, there are fifteen active ETFs on the New York Stock Exchange (NYSE). [30]

Of the listed ETFs below, the DENT Tactical ETF (NYSE:DENT) is unique in its investment procedure. The other funds focus primarily on selecting individual stocks, bonds, or REITs, while DENT is an "ETF of ETFs". It invests in other ETFs and thereby executing its tactical strategy. This structure explains to some extent the higher total expense ratio. Fund of funds in the mutual fund sector are subject to some scrutiny with respect to the management fees they charge compared to their performance. If more ETF of ETFs will be launched, a performance analysis can be done on this specific type of ETFs.

Grail Advisors was the subsequent sponsor to list some more active ETFs. In June (2009) it had filed with the SEC to launch four active ETFs and they were incepted on the first of October. They (NYSE:RPQ, NYSE:RPX, NYSE:RFF and NYSE:RWG) focus all on long-term capital appreciation. RPX invests in stocks (equity securities) that have above-average growth prospects according to RiverPark Advisors, the sub-advisor of Grail. RPQ invests in companies that develop, produce or distribute technology-related products and services. RFF will focus on financial service companies and RWG invests in 20-30

[28] In December 2009 these funds were listed and they are trading on the NYSE Arca under the symbols FZB, FCV, FOC, FKL and FMV respectively.
[29] FondsNieuws, November 13, 2009: see the appendix for the full link.
[30] It has come to our awareness that the phenomenon actively-managed ETFs is exhibiting a steep grow the last year (2009) and that despite a thorough examination of the industry some ETFs are missing. First of all, we focus on the U.S. market only, for instance, Horizons AlphaPro Management offers several actively-managed ETFs on the TSX in Canada: Horizons AlphaPro Seasonal Rotation ETF (TSE:HAC) and Horizons AlphaPro Managed S&P/TSX 60 (TSE:HAX). However, besides other countries, we could not indicate the one missing actively-managed ETFs in Table 1; only fourteen out of fifteen are displayed. While finalizing this thesis (January 2010) several news articles were discovered that stated that at the end of year 2009 15 active ETFs were listed. However, no news source gave an exhaustive overview of these funds. In another news article the author referred to IndexUniverse that distinguished fourteen actively-managed ETFs holding a mere $ 93m as of December 1, which is in line with our findings.

companies with a market cap over $5 bn that Wedgewood, another sub-advisor, finds attractive growth companies. Its earlier listed ETF, the American Beacon Large Value ETF (NYSE:GVT) is very similar to its new RP Focused Large Cap Growth ETF (NYSE:RWG), both seek to invest in undervalued securities from the Russell 1000 index but GVT has multiple sub-advisors.

Table 1 – Currently trading active Exchange Traded Funds in the United States
This table shows the currently trading active ETFs (see note 25). The Total Expense Ratios are as of 20 November 2009. Data is obtained from the sponsor's website and Bloomberg for cross-reference. Grail Advisors American Beacon Large Value Fund reports a gross expense ratio of 0.85% and a net expense ratio of 0.79%. The four new active ETFs of Grail Advisors are recently incepted and therefore their gross and net expense ratio does not yet differ. The expense ratios consist of management fees and acquired fund fees and expenses.

Inception	Issuer	Name	Ticker	Benchmark	TER
11 Apr 2008	PowerShares	Active AlphaQ	PQY	NASDAQ-100 Index	0.75%
11 Apr 2008	PowerShares	Active Alpha Multi Cap	PQZ	Russell 3000 Index	0.75%
11 Apr 2008	PowerShares	Active Low Duration	PLK	Barcl. Cap 1-3 Yr US Treasury Index	0.30%
11 Apr 2008	PowerShares	Active Mega Cap	PMA	Russell Top 200 Index	0.75%
20 Nov 2008	PowerShares	Active U.S. Real Estate	PSR	FTSE NAREIT Equity REITs Index	0.80%
4 May 2009	Grail Advisors	Am. Beacon Large Value	GVT	Russell 1000 Value Index	0.85%
15 Sept 2009	AdvisorShares	Dent Tactical ETF	DENT	NA	1.56%
1 Oct 2009	Grail Advisors	RP Technology ETF	RPQ	NASDAQ Composite	0.89%
1 Oct 2009	Grail Advisors	RP Growth ETF	RPX	S&P 500	0.89%
1 Oct 2009	Grail Advisors	RP Financials ETF	RFF	S&P Financial	0.89%
1 Oct 2009	Grail Advisors	RP Foc. L. Cap Growth	RWG	S&P 500, Russell 1000	0.89%
16 Nov 2009	iShares	Div. Alternatives Trust	ALT	NA	0.95%
16 Nov 2009	PIMCO	Enh. Short Mat. Strategy	MINT	Citigroup 3m Treasury Bill Index	0.35%
30 Nov 2009	PIMCO	Interm. Muni Bond Strat.	MUNI	Barcl. Cap. 1-15 Yr Muni Bond Idx	0.35%

Recently iShares listed it first active ETF, the Diversified Alternatives Trust (NYSE:ALT). It is a so-called multi-asset multi-strategy ETF with no tangible benchmark. Its objective is to achieve a target volatility (as measured by the annualized standard deviation) of 6 to 8 percent and its Sharpe ratio is expected to lie between 0.5 and 0.75.

PIMCO launched its first active ETF on the same day as iShares (November 16, 2009). Its product is called the PIMCO Enhanced Short Maturity Strategy Fund (NYSE:MINT). According to the prospectus it tends to be a higher yielding alternative to money market funds. Only investment-grade debt securities with a short duration are considered and the average portfolio duration will not exceed one year.

The five active ETFs from PowerShares are subject to our analysis and they will be covered in the chapter on data and methodology. We will follow with some active ETFs that are in the pipeline. Some of the major players that have filed with the SEC to launch additional actively-managed ETFs are

AdvisorShares, Claymore, Grail Advisors, iShares, PIMCO, PowerShares, Russell Investments, State Street and Vanguard.

In May 2009, Claymore filed for three active ETFs who are to be sub-advised by Delta Global Advisors. Approval was asked for the Claymore Delta Global Infrastructure ETF, the Claymore Delta Global Hard Assets ETF and the Claymore Delta Global Agribusiness ETF. The 'Hard Assets ETF' would be the first actively-managed commodity ETF if listed. The investment style of all three ETFs could be characterized as a bottom-up fundamental approach or more focused on technical analysis. The Infrastructure ETF will focus on companies in emerging markets who benefit from infrastructure projects.

One month later, Claymore filed for another three actively-managed ETFs. The Claymore S&P Commodity Trends Strategy ETF, the Claymore Active National Municipal ETF and the Claymore Laffer MacroEconomic Global Equity ETF are in registration with the SEC. The latter is managed by Laffer Associates, the research firm of Dr. Arthur Laffer.[31] This ETF would also be an ETF of ETFs, investing in single country ETFs that represent the most undervalued equity markets around the world. The Commodity Trends Strategy ETF is technically an active ETF, but it will seek to replicate the S&P Commodity Trends Indicator, a long/short index covering the commodity futures markets. The Active National Municipal ETF will try to outperform the Barclays Capital 7-Year Municipal Bond Index.

iShares, who launched ALT recently, had filed for the registration of two other active ETFs in May 2009. The iShares Active Equity Fund will invest the largest 1,000 companies on the AMEX and the iShares Fixed Income Fund will allocate its assets among investment-grade and junk bonds in a 70-30 relation at the highest (with respect to the percentage junk rated debt).

More actively-managed bond ETFs are introduced by Grail. The ETFs that they plan to add (announced on October 5, 2009) to the current spectrum are the Grail McDonnell Intermediate Municipal Bond ETF and the Grail McDonnell Core Taxable Bond ETF. Once again, Grail has assigned a sub-advisor, here McDonnell Investment Management, and will serve as the fund manager self. No disclosure was made about the strategy or the characteristics of the bonds they would like to invest in.

AdvisorShares, the sponsor who offers the DENT ETF, has plans to offer two additional actively-managed ETFs. The WCM/BNY Mellon Focused Growth ADR ETF (AADR) and the Legacy Long/Short ETF (HDGE). The AADR will focus on non-U.S. organizations in both developed and emerging markets and it will try to beat two benchmarks, the Bank of New York Mellon Classic ADR Index and the better known MSCI EAFE

[31] Dr. Arthur Laffer is well-known for the Laffer curve (a parabola) which is used to adjust the tax rate to maximize total tax revenues.

Index. WCM Investment Management will act as sub-advisor. The HDGE is the second ETF of ETFs that is in the pipeline and it will be managed by Legacy Asset Management.

New filings are made at the SEC the moment we speak. Some of the ETFs are actively-managed others are still passive index trackers. At least we may expect that more active ETFs will be listed in 2010 and that investors will become more interested in this new investment vehicle. In the appendix a list is attached of several interesting websites that track the ETF industry.

4. Literature review

Whereas a thorough examination of actively-managed mutual funds and passive (index) mutual funds exists, the performance analysis of actively-managed ETFs is still an immature subject of research. Some studies discuss the phenomenon of exchange traded funds, but they focus solely on conventional (passive) ETFs. To the best of our knowledge, Rompotis (2009a) was the first to compare the performance of active ETFs with passive ETFs. Therefore we will give a brief review of the most significant papers in the field of performance evaluation of mutual funds and some major analyses on ETFs.

The existing literature can be divided in several distinctive subjects. Some studies compare active and passive management and they, except Rompotis (2009a), focus primarily on mutual funds (see §3.1). There are studies which investigate index mutual funds and (passive) ETFs (see §3.2). Furthermore, some research focuses on the characteristics of ETFs or analyses their performance with their corresponding benchmark or the market index (see §3.3). From this, we will discuss the three subjects separately and tables 2, 3 and 4 will summarize the main conclusions. Consequently, our contribution to the existing literature will be elaborated at the end of this chapter (see §3.4).

4.1 Active versus Passive Management

The debate about active versus passive management is widely covered in the literature. Blake, Elton and Gruber (1993) investigate the performance of bond mutual funds. Prior studies had focussed solely on common stock funds or balanced funds (a combination of stock and debt instruments). They find that the performance lacks behind of the relevant index and that this lack can be attributed to the management fees. A regression analysis shows that a percentage-point increase in expenses leads to a percentage-point decrease in return. Furthermore, no evidence of predictability using past performance was found for the unbiased sample (corrected for survivorship bias).

Malkiel (1995) shows that actively-managed mutual funds fail to deliver excess returns. Generally, the active funds underperform the market, even before management fees are deducted. The performance persistency, as found in prior studies on times series of securities as well as mutual fund returns, is questionable in the light of a survivorship bias. Furthermore, investment strategies who exploit these predictable patterns deliver excess returns in the 1970s, but fail to do so in the 1980s, undermining the robustness of performance persistency. Malkiel (1995) concludes that investors are better off to invest through low-cost index funds.

Gruber (1996) investigates the actively-managed mutual fund puzzle. Although these active funds do not provide superior results, compared to both the benchmark and passive equivalents, there is an ongoing

demand from investors. There are two types of mutual funds, open-end and closed-end. The first sell at their net asset value (NAV) and no premium for management abilities is included. For closed-end funds this ability should be priced. From this Gruber (1996) constructs the following line of reasoning. If mutual funds sell at their NAV, their performance should be predictable. There are some (sophisticated) investors who are aware of this fact and their cash flows into and out of the fund confirm this. The investors who supplied new money benefit from this, as they earn positive and higher risk-adjusted returns than the average investor.

Harper, Madura and Schnusenberg (2006) compare active mutual funds with passive ETFs. They focus on closed-end country mutual funds (CEFs) for fourteen different countries and equivalent open-end ETFs. They find that on average ETFs have higher risk-adjusted returns, as measured by Sharpe ratios, than CEFs. Besides, CEFs show negative alphas, displaying more evidence that a passive investment strategy is superior to an active strategy.

Rompotis (2009a) relocates the active versus passive management debate purely to the ETF market. In his pioneering work active ETFs underperform both the equivalent passive ETFs and their benchmark indices. Furthermore, Sharpe and Treynor ratios endorse this conclusion. Rompotis (2009a) also investigates the selectivity and market timing skills of ETF managers. For passive ETFs this should not be an issue and his results for active ETFs demonstrate that managers are lacking such skills.

4.2 Index Mutual Funds versus Passive ETFs

Passive ETFs and index mutual funds try to replicate the performance of their index or benchmark. This index is in most cases a broad, diversified index for a certain country or continent. Dellva (2001) is one of the first to identify some features of the increasingly popular ETFs. By applying a cost comparison between the SPDR (NYSE:SPY), the iShares S&P 500 Index Fund (NYSE:IVV) and the Vanguard Index 500 Fund (VFINX), he reveals that ETFs are a less tempting alternative for small investors, due to transaction costs. Nevertheless, the annual expenses of ETFs are significantly lower than for index mutual funds. Another characteristic is the tax efficiency of an ETF, caused by the in-kind creation and redemption of shares. His results indicate that this tax efficiency is of lesser interest to the tax-deferred long-term retirement investor.

In their paper, Poterba and Shoven (2002) focus on the taxable investor by comparing pre-tax and post-tax returns. The analysed investment vehicles are the largest ETF, the SPDR (SPY), and the Vanguard Index 500 Fund, the largest equity index mutual fund. Both funds track the S&P 500 Index and they present the same performance. However, ETFs are more tax efficient, due to the in-kind redemption

Table 2 – Existing Literature on Active versus Passive Management
This table presents the main conclusions from existing research. Some studies only compare active managed funds with their benchmark indices and not explicitly with comparable passive index funds. The presented period is the space of time for the sample. Multiple data ranges means that multiple distinctive samples were used. The time period is often from the beginning of the year to the end of the year. The frequency is the level at which the analysis is performed (reported) and not necessarily the frequency at which the data was obtained. The last column shows the asset class.

Study	*Main Conclusions*	*Period*	*Frequency*	*Class*
Blake, Elton & Gruber (1993)	Bond mutual funds underperform their corresponding benchmark. This underperformance is roughly equal to the charged management fees. No strong evidence for predictability using past performance was found.	1979 – 1988 1977 – 1991 1987 – 1991	Monthly	Bond
Malkiel (1995)	Actively-managed funds fail to deliver risk-adjusted (excess) returns and investors should invest through low-cost index funds instead. The observed persistence in returns as found in other studies is subject to the survivorship bias.	1971 - 1991	Annual	Equity
Gruber (1996)	Actively-managed mutual funds provide on average no better return than the market indices. However, fund performance is partly predictable from past performance and sophisticated investors will act on this information. Their cash flows into and out of the fund will deliver positive excess risk-adjusted returns.	1985 – 1994	Monthly	Equity
Harper, Madura & Schnusenberg (2006)	ETFs exhibit higher mean returns (lower expense ratios) and on average higher Sharpe ratios compared to country CEFs, concluding that a passive investment strategy is superior to an active strategy.	1996 – 2001	Monthly	Equity
Rompotis (2009a)	Active ETFs underperform both the equivalent passive ETFs and their benchmark indices. Furthermore, their tracking errors are higher and their rating performances (Sharpe, Treynor) are inferior to their passive counterparts.	2008 – 2008	Daily	Mixed

process. This means that the existing investors are not liable to the realized capital gains until their own settlement.

However, another study, by Elton, Gruber, Comer and Li (2002), contradicts the results of Dellva (2001) and Poterba and Shoven (2002). Their results show that the SPDR underperforms its benchmark, the S&P 500 Index as well as its counterparts in the mutual fund industry. The main source is the loss of return on reinvested dividends as dividends have to be held in non-interest bearing accounts. However, they also note that newer ETFs do not suffer from this disadvantage.[32] Besides, they reveal that the

[32] ETFs can be organized as unit investment trust (UIT) or as an open-end investment company. The latter does not have to held dividends in non-interest bearing accounts. However, the SEC has granted ETFs that are structured as

market efficiency (arbitrage) allows the trading price of the SPDR to move closely with its net asset value (NAV).

Kostovetsky (2003) examines the main areas of difference between ETFs and index mutual funds. In his theoretical model he distinguishes management fees, tax efficiency and transaction costs. He concludes that the sources of underperformance of ETFs and index funds compared to their benchmark are to a large extent different, due to their specific structures and operating formation.

Gastineau (2004) investigates the performance of conventional index mutual funds and passive ETFs by examining the operating efficiency. Other studies have focused on the expense ratios and the tax-efficiency and thereby praise ETFs. However, mutual funds have a higher operating efficiency and Gastineau (2004) proofs that conventional index mutual funds beat their benchmark as well as similar passive ETFs by not executing a perfect replication strategy. For instance, ETFs are adjusted for reorganisations and the reweighing of stocks in de underlying index at the execution date, whereas the mutual funds can change their portfolio at the announcement date.[33]

Guedj and Huang (2008) analyse the coexistence of ETFs and index mutual funds, or open-ended mutual funds (OEFs) by examining the differences in liquidity. OEFs deal with flow-induced trading costs and those costs can impede the performance. This flow-induced trading is costly to all remaining investors, but beneficial to the redeeming investor. However, the ETF structure is not the dominant organizational form. Some investors, those who are risk-averse, benefit from the OEF structure as it provides some kind of partial insurance against future liquidity shocks. Moral hazard can cause excessive flow-induced trading and the insurance cost increases. Therefore, investors with higher liquidity needs prefer to invest in an index mutual fund, because they are the major beneficiaries form the liquidity insurance. This liquidity aspect makes ETFs a good investment vehicle for the less liquid and more specific index and this is supported by the fact that the growth in the ETF market is notably in the less mainstream indices.

Svetina and Wahal (2008) investigate 584 different ETFs from their inception to the end of 2007. They find that only 17 percent of those ETFs directly compete with a counterpart in the index mutual fund industry. Of the other 83 percent of ETFs the greater part tracks a narrow, specific segment of the market, thereby expanding the investment opportunity set for investors. The inception of new

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UIT a special exemption, which allows them to reinvest dividends. Nevertheless, those dividends are taxed as personal income for the unit holders.

[33] Blume and Edelen (2004) demonstrate for S&P 500 index mutual funds that trading at the announcement rather than at the execution date of the change in the underlying index is profitable. Obviously the tracking error increases as the index is not fully replicated. Furthermore, they find that less than half of the funds in their sample follow the exact replication strategy.

competing ETFs lowers the flow of money to existing index mutual funds, but it also reduces the market share of incumbent ETFs in the same asset class and investment style.

Rompotis (2008) compares ETFs with index funds on return, volatility, tracking ability, expenses and a possible relationship between costs and performance. His data set consists of sixteen matched ETFs and index funds covering broad market indices, like Russell, Standard & Poor's, Wilshire and MSCI. He finds no statistically significant difference between the risk and return of ETFs and index funds. Furthermore, both ETFs and index funds do not present excess returns and their tracking errors are statistically the same, despite the fact that ETFs follow more closely the composition of their index. Rompotis (2009b) follows the same research method, but focuses exclusively on interfamily competition for Vanguard. Another insight presented in this paper is that the risk of the tracking indices is similar to the risk of the corresponding ETFs and index funds.

Agapova (2009) examines the substitutability of open-end mutual funds and ETFs. In the light of the tremendous increase in ETFs and asset under management compared to the mutual fund industry, her paper explores the reasons for the coexistence of both investment vehicles. By comparing (cash) flows into both funds on a monthly basis an analysis on substitution effects can be performed. The results indicate that coexistence can be explained by a "clientele effect". For instance, tax-sensitive investors will shift from conventional funds to ETFs as the capital gains increases. The settlement with the treasury on capital gains is upon final sale for ETFs allowing the accumulation of more wealth in between. Secondly, some retirement accounts have restrictions. Especially the new defined contribution plans (as opposed to defined benefit) do not offer ETFs (at least not in the United States).

Blitz, Huij and Swinkels (2009) investigate the underperformance of European index funds and ETFs, because their U.S. counterparts perform significantly better. They find that this underperformance can be ascribed to a significant performance drag caused by dividend withholding taxes. Furthermore, these dividend withholding taxes have an equivalent impact on the performance as other fund expenses and combined they explain almost the entire underperformance. Therefore, the well-known 'total expense ratio' is not a sufficient measurement of all the costs incurred by a fund. Besides, a fair comparison between the performances of passively-managed funds is not possible if dividend taxes are ignored. Alphas are not properly estimated if the benchmark index assumes full reinvestment of dividends and the fund is subject to high dividend taxation.

Table 3 – Existing Literature on Passive Index (Mutual) Funds vs. Passive ETFs

This table presents the main conclusions from existing research. The time period is often from the beginning of the year to the end of the year. The frequency is the level at which the analysis is performed and not necessarily the level at which the data was obtained. The last column shows the asset class, which is in most cases a stock market index, except for Svetina and Wahal (2008), who also included fixed income, real estate and other market niches.

Study	*Main Conclusions*	*Period*	*Frequency*	*Class*
Dellva (2001)	ETFs are a less tempting alternative for small investors, due to transaction costs. However, ETFs have significant tax efficiencies, but this benefit is of less interest to the tax-deferred retirement investor.	NA	NA	Equity
Poterba & Shoven (2002)	The pre-tax and post-tax returns of the SPDR (an ETF) and the Vanguard Index mutual fund on the S&P 500 prove to be very similar.	1994 – 2000	Annual	Equity
Elton, Gruber, Comer & Li (2002)	Spiders underperform their benchmark, the S&P 500 Index, as well as similar low-cost index mutual funds. The main source is the loss of return on reinvested dividends. However, newer products, like for instance WEBS, do not have this reinvestment restriction anymore.	1993 – 1998	Annual	Equity
Kostovetsky (2003)	The main areas of difference between ETFs and index mutual funds are management fees, tax efficiency, transaction costs and other qualitative differences.	NA	NA	NA
Gastineau (2004)	The pre-tax return of passive ETFs generally exhibit inferior results if compared to their conventional index mutual funds equivalents. Causes lie in the non-reinvestment of dividends and the stringent replication policy.	1994 – 2002	Annual	Equity
Guedj & Huang (2008)	ETFs are better fitted for less liquid and smaller, more specific, underlying indices. Risk-averse investors will benefit from the OEF structure, which provides some kind of insurance against liquidity.	1992 – 2006	Quarterly	Equity
Svetina & Wahal (2008)	The entry of new ETFs will increase competition. Investors will withdraw money from existing ETFs in the same asset class and investment style as well as comparable index mutual funds.	1993 – 2007	Annual	Mixed
Rompotis (2008)	ETFs and index funds (same benchmark) do not have statistically significant different returns or risk. Furthermore, ETFs have a greater tracking error, but again not significantly different.	2001 – 2002	Daily	Equity
Rompotis (2009b)	ETFs and index funds have on average the same returns and risk. This risk is similar to the risk of the benchmark, but the returns stay behind.	NA	NA	Equity
Agapova (2009)	Conventional index mutual funds and ETFs are substitutes, but not perfect substitutes. Their coexistence can be explained by a "clientele effect" on time horizon (retirement) and tax.	2000 – 2004	Monthly	Equity
Blitz, Huij & Swinkels (2009)	The well-known "Total Expense Ratio" is not a sufficient measurement tool. The large under-performance of European Funds can be attributed to the dividend withholding tax, which has a more or less equal impact as all other expenses.	2004 – 2008	Monthly	Equity

4.3 Characteristics of ETFs

Passive ETFs have a lot in common with conventional index mutual funds. However, two of the major differences are in the field of creation and trading. Institutional investors create shares of an (index) ETF by depositing shares of the companies (in the index) in a basket in return for shares in the fund. Furthermore, shares of ETFs trade continuously during the opening hours of the stock exchange. Price-making is subject to demand and supply and hence it may deviate from the calculated net asset value (NAV). Engle and Sarkar (2006) analyse the size of these premiums or discounts for several domestic and international ETFs. The exact processes for creation and redemption differ between ETFs and arbitrage is more complex and expensive for international transactions. The hypothesis that prices of international ETFs deviate more from their NAV is supported by the empirical results. The mean premium and standard deviation for the total sample were respectively 5 and 20 basis points (bps). After a statistical correction for measurement errors the new average standard deviation is 14 bps, but for the international subsample it is 77 bps. Thus, domestic ETFs are priced very closely to their NAV.

Another study that focuses on price volatility is Aber, Li and Can (2009). In their work they examine the price volatility and tracking ability of ETFs by analysing the premiums or discounts, daily returns and the tracking error compared with conventional index mutual funds. They conclude that there is a greater possibility that an ETF trades at a premium to their NAV, thus the market tends to overvalue ETFs. Besides, the price volatility was also high, allowing active day traders to make substantial returns. However, the degree of co-movement with the benchmark is roughly the same for ETFs and conventional mutual funds. Finally, a mean-variance analysis demonstrates that the Vanguard conventional mutual funds beat their corresponding iShares ETFs in terms of tracking error.

ETFs have a tax and cost advantage, but according to Bernstein (2002) these advantages are reduced or destroyed by the temptation of investors to trade frequently. Statistics show that the average holding period for the SPDR (SPY) was only ten days during the first five months of 2001. The holding period for the Nasdaq 100 Index tracker (QQQQ) was even lower with four days. Hence, short holding periods and other trading expenses (i.e. brokerage commissions) nullify the advantage of a lower expense basis for ETFs.

Swinkels and Tjong-A-Tjoe (2008) also focus on performance persistency. In their research they analyse exploitable strategies for industry momentum. The momentum anomaly, in which past winners will continue to outperform and the industries with relatively low past returns will continue to underperform. In theory this strategy will yield 5 percent per annum, as shown in earlier studies. However, when taking transaction costs (broker commissions, short selling costs, the bid-ask spread)

into consideration these arbitrage opportunities disappear. Their novelty lies in the use of sector SPDRs on the S&P 500 Index and industry ETFs on the Dow Jones Index.

Kuo and Mateus (2006) investigate 20 country-specific ETFs from the iShares stable on performance and persistence. In their analysis they use three different kinds of ratios for risk-adjusted performance measurement: Sharpe, Treynor and Sortino. They conclude that the U.S. market index (S&P 500) delivers sometimes inferior risk-adjusted returns if compared with the country-specific ETFs. Secondly, at an annual level, past performance can predict future returns.

Johnson (2009) makes a thorough examination of the tracking errors of ETFs. In his paper he addresses exclusively foreign country ETFs and the tracking error between a foreign ETF and its underlying home index. His results show among other things that the difference between trading hours for the foreign ETF and the U.S. market is a significant variable in the correlation coefficient between ETFs and their underlying home index.

Rompotis (2006) discusses the performance and trading characteristics of iShares ETFs especially. He distinguishes three types of iShares; international, market cap and sector. He also finds that ETFs trade at a premium from their NAV. Furthermore, a significant tracking error exists, particularly for international MSCI ETFs. Evidence for several correlations is found. Expense ratios, risk, the premium and trading volume affect the tracking error. Furthermore, the premium is positively influenced by the tracking error and negatively affected by volume. Finally, trading volume increases as price volatility rises.

Rompotis (2007) evaluates the seasonality and persistency of ETFs performance and volatility. Irrespective of market sector or market cap his results show a substantially positive November effect. Average daily returns, its standard deviations and the standard deviations between ETF and benchmark returns are higher. Investors could exploit this anomaly by investing only in ETFs in November. A reverse effect is observed in December, where December presents the lowest average risk. The persistence of the November patterns is weakly confirmed for performance, though the persistence in risk and tracking error is supported by strong evidence.

Table 4 – Characteristics of Exchange Traded Funds

This table presents the main conclusions from existing research. The time period is often from the beginning of the year to the end of the year. The frequency is the level at which the analysis is performed and not necessarily the level at which the data was obtained. The last column shows the asset class, which is in all cases a stock market index, or not available.

Study	*Main Conclusions*	*Period*	*Frequency*	*Class*
Bernstein (2002)	In practice the cost advantages of ETFs are greatly reduced by the short-term horizon or 'nervous' behaviour of its investors.	NA	NA	NA
Engle & Sarkar (2006)	Prices of domestic ETFs are close to their net asset value and the market supply and demand has a limited influence. International ETFs have a higher premium, but they are less actively traded and price arbitrage is more costly and complex.	2000 – 2000	Daily	Equity
Kuo & Mateus (2006)	Some country-specific MSCI ETFs deliver better risk-adjusted return than the S&P 500. Furthermore, evidence suggests performance persistency on annual base.	2001 – 2006	Monthly	Equity
Rompotis (2006)	The tracking error is affected by expense ratios, risks, trading volume and the premium above the NAV. Furthermore, in a volatile market the trading volume increases.	2005 – 2006	Daily	Equity
Rompotis (2007)	Seasonality exists for the month November. Investors could profit from this anomaly by investing in ETFs during the month November. They can outperform a buy-and-hold investor over a five year (accumulating) period.	2002 – 2006	Monthly	Mixed
Swinkels & Tjong-A-Tjoe (2008)	Industry momentum is a phenomenon that can be confirmed by tradable industry ETFs. In theory tough, taking transaction costs into account no profitable strategy exists which can be exploited.	2000 – 2007	Monthly	Equity
Aber, Li & Can (2009)	The market tends to overvalue ETFs as it is likely that ETFs sell at a premium during the day. The price volatility of ETFs is high, allowing active traders to earn a substantial amount from it. On average the ETFs are beaten by their mutual fund equivalents in terms of tracking error.	2000 – 2006	Daily	Equity
Johnson (2009)	The tracking error between a foreign ETF and its underlying home index can partly be explained by different trading hours for the foreign ETF and the U.S. market.	1997 – 2006	NA	NA

4.4 Active ETFs

To the best of our knowledge, no other paper, except Rompotis (2009a), has examined actively-managed ETFs. Rompotis (2009a) analyses the performance of three active ETFs over a six-month period. This paper adds to the existing literature by expanding the comparison between active and passive ETFs. Our data sample covers a larger time span, more products and besides a performance analysis the performance behaviour under different market trends (bull or bear market) is investigated.

Still, the fact that active ETFs are not yet widespread investment vehicles and their recent inception is a major drawback of this paper. Furthermore, this analysis focuses on the U.S. market only. Future research may focus on a direct comparison between active ETFs and actively-managed mutual funds. ETFs mainly address the narrower and less liquid indices or portfolios, as a consequence, at the moment it is not (yet) possible to match an active ETF with an actively-managed mutual fund which are subject to the same benchmark. ETFs have to disclose their holdings on a daily basis, whereas mutual funds are obliged to file their portfolio holdings every three months. It is worthwhile to analyse whether this policy makes it possible for an active ETF to generate the same alpha as a conventional mutual fund.

In addition, it could be interesting to perform a tetraptych[34] and investigate an active mutual fund, an index mutual fund, a passive ETF and an active ETF all with a claim on the same underlying index or benchmark. The transparency policy of an ETF can make it conceivable that the most successful portfolio managers are less inclined to manage an ETF, because their strategy to generate consistent alphas is showed to the world and they switch to a mutual fund. Further research will shed light on these remaining questions.

[34] A tetraptych is a four part polyptych. Traditionally used in relation to paintings consisting of multiple (wooden) panels, but nowadays also in modern language to express that an object has a certain number of aspects.

5. Data & Descriptive Statistics

As mentioned before, the inception date of active ETFs was April 11, 2008. They were introduced in the U.S. market by Invesco PowerShares Capital Management. Active ETFs have a short history compared to passive ETFs. The first passive ETF was the 'Spiders' (SPDR – Standard and Poor's Depositary Receipt) which track the performance of the S&P 500 Index. It was listed in 1993 on the American Stock Exchange (AMEX). At the moment, there are 15 active ETFs available in the U.S. market. We will investigate the performance of five of them, all from the PowerShares stable. Table 5 shows the names, tickers, corresponding benchmarks and passive ETFs for our five actively-managed ETFs. [35]

Table 5 – Sample of Active Exchange Traded Funds
This table reports the names and tickers of the five active and passive ETFs in our study.
* The corresponding benchmark for PMA, the official benchmark for MGC is the MSCI US Large Cap 300 Index.
** The corresponding benchmark for PSR, the official benchmark for VNQ is the MSCI US REIT Index.

Active ETF	Ticker	Benchmark	Passive ETF	Ticker
Active AlphaQ	PQY	NASDAQ-100 Index	PowerShares QQQ	QQQQ
Active Alpha Multi Cap	PQZ	Russell 3000 Index	iShares Russell 3000 Index	IWV
Active Low Duration	PLK	Barcl. Cap 1-3 Yr US Treasury Index	iShares Barcl. 1-3 Yr US Tr.	SHY
Active Mega Cap	PMA	Russell Top 200 Index*	Vanguard Mega Cap 300	MGC
Active U.S. Real Estate	PSR	FTSE NAREIT Equity REITs Index**	Vanguard REIT ETF	VNQ

The first three active ETFs (PQY, PQZ and PLK) have a perfect passive substitute in the sense that the corresponding passive trackers have the exact same benchmark. For the PowerShares Active Mega Cap Fund (PMA) there is no passive ETF that tries to replicate the Russell Top 200 Index. iShares has listed three ETFs (All[36], Growth and Value) on the Russell Top 200 Index on September 29 (2009), but for our analysis we will use the Vanguard Mega Cap 300 ETF with the MSCI US Large Cap 300 Index (MXUSLC:IND) as benchmark.[37] For the PowerShares Active U.S. Real Estate Fund (PSR) we encounter

[35] Not reported in Table 5 are the total expense ratios (TERs). The values for the active ETFs were already presented in Table 1 and were 0.75%, 0.75%, 0.30%, 0.75% and 0.80% for the ETFs PQY, PQZ, PLK, PMA and PSR respectively. The passive ETFs have substantial lower TERs with 0.20%, 0.20%, 0.15%, 0.13% and 0.15% for the QQQQ, IWV, SHY, MGC and VNQ respectively. In our following analysis we will not examine the total expense ratio any further. Furthermore, the TER is controversial as the following verbatim by Peter Robertson, the head of retail at Vanguard Investments shows: *"The 'T' in TER is a total misnomer because transaction costs (including tax) are so high that what investors actually pay can be very different to the TER."*

[36] The ticker of the passive ETF that tracks the Russell Top 200 Index (All) is IWL.

[37] The Russell Top 200 Index consists of the 200 companies with the largest market capitalisation in the United States and the MSCI US Large Cap 300 Index of 300 companies. However, measured by total percentage of the U.S. market (capitalization) they possess 68% and 71% respectively. Furthermore a correlation analysis on the raw total return indices and daily returns of both indices results in a 99.98% and 99.96% correlation respectively.

the same problem, no precise passive equivalent is available. In our study we will use the Vanguard REIT ETF (MGC) as passive Real Estate ETF with its benchmark, the MSCI US REIT Index.[38]

The Active AlphaQ Fund (PQY) invests in a portfolio of approximately 50 NASDAQ-listed securities. Its sub-advisor (AER Advisors) performs the stock-screening and -picking considering the stocks of companies with more than $400 million in market capitalisation. The portfolio is rebalanced on a weekly basis and stocks are selected based on strong earnings growth, low valuations and positive money flows. Because the fund managers define their universe as the 100 largest NASDAQ-listed Global Market Securities, the NASDAQ 100 Index is a logical benchmark.

The Active Alpha Multi Cap Fund (PQZ) follows the same investment approach as (PQY) but the fund managers define their universe as the 2,000 largest stocks of companies with varying capitalizations. The sub-advisor, their stock-screening and –picking is subject to the same requirements. Again, the fund invests generally in 50 stocks. Because the possible investments are selected from a broader basket, the Russell 300 Index is the logical benchmark.

The Active Low Duration Fund (PLK) invests normally over 80% of its assets in U.S. government, corporate and agency debt securities. Non-investment (junk) grade securities may not exceed 25% of the fund's total assets. Investments may be in instruments of any maturity, but the weighted average effective duration is aimed at zero to three years. Invesco Institutional (the company that acquired PowerShares) is the sub-advisor. As benchmark the Barclays Capital 1-3 Yr U.S. Treasury Index is assigned.

The Active Mega Cap Fund (PMA) invests in mega-cap stocks that meet certain liquidity requirements. The universe is defined as the holdings of the Russell Top 200 Index (its benchmark) as well as other mega-cap stocks. The sub-advisor, Invesco Institutional, selects stocks based on four main concepts: earnings momentum, price trend, management action and relative value. The logical benchmark is the Russell Top 200 Index. Since the universe is not only limited to the Russell Top 200 Index and a proper

[38] The FTSE NAREIT Equity REITs Index consists of over 100 U.S. Real Estate Investment Trusts who purchase real estate to receive rents and capital gains. Initially two alternatives were considered for the passive ETF, the FTY (iShares FTSE NAREIT Real Estate 50) and the VNQ (Vanguard REIT ETF). The first consists of the largest 50 eligible REITs (by market capitalisation) from the NAREIT Composite Index, an index who besides equity REITs also consists of mortgage REITs (invests in mortgages to receive interest) and hybrid REITs (a combination of equity and mortgage). The second ETF (VNQ) has as benchmark the MSCI US REIT Index, an index that is comprised of solely equity REITs that are included in the MSCI US Investable Market 2500 Index (85% of the US REIT universe). Furthermore price and return correlations between the FTSE NAREIT Equity REITs Index and the MSCI US REIT Index (MREIT) are higher than the correlations with the FTSE NAREIT Real Estate 50 Index (FNR5). Correlations of the MREIT are 99.98% and 99.99% respectively, compared to 99.98% and 99.94% for the FNR5. The composition of the MREIT and the correlation analysis support our choice to consider the Vanguard REIT ETF in following analyses.

passive equivalent was not available for the whole sample period, the Vanguard Mega Cap 300 ETF is a good alternative as passive counterpart. Its benchmark is the MSCI US Large Cap 300 Index.

The Active U.S. Real Estate Fund (PSR) invests predominantly in equity REITs that are included in the FTSE NAREIT Equity REITs Index (FNER). Selection, by its sub-advisor Invesco Institutional, is based on quantitative and statistical metrics to distinguish attractively priced securities and to manage risk. The not perfectly corresponding passive equivalent of PSR is the Vanguard REIT ETF (VNQ), with the MSCI US REIT Index as benchmark.

All the passive ETFs in our sample try to replicate the performance and risk-profile of their benchmark. Portfolio holdings of these ETFs are rebalanced whenever there are changes in the benchmark indices' holdings. Portfolio holdings of the active ETFs PQY and PQZ are rebalanced weekly, for the others no standard frequency is readily available, but portfolio holdings have to be disclosed on a daily basis and changes could be extracted.

PowerShares reports the performance (returns) of their ETFs on its website with respect to both the corresponding benchmark and the S&P 500 Index. Therefore, we will include a comparison with the market performance (proxy: S&P 500 Index) for the active ETFs that invest in 'pure' stock equity (PQY, PQZ and PMA).

Our data set was obtained via Thomson DataStream. Except data for the FTSE Real Estate indices (FNER and FNR5) that was extracted from Bloomberg and data for the Chicago Board Options Exchange Volatility Index (VIX) which was derived from yahoo.finance. Both daily prices as well as daily total returns were gathered. In our analysis we use total returns, as they correct for dividends and stock splits. Unfortunately total returns data for the MSCI US REIT Index (MREIT) was not available and therefore, to make the intra-cluster comparison more equal, we use daily prices for our real estate sample (PSR, FNER, VNQ and MREIT).

Table 6 shows the descriptive statistics of the ETFs and indices. Presented are the mean (average) and median daily returns, the standard deviation of the daily returns and highest and lowest observed daily return during the sample period. The sample period covers the period of May 2008 until October 2009 (380 observations) and December 2008 until October 2009 (232 observations) for the real estate ETFs. Data has been corrected for NYSE Full Closure Holidays. As mentioned in Table 1, the inception date of the first four active ETFs was April 11, 2008 and for the real estate active ETF it was November 20, 2008. We start the sample the following month to remove some series of constant daily prices (returns) stemming from the novelty and non-trading of actively-managed ETFs.

The results indicate that the active equity ETFs (PQY, PQZ) underperform their passive ETFs as well as their corresponding benchmark. However, the other actively-managed equity ETF (PMA) outperforms its benchmark, the result of the passive ETF and the passive ETF's benchmark. The active bond ETF displays the opposite of what one may expect. Here the actively-managed ETF outperforms its passive equivalent and the benchmark. Finally, the active real estate ETF has a higher average daily return than its benchmark or passive counterpart. Furthermore, the risk, as measured by the standard deviation, is not always higher for the actively-managed ETF. In fact the last two active ETFs have the lowest standard deviation within their cluster. Our results are contrary to Rompotis (2009a), who finds that the active equity ETFs are underperforming both their passive equivalents as well as their benchmarks. Moreover, his results indicate that active bond ETF outperforms its passive equivalent but not its corresponding benchmark and that overall the risk (as measured by the standard deviation of daily returns) of actively-managed ETFs is higher compared to their passive ETFs and benchmarks.

Table 6 – Descriptive Statistics

This table presents the mean and median daily return, the standard deviation and the minimum and maximum return of active ETFs, passive ETFs, benchmarks and the market (S&P 500 Index) respectively. The sample period is from 05/01/2008 till 10/30/2009, except for the fifth cluster (real estate) where the period runs from 12/01/2008 till 10/30/2009 as indicated by the last column 'Observations'. In column 'Type' the following abbreviations are used: A is actively managed, P is passively managed, B is benchmark and M is market.

Type	Description	Symbol	Mean	Median	St.dev	Min	Max	Obs.
A	Active AlphaQ Fund	PQY	-0.042%	0.000%	2.344%	-10.412%	13.569%	380
P	PowerShares Trust 1 Ser.	QQQQ	-0.010%	0.031%	2.290%	-8.951%	12.171%	380
B	NASDAQ 100 Index	NDX	-0.005%	0.043%	2.418%	-10.520%	12.580%	380
A	Active Alpha Multi Cap	PQZ	-0.092%	0.000%	2.932%	-12.371%	13.924%	380
P	iShares Russell 3000 Index	IWV	-0.037%	0.063%	2.374%	-9.067%	10.428%	380
B	Russell 3000 Index	R3000	-0.036%	0.078%	2.455%	-9.275%	11.475%	380
A	Active Low Duration Fund	PLK	0.014%	0.000%	0.674%	-2.965%	2.965%	380
P	iShares Barclays	SHY	0.013%	0.024%	0.152%	-0.659%	0.712%	380
B	BarCap 1-3 Yr US Treasury	LHTR1T3	-0.001%	0.000%	0.164%	-0.942%	0.758%	380
A	Active Mega Cap Fund	PMA	-0.028%	0.000%	2.081%	-9.172%	9.931%	380
B	Russell Top 200 Index	R200	-0.038%	0.130%	2.368%	-8.792%	11.840%	380
P	Vanguard Mega Cap 300	MGC	-0.038%	0.086%	2.302%	-8.735%	11.600%	380
B	MSCI US Large Cap 300	M300	-0.036%	0.093%	2.379%	-8.850%	11.626%	380
A	Active US Real Estate	PSR	0.286%	0.000%	3.972%	-17.200%	17.272%	232
B	FTSE NAREIT Equity REITs	FNER	0.221%	0.124%	5.127%	-19.372%	16.970%	232
P	Vanguard REIT ETF	VNQ	0.213%	-0.081%	4.943%	-19.517%	16.174%	232
B	MSCI US REIT Index	MREIT	0.229%	0.135%	5.210%	-19.739%	17.211%	232
M	S&P 500 Index	SPX	-0.037%	0.119%	2.423%	-9.026%	11.581%	380

Return data is in most cases not normally distributed. To test the normality hypothesis we use the Jarque-Bera Test (Jarque and Bera, 1980) who makes use of the skewness and kurtosis of the sample data. We have calculated the skewness and kurtosis in Microsoft Excel, which uses a slightly different formula than most business statistics textbooks.[39] Skewness is 'a measure of the degree of asymmetry of a frequency distribution'. The normal distribution assumes a symmetric frequency distribution, in which mean, median and mode are equal. The majority of our ETFs exhibit a left-skewed return distribution, because the mean is smaller than the median in those cases. Hence, we expect to find negative skewness statistics, and thus a positive skewness for distributions that are right-skewed. Kurtosis is 'a measure of the peakedness of a distribution'. A higher value indicates a more peaked distribution and the absolute kurtosis of the normal distribution is 3. To analyze the deviations from the normal distribution, the value 3 is generally subtracted to realize the relative kurtosis. Hereafter kurtosis is used to refer to relative kurtosis. A positive kurtosis means a more peaked distribution than the normal distribution and it is commonly referred to a leptokurtic distribution. The opposite is a platykurtic distribution in which the distribution is flatter than the normal distribution. The corresponding kurtosis value is negative.

Table 7 shows the skewness, kurtosis and Jarque-Bera Test statistics for our full sample return distributions. The Jarque-Bera tests the null hypothesis that the data follows a normal distribution. In fact the joint hypothesis that the skewness and kurtosis both do not differ significantly from zero is examined. As can be seen in the last column of the table, none our return distributions follow a normal distribution. These results are in line with prior findings in the field of finance.

[39] Aczel and Sounderpandian (2002) define the skewness of a population as $\sum_{i=1}^{N}\left[\frac{x_i-\mu}{\sigma}\right]^3 / N$ and their formula for absolute kurtosis of a population is as follows: $\sum_{i=1}^{N}\left[\frac{x_i-\mu}{\sigma}\right]^4 / N$. Hence, the relative kurtosis is the absolute kurtosis minus 3. MS Excel calculates the relative kurtosis directly using the function KURT. Furthermore a correction is made for small samples, for which a slightly higher number than 3 is subtracted. The MS Excel formulas for KURT and SKEW are defined as follows: $KURT = \left[\frac{n(n+1)}{(n-1)(n-2)(n-3)}\sum\left(\frac{x_i-\bar{x}}{s}\right)^4\right] - \frac{3(n-1)^2}{(n-2)(n-3)}$ and $SKEW = \frac{n}{(n-1)(n-2)}\sum\left(\frac{x_i-\bar{x}}{s}\right)^3$ In our analysis we will use the calculated MS Excel values. In the original Jarque-Bera formula we will not subtract the value 3 of the kurtosis value. The original Jarque-Bera formula is defined as follows: $JB = \frac{n}{6}\left[S^2 + \frac{(K-3)^2}{4}\right] \sim \chi_2^2\ (2)$ where n is the sample size and S and K the values for skewness and absolute kurtosis respectively. The JB-Test has an asymptotic chi-squared distribution with two degrees of freedom. The null hypothesis, that the data follows a normal distribution, is the joint hypothesis that the skewness and (relative) kurtosis are both zero.

Table 7 – Test of Normality

This table presents the skewness, kurtosis and Jarque-Bera Test-statistics for our full sample (05/01/2008 – 10/30/2009). Under a normal distribution the skewness is expected to be zero. The kurtosis is excess kurtosis from the normal value of 3. The null hypothesis is rejected at JB-Test values greater than 5.99 (95%) or 9.21 (99%).

Type	Ticker	Skewness	Kurtosis	Jarque-Bera	p-value
Active	PQY	0.3260	7.2407	836.83	0.0000
Passive	QQQ	0.3144	4.1868	283.81	0.0000
Benchmark	NDX	0.2154	4.1039	269.60	0.0000
Active	PQZ	-0.3563	4.5308	333.07	0.0000
Passive	IWV	-0.0058	2.9885	141.41	0.0000
Benchmark	R3000	0.0378	3.2928	171.76	0.0000
Active	PLK	-0.0345	5.0557	404.78	0.0000
Passive	SHY	-0.3357	3.2993	179.49	0.0000
Benchmark	LHTR1T3	-0.3275	5.0479	410.25	0.0000
Active	PMA	-0.0922	5.2381	434.98	0.0000
Benchmark	R200	0.1492	4.0682	263.45	0.0000
Passive	MGC	0.2333	4.3095	297.50	0.0000
Benchmark	M300	0.1163	3.8728	238.34	0.0000
Active	PSR	0.3310	4.0730	164.60	0.0000
Benchmark	FNER	0.0782	1.3323	17.39	0.0002
Passive	VNQ	0.0576	1.3969	18.99	0.0001
Benchmark	MREIT	0.0742	1.3272	17.24	0.0002
Market	SPX	0.0978	3.6721	214.10	0.0000

6. Methodology

6.1 Risk Adjusted Performance

In order to investigate if actively-managed ETFs provide better returns than their passive equivalents and/or benchmarks we calculate Jensen's alpha. The risk-adjusted performance regression is modelled as follows:

$$R_i - R_f = \alpha_i + \beta_i(R_m - R_f) + \varepsilon_i \quad (1)$$

where, R_i represents the daily return for the ETF i. R_m denotes the daily return on the market portfolio, which is in our case either the corresponding benchmark or the market proxy (S&P 500 Index). R_f is the risk-free rate, which is in our case the daily risk-free return on a one month U.S. Treasury Bill.[40] The coefficient α_i is Jensen's alpha. Jensen (1972) added the parameter alpha to the traditional Capital Asset Pricing Model (CAPM), to analyse the performance of mutual funds. By using the risk-adjusted returns of the ETFs we correct the returns for the level of riskiness. After all, the traditional risk-return-relationship should hold; riskier assets have a higher expected return than less riskier assets. The variable alpha measures the deviation of the observed risk-adjusted return with the expected risk-adjusted return. If the efficient market hypothesis holds and assets are correctly priced the expected alpha should not be different from zero. Outperformance occurs when the alphas are positive and significant. If the portfolio manager fails to deliver better risk-adjusted returns than the benchmark the alphas are negative. In our study we expect the alphas of passive ETFs not to be significantly different from zero, because the passive ETF tries to replicate the performance (risk and return) of the benchmark.

The aforementioned riskiness is measured by the β_i, the systematic risk of ETF i. Its degree indicates the sensitivity of the ETF's returns to the corresponding benchmark or the S&P 500. ε_i denotes the residuals of the performance regression (1).

Financial data exhibits several defects that make proper testing of variables difficult.[41] Generally speaking, no asset or security return time series follows the normal distribution. One of the violations of the classical linear regression model (CLR model) could be that the disturbances are non-spherical. In other words, the residual errors terms (ε_i) should be on average equal to zero and no relationship or trend should be existent between the terms. Two sources for this violation could be autocorrelation (or

[40] The daily return on a 1-month U.S. T-bill is used as proxy for the risk free rate. Our focus is from a U.S. investor's point of view, which chooses from the spectrum of available U.S. listed ETFs. Data is obtained from the website of Kenneth French; see the appendix for the full link.

[41] The discussion in this paragraph and the following paragraphs is based on the theory of econometrics as presented in the books by Brooks (2005) and Kennedy (2003).

serial correlation) and heteroskedasticity. The first means that the residual error term in period one gives information on the residual error term in period two. Causes lay among others things in the omission of relevant variables (e.g. misspecification of the regression) or data manipulation (e.g. using moving averages instead of raw data). The consequence for our data analysis is that the estimated coefficients alpha and beta are correctly estimated, but the standard errors of them are distorted. [42] Hence, seemingly significant coefficients may not be significant after all. The test statistic to determine autocorrelation is the Durbin-Watson statistic. EViews delivers automatically this statistic. The value lies between zero and four, where values below two indicate positive autocorrelation and values above two negative autocorrelation. A rule of thumb is that there is no significant autocorrelation if the statistic lies between 1.5 and 2.5. This Durbin-Watson Test covers only first-order autocorrelation. With the Breusch-Godfrey Serial Correlation LM Test we test for higher order autocorrelation.[43] The results indicate a high persistence in autocorrelation. Only after more than 100 trading days the information from the first residual error term will vanish from the current residual error term. To correct for autocorrelation, working with lags is time-consuming and our reported *p*-values in the empirical section are (mostly) not on the verge of the five percent critical value. Hence, we take notice of negative autocorrelation but do not correct our regression results.

The second violation, heteroskedasticity, is the problem that the variance of the residual error terms is not constant. Hence, some observations contain more information than others. This can be caused by a crisis in which the time series exhibit a lot of noise. Our sample period covers the interference at Freddy Mac and Fanny Mae, the multibillion state backing of AIG in July 2008 and the demise of Lehman Brothers on September 15, 2008. As a consequence the standard errors of the coefficients are biased (i.e. in most cases they are too low). Again, seemingly significant coefficients might be not significant at all. We test for heteroskedasticity with the White Test. The null hypothesis of homoskedasticity is rejected at *p*-values below five percent. Our results can easily be corrected in EViews using the "white-wash" option.[44]

6.2 Rating Performance

Besides Jensen's alpha we rate the performance of the ETFs. A common rating method is the Total Return that is achieved by the ETF during the sample period. Total Return is calculated by adding the

[42] For small samples the coefficients are biased themselves. At least for our total sample period we have over 200 data points; therefore we do not consider our sample small.
[43] We test for higher order autocorrelation in the residual errors for the first regression: PQY on the NASDAQ 100 Index. Our results indicate a reasonable magnitude of autocorrelation that we expect similar results for other performance regressions where the DW-Statistic exceeds 2.5 (All reported DW-Statistics are above two). Results for these Breusch-Godfrey Serial Correlation LM Tests are available upon request.
[44] EViews output is available upon request.

daily returns on an initial investment outlay of 100 and subtracting this value of 100 at the end of the sample period.

Secondly, we calculate the Sharpe ratio, or reward-to-variability ratio (Sharpe, 1966; 1994). [45] We use the revised Sharpe ratio, which is formulated as follows (2):

$$Sharpe(1994)_i = \frac{E[R_i - R_f]}{\sqrt{Var[R_i - R_f]}} \quad (2)$$

where, $R_i - R_f$ is the average daily excess return of ETF i on the risk-free rate. The denominator is the standard deviation (alternatively written as σ) of the ETF's i excess return on the risk-free rate. Because the risk-free rate is not constant during our sample period we use this revised Sharpe ratio as opposed to the original Sharpe ratio.[46] The Sharpe ratio determines how well the return of the ETF compensates the investor for the risk that is taken. A higher Sharpe ratio indicates a better performance.

Besides the Sharpe ratio we estimate the Treynor ratio, or reward-to-volatility ratio (Treynor, 1965; Treynor and Mazuy, 1966), which is expressed by the following formula (3):

$$Treynor_i = \frac{\bar{R}_i - \bar{R}_f}{\beta_i} \quad (3)$$

where, $\bar{R}_i$ is the average daily return for the ETF i and $\bar{R}_f$ denotes the average daily risk-free rate. β_i is the systematic risk of ETF i that is obtained via the performance regression (1). Likewise the Sharpe ratio, a higher Treynor ratio indicates a better performance.

Whereas the Sharpe and Treynor ratio use total risk (standard deviations from the mean, or correlations with the market), the Sortino ratio uses only downside risk (negative deviations from the average). Especially when the returns of an asset or portfolio are not normally distributed, downside risk is a better measure for investment risk. Sortino and Van der Meer (1991) measure fund performance with lower partial moments (LPM) as indicator for downside risk. The formula for LPM is shown below and it is defined as follows (4):

[45] Our time series coincide with the financial crisis and proper performance measurement in declining markets is a challenge. Some studies propose a refinement for the original Sharpe ratio, especially for bear market periods. Scholz (2007) discusses several refinements, concluding that a normalized Sharpe ratio is the preferred ex post performance measurement for any market climate except the normal (average) one. However, we cannot use this normalised Sharpe ratio as our data set covers only one and a half year and the true market parameters mean and variance cannot be estimated over a longer time period, i.e. 20 years. Hence, we will use the original Sharpe ratio without constant risk free rate for our fund rankings, but we are aware of this vulnerability.

[46] $Sharpe(1966)_i = \frac{\bar{R}_i - \bar{R}_f}{\sigma_i}$ where $\bar{R}_i$ denotes the average daily return of ETF i, $\bar{R}_f$ is the average daily risk-free rate and σ_i is the standard deviation of ETF's i return, as a proxy for risk.

$$LPM\ (\alpha, \tau) = \frac{1}{K} \sum_{t=1}^{k} \max[0, (\tau - R_i)^{\alpha}] \quad (4)$$

where, R_i is the daily portfolio performance for the ETF i, τ the target return, α the level of risk-averseness of the investor and as well the degree of LPM, and K the number of observations. Consequently, the Sortino ratio is computed as follows (5):

$$Sortino\ (\alpha, \tau) = \frac{\bar{R}_i - \tau}{\sqrt[\alpha]{LPM_{\alpha}(\tau, R_i)}} \quad (5)$$

The higher the Sortino Ratio, the better the performance and the lower the risk of large losses. An α < 1 indicates a risk loving investors, an α of 1 a risk neutral investor and a risk-averse investor has an α > 1. Technically there is no upper limit to the value of alpha. Following Kuo & Mateus (2006) we set the value of α equal to 2. In our analysis the target return (τ) is $\bar{R}_f$, the average daily risk-free rate over the total sample period (annualized 0.64%). $\bar{R}_i$ is the average daily portfolio (ETF) return as defined above.

Finally, the Jensen's alphas from the performance regression (1) are added to the rating performance review. A higher alpha indicates a better ranking. A portfolio manager adds value if the alpha is positive and significant and vice versa.

6.3 Tracking Error

Tracking error is the deviation between the performance of an index fund and the performance of its corresponding benchmark index. In other words, the portfolio managers fail to correctly replicate the performance of the underlying benchmark. In our paper we will use three different measures of tracking error, which are also described in Frino and Gallagher (2001, 2004).

The first measure of tracking error (hereafter TE_1) is the standard error of regression; the squared root of the sum of squared residuals divided by the number of observations minus the number of regression coefficients (here: α and β). As represented by the following equation:

$$TE_{1,i} = \sqrt{\frac{1}{n-2} \sum_{i=1}^{n} \varepsilon_i^2} \quad (6)$$

Following the performance regression (1), this statistic is automatically presented in the EViews regression output.

The second measure of tracking error (TE_2) that we will calculate is the average of the absolute daily differences between the returns of the ETF and the corresponding indices (benchmark and market). By

using the absolute value of return differences both positive and negative differences are considered and therefore some differences do not cancel each other out. TE_2 is expressed in the following equation (7):

$$TE_{2,i} = \frac{1}{n}\sum_{t=1}^{n}|e_{it}| \tag{7}$$

where $|e_{it}|$ is the absolute return difference in day t; $|e_{it}| = |R_{it} - R_{mt}|$ where R_{mt} is either the market or benchmark return at day t.

The last measure, TE_3, is defined as the standard deviation of return differences between ETFs and their indices. This tracking error is described by the following estimation (8):

$$TE_{3,i} = \sqrt{\frac{1}{n-1}\sum_{t=1}^{n}(e_{it} - \bar{e}_i)^2} \tag{8}$$

where e_{it} is the return difference on day t and $\bar{e}_i$ is the average return difference over the total sample period of n days.

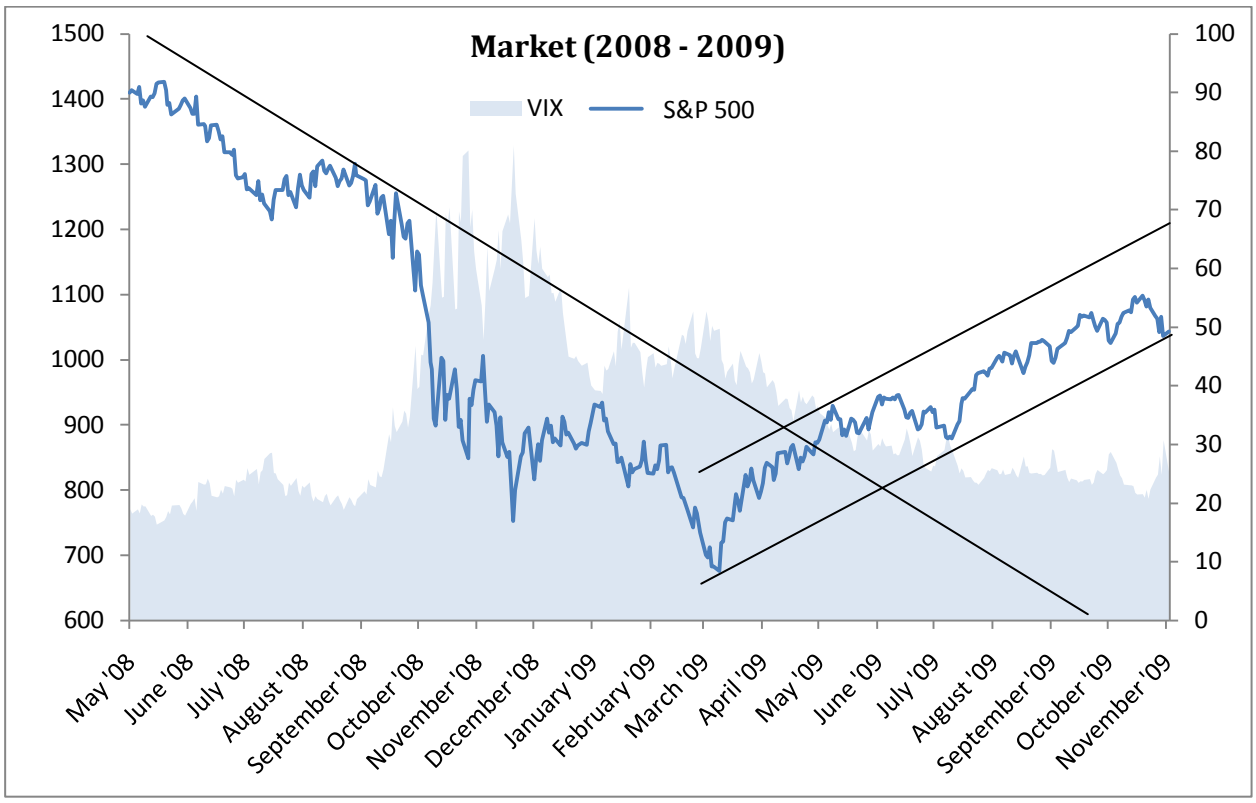
The tracking error analysis is primarily focussed at the passively-managed ETFs. Active ETFs try to outperform the market/benchmark and they should have a higher tracking error than passive ETFs. Efficient passive ETFs that aim at replicating their corresponding benchmark have a low tracking error. One may even argue that a high tracking error for an active ETF indicates the higher potential to outperform the benchmark and generate alpha.

6.4 Performance under different market trends

As mentioned before, our sample period covers the financial crisis of 2008. The performance under different market circumstances might be different. A clear-cut definition of a bull or bear market is not readily available. Fabozzi and Francis (1979) analyse the systemic risk for mutual funds in bull and bear markets. They list three different definitions to distinguish a market trend. Among others they refer to Forbes and Wiesenberger for their categorization of markets. Their last definition is the most appealing, where a positive monthly return for the market is defined as an up-market and a negative return is defined as a down-market. In our analysis we split our sample in two periods, one in which the market trend was downward and one where the trend was upward. As turning point we took the bottom of the market on March 9, 2009. The S&P 500 hit its lowest point (676.53) in years and the Dutch AEX Index was also at its lowest point (199.25) since 1995. The course of the market as well as the volatility index (VIX) is depicted in Figure 4.

As a result our bear market sample starts on May 1, 2008 and ends on March 9, 2009. Subsequently our bull market sample covers the period March 10, 2009 till October 30, 2009. The subsamples have 215 and 165 observations respectively, except for our real estate ETF analysis that has only 67 observations in the bear market period (owing to the fact that the PSR ETF was only incepted in November 2008).

Figure 4 – Market trends
This figure shows the course of the S&P 500 Index and the Volatility Index (VIX) over the period May 2008 till October 2009. The VIX is calculated by the Chicago Board Options Exchange and it is also known as the 'fear index'. A higher value indicates a more volatile investment climate, and thus more risk (uncertainty). From this figure it is clearly visible that the volatility in the market increased considerable after the bankruptcy of Lehman Brothers and the subsequent struggle to ratify the Troubled Asset Relief Program (TARP). From February/March and onwards the volatility declined steadily to more normal values, below 25.



Once we have created subsamples we will perform the same analysis as described in § 6.1 till § 6.3. Risk-adjusted performance, rating performance and tracking errors are calculated for the subsamples and compared with the total sample period averages and with each other. Results are presented in § 7.4.

7. Empirical Results

7.1 Risk Adjusted Performance

Results for the risk-adjusted performance regression are displayed in Table 8. The performance regression is executed on the corresponding index of the ETF as well as the market index, the S&P 500 in some cases. The coefficients alpha and beta are presented, together with their probability.[47] R-squared or the goodness of fit of the regression and the number of observations are shown in the last columns.

Table 8 – Performance Regression Results

This table presents the results of the risk-adjusted performance regression: $R_i - R_f = \alpha_i + \beta_i(R_m - R_f) + \varepsilon_i$ In which we estimate the alphas and betas by regressing the risk-adjusted daily return of the ETF i on the risk-adjusted daily return of the corresponding benchmark index or the market index (the S&P 500 Index). R_i represents the daily return for the ETF i. R_m denotes the return of the market portfolio and R_f is the risk-free rate. T-tests are performed to test whether the alpha coefficients differ significantly from zero and the estimated betas from unity.

Type	Symbol	Underlying	α	Prob.	β	Prob.	R^2	Obs.
Active ETF	PQY	NASDAQ 100 Index	-0.039%	0.633	0.717	0.000	0.548	380
Passive ETF	QQQQ	NASDAQ 100 Index	-0.005%	0.768	0.938	0.000	0.981	380
Active ETF	PQY	S&P 500 Index	-0.017%	0.844	0.694	0.000	0.514	380
Passive ETF	QQQQ	S&P 500 Index	0.023%	0.570	0.886	0.000	0.879	380
Active ETF	PQZ	Russell 3000 Index	-0.059%	0.524	0.940	0.284	0.619	380
Passive ETF	IWV	Russell 3000 Index	-0.003%	0.765	0.963	0.000	0.992	380
Active ETF	PQZ	S&P 500 Index	-0.057%	0.541	0.946	0.347	0.611	380
Passive ETF	IWV	S&P 500 Index	-0.001%	0.932	0.974	0.011	0.987	380
Active ETF	PLK	Barclays 1-3 Yr US Tr. Index	0.013%	0.700	0.401	0.135	0.009	380
Passive ETF	SHY	Barclays 1-3 Yr US Tr. Index	0.013%	0.002	0.778	0.000	0.699	380
Active ETF	PMA	Russell Top 200 Index	-0.012%	0.893	0.467	0.000	0.282	380
Passive ETF	MGC	MSCI US Large Cap 300 Index	-0.004%	0.811	0.958	0.002	0.982	380
Active ETF	PMA	S&P 500 Index	-0.013%	0.889	0.460	0.000	0.287	380
Passive ETF	MGC	S&P 500 Index	-0.003%	0.855	0.941	0.000	0.981	380
Active ETF	PSR	FTSE NAREIT Equity REITs Ind.	0.206%	0.367	0.361	0.000	0.218	232
Passive ETF	VNQ	MSCI US REIT Index	-0.003%	0.914	0.944	0.000	0.991	232

Jensen's alpha shows the risk-adjusted excess returns of the ETFs and according to our results none of the results, except the SHY α_b, are significantly different from zero at the 1% level.[48] Most estimates are

[47] Probabilities for the alphas are generated by EViews automatically. The null hypothesis that the alpha coefficient does not significantly differ from zero is rejected at probability levels smaller than 0.05 (95% confidence level). Whether betas differ significantly from unity (1) is analyzed with the Wald-Test in which the normalized restriction -1 + β = 0 is tested. The same significance level, or probability of a type I error is used; 5%.

[48] The subscript *b* or *m* for alphas and betas, here and in the following paragraphs, refers to the underlying index, where *b* stands for the corresponding benchmark and *m* for the market index (S&P 500 Index).

negative, which is in line with prior results of Rompotis (2009a). However, all his alpha estimates are negative and here some of them have positive values. Furthermore, the aforementioned SHY α_b is one of those positives, although small, but something that is not expected for a passive ETF who tries to replicate the benchmark. Moreover, a priori the alpha of the benchmark is estimated at zero and the majority of negative alphas indicate that both active and passive ETFs perform worse than their indices. As a result of several expenses (TER) we expect passive ETFs to perform slightly worse than their benchmark, but actively-managed ETFs should beat the market and offer their investors above average (excess) returns. The results in table 8 are in line with prior work on the mutual fund industry by Blake et al. (1993), Malkiel (1995) and Gruber (1996). However, our results do not indicate a significant underperformance in relation to the benchmark or market returns for all ETFs. Finally, it should be noted that our sample period covers the financial (credit) crisis of 2008, a period that is characterized by high volatility (VIX) and financial distress. Judgement about the skills of the active ETF managers is intricate, therefore we will come back on this feature in §7.4 where the stock market rally of March 2009 and onwards is discussed.

Considering beta estimates, only three (four) betas are *not* significantly different than unity at the 5% (1%) level. They are the benchmark and market beta for the second actively-managed ETF: PQZ β_b and PQZ β_m and the benchmark beta for the third active ETF: PLKβ_b. (On the 1% level also the market beta for the second passive ETF: IWVβ_m). The PLK β_b is an oddity, as all beta estimates are significantly different from zero (as displayed in the standard coefficient test in EViews) except the PLK β_b. Thus, the PLK β_b is not significantly different from zero nor unity.[49]

Beta can be seen as a measure of aggressiveness of the manager. Our results show that all active ETF betas are lower than their passive ETF counterpart betas. Thus, the actively-managed ETFs are less aggressive than the market and its passive equivalents. These results make perfectly sense, as during a bear market investors seek some kind of protection. A more conservative investment approach makes the capital less sensitive to broad market movements.[50] However, in a bull market the fund's return will lack the performance of the benchmark/market return. In our total sample, which can be referred to as a bear market, the lower sensitivities of the active ETFs to the market have not protected them for a greater loss in value than the market portfolio. At least this holds for two of them (PQY, PQZ), whereas the active bond ETF (PLK) underperforms the passive equivalent (SHY) and PMA and PSR exhibit better performances than the market (based on Total Returns).

[49] EViews output is available upon request.
[50] In a downward market the portfolio loses less value, but in an upward market the portfolio gains less value.

7.2 Rating Performance

In this section we discuss the rating performance of the active and passive ETFs and their corresponding indices. The criteria that are used are the Total Return, Sharpe ratio, Treynor ratio, Sortino ratio and Jensen's alpha. The results can be found in Table 9. As we have run two types of risk-adjusted performance regressions, one on the benchmark and one the market (S&P 500), we have two beta estimates for our stock market equity ETFs and therefore we can compute two different Treynor ratios for them. The same holds for our alpha estimates resulting in two Jensen's alpha statistics.[51]

Table 9 – Performance Rating

This table presents the performance rating of our ETFs and the benchmark performance. The results are grouped and we analyse the performance with Total Return, the Sharpe Ratio, the Treynor ratio, the Sortino ratio and Jensen's alpha following the risk-adjusted performance regression. For the first, second and fourth ETF group we have regressed the returns on both the corresponding benchmark and a wide market proxy (the S&P 500). Therefore multiple Treynor and Jensen statistics are presented for those cases.

Type	Symbol	Total Return	Sharpe	Treynor$_b$	Treynor$_m$	Sortino	Jensen α_b	Jensen α_m
Active ETF	PQY	-23.073	-0.019	-0.062	-0.064	-0,026	-0.039%	-0.017%
Passive ETF	QQQ	-12.656	-0.005	-0.013	-0.014	-0,007	-0.005%	0.023%
Benchmark	NDX	-12.221	-0.003	-0.008	NA	-0,005	0.000%	NA
Active ETF	PQZ	-40.306	-0.032	-0.101	-0.100	-0,043	-0.059%	-0.057%
Passive ETF	IWV	-22.055	-0.017	-0.041	-0.041	-0,023	-0.003%	-0.001%
Benchmark	R3000	-22.085	-0.016	-0.038	NA	-0,021	0.000%	NA
Active ETF	PLK	4.733	0.018	0.030	NA	0,025	0.013%	NA
Passive ETF	SHY	5.054	0.069	0.014	NA	0,099	0.013%	NA
Benchmark	LHTR1T3	-0.311	-0.020	-0.003	NA	-0,027	0.000%	NA
Active ETF	PMA	-17.314	-0.015	-0.066	-0.067	-0,021	-0.012%	-0.013%
Benchmark	R200	-22.072	-0.017	-0.040	NA	-0,024	0.000%	NA
Passive ETF	MGC	-21.679	-0.018	-0.042	-0.043	-0,025	-0.004%	-0.003%
Benchmark	M300	-21.563	-0.016	-0.038	NA	-0,022	0.000%	NA
Active ETF	PSR	61.923	0.072	0.790	NA	0,113	0.206%	NA
Benchmark	FNER	23.170	0.043	0.220	NA	0,064	0.000%	NA
Passive ETF	VNQ	23.441	0.043	0.225	NA	0,064	-0.003%	NA
Benchmark	MREIT	24.192	0.044	0.228	NA	0,065	0.000%	NA
Market	SPX	-22.348	-0.016	NA	-0.040	-0,023	NA	0.000%

Our results are not unambiguous. Considering the first two active ETFs (PQY and PQZ), they underperform their passive equivalents, their benchmark and the market on all five types of performance rating. This is in line with our expectations derived from the risk-adjusted performance

[51] Parameters denoted with subscript *b* or *m* refer to the benchmark or market respectively.

regression analysis. Furthermore, the Sharpe, Treynor and Sortino statistics are negative, indicating that performance return was lower than the risk-free rate. Moreover, the passive ETFs (QQQQ and IWV) display generally slightly lower ratings than their benchmark. The results of the first two ETFs are in line with prior findings by Rompotis (2009a). He also finds that the order from best to worst investment vehicle is the benchmark, passive ETF and ultimately the actively-managed ETF.

The third cluster comparison in our analysis, the active bond ETF (PLK), shows a different picture. Here the active and passive ETF are both performing better than their benchmark. However to make a distinction between the active and passive ETF is more difficult due to mixed results. Based on Total Return, Sharpe and Sortino the passive ETF (SHY) is the most attractive, but according to the Treynor ratio the active ETF is delivering better risk-adjusted returns. As mentioned above, the PLK β_b is a peculiar estimate, therefore we may argue that here the passive ETF is the best performer. As a consequence of the investment asset class (bonds), we do not compare our results with the market proxy, the S&P 500.[52]

The fourth ETF sample focuses on U.S. large-cap companies. According to our results the active ETF (PMA) is the most attractive investment vehicle based on its Total Return, Sharpe ratio and Sortino ratio. This is compared to its own corresponding benchmark, its non-equivalent passive ETF counterpart and its corresponding benchmark, and the market index. The passive ETF (MGC) is superior to PMA based on Jensen's alpha and the Treynor ratio, but we know from our earlier analysis that those alpha results were not significant.

Finally we analyse the real estate active ETF (PSR) which is on all criteria the superior of its own benchmark, its non-equivalent passive counterpart and its benchmark, the market and on all occasions the best of our total sample. All real estate investment vehicles deliver positive total returns and subsequently positive Sharpe, Treynor and Sortino ratios. Of course their investment style is very different than the other three active equity ETFs. The real estate ETFs invest in REITs, which are companies who invest in real estate by ownership. Those REITs receive the capital gains on the appreciation in property, but more important they receive rents. In the world as of 2008, where property prices crashed, those rents are steady streams of income.

Overall three out of five actively-managed ETFs are underperforming their passive equivalents. Active management yields better returns in real estate and in one stock market equity ETF focussing on large-

[52] Rompotis (2009a) finds the benchmark to be the best investment based on performance rating and average daily return. Second the actively-managed ETF and finally the passive ETF. Here, in our results the benchmark is the worst performer both on rating performance as well as on average daily return. This peculiar result may origin from the dataset from Thomson DataStream.

caps. In downturns, REITs and bonds offer a safe haven for investors. However, these results are based on a period with a significant market crash and strong recovery afterwards. In § 7.4 we will analyse the rating performance under different market trends and we will investigate if the above results still hold or that some ETFs perform better.

7.3 Tracking Error

In this segment of the paper we present the estimations of ETF's tracking error. The tracking error is the deviation between the returns of the ETFs and their indices. Our estimations are presented in Table 10. The first three columns display the results of the three different types of tracking error and the last column shows the average tracking error of the three alternative estimates.

Table 10 – Tracking Errors

This table presents the estimations of tracking error. The tracking error is the deviation between the return on the investment vehicle (ETF) and the underlying index. We have computed three different measures, where TE_1 reflects the standard error of ETF's i performance regression, TE_2 is the absolute average return difference between the ETF i and the underlying index and TE_3 is the standard deviation of the return difference between the ETF and its underlying index. The last column displays the equally-weighted average of the three tracking errors.

Type	Symbol	Underlying	TE_1	TE_2	TE_3	Average
Active ETF	PQY	NASDAQ 100 Index	1,579%	1,131%	1,719%	1,476%
Passive ETF	QQQQ	NASDAQ 100 Index	0,319%	0,182%	0,352%	0,284%
Active ETF	PQY	S&P 500 Index	1,636%	1,159%	1,795%	1,530%
Passive ETF	QQQQ	S&P 500 Index	0,798%	0,620%	0,844%	0,754%
Active ETF	PQZ	Russell 3000 Index	1,811%	1,284%	1,815%	1,637%
Passive ETF	IWV	Russell 3000 Index	0,213%	0,150%	0,231%	0,198%
Active ETF	PQZ	S&P 500 Index	1,831%	1,308%	1,834%	1,658%
Passive ETF	IWV	S&P 500 Index	0,266%	0,179%	0,273%	0,240%
Active ETF	PLK	BarCap 1-3 Yr US Tr.	0,671%	0,408%	0,678%	0,586%
Passive ETF	SHY	BarCap 1-3 Yr US Tr.	0,084%	0,064%	0,091%	0,079%
Active ETF	PMA	Russell Top 200 Index	1,766%	1,371%	2,169%	1,768%
Passive ETF	MGC	MSCI US Large Cap 300 Index	0,313%	0,184%	0,328%	0,275%
Active ETF	PMA	S&P 500 Index	1,760%	1,395%	2,191%	1,782%
Passive ETF	MGC	S&P 500 Index	0,315%	0,205%	0,346%	0,289%
Active ETF	PSR	FTSE NAREIT Equity REITs Index	3,521%	3,094%	4,802%	3,805%
Passive ETF	VNQ	MSCI US REIT Index	0,475%	0,386%	0,556%	0,472%

In all cases the tracking errors of the actively-managed ETFs are higher than their passive equivalents. This relationship holds for both the return comparison between the ETF and its corresponding benchmark as well as between the ETF and the market index, the S&P 500 Index.

The smallest average tracking error is observed for the passive bond ETF (SHY). Furthermore its active counterpart (PLK) has the lowest tracking error for the active ETF sample. These results are in line with Rompotis (2009a), who also finds the bond ETFs to have the lowest tracking error. The reported Total Expense Ratio (TER), a source for tracking error, is also the lowest for the active bond ETF (0.30%) compared to active equity ETFs (0.75%).

Considering the 'pure' active equity EFTs, the PMA (on the Russell Top 200 Index) has the highest tracking error. This also the one with highest Total Return, the best rating performance and the least negative alpha compared to PQY and PQZ. The real estate active REIT ETF has the highest tracking error (on average 381 bps).

Our results are reasonable and expectable in the light of the strategy of active ETFs. Passively-managed ETFs that try to replicate their corresponding benchmark should not have a high tracking error and the tracking errors of active ETFs should be higher in order to make it possible to beat the market. In that manner, tracking error is a necessarily condition to generate alpha returns.

7.4 Performance under different market trends

Our total sample period covers the period May 1, 2008 till October 30, 2009. This period is characterized as a very volatile period. The credit crisis of 2008 let the markets crash in autumn/winter 2008, but the last three-quarter of a year (2009) we see some strong recovery in the stock market. As explained in §6.4 we have created two subsamples, one for the bear market period (downward price movements) and one for the bull market period (upward price trend). Descriptive statistics for the bull market period, starting March 10 (2009) till the end of our sample period (October 30, 2009) are presented in table 11. Descriptive statistics for the bear market period can be found in the appendix (A.4).[53]

In the bull market all mean returns are positive, except for the benchmark for bond ETFs (LHTR1T3), which is an oddity. The reduction in volatility is shown by the reported minimum and maximum daily returns for the ETFs and benchmark indices. All minimum returns are much lower than for the total sample. This holds for the maximum returns too, exceptions are three real estate investment vehicles (FNER, VNQ, and MREIT). Furthermore, the standard deviation gives a clear insight into the reduced variability.

[53] Tables 8, 9 and 10; displaying the risk-adjusted performance regression results, performance ratings and tracking errors respectively for the total sample are also available for the bull and bear market period. They can be found in Appendix A.5 till A.10. Here we will focus on the differences between the two sample periods (bull and bear) solely.

Table 11 – Descriptive Statistics 03/10/09 – 10/30/09

This table presents the mean and median daily return, the standard deviation and the minimum and maximum return of active ETFs, passive ETFs, benchmarks and the market (S&P 500 Index) respectively. The sample period is from 03/10/2008 till 10/30/2009 resulting in a total number of 165 observations. In column 'Type' the following abbreviations are used: A is actively managed, P is passively managed, B is benchmark and M is market.

Type	Description	Symbol	Mean	Median	St.dev	Min	Max	Obs.
A	Active AlphaQ Fund	PQY	0,231%	0,056%	1,565%	-4,416%	4,401%	165
P	PowerShares Trust 1 Ser.	QQQQ	0,296%	0,220%	1,518%	-3,202%	6,176%	165
B	NASDAQ 100 Index	NDX	0,299%	0,241%	1,570%	-3,290%	6,569%	165
A	Active Alpha Multi Cap	PQZ	0,227%	0,229%	1,782%	-5,587%	6,853%	165
P	iShares Russell 3000 Index	IWV	0,286%	0,268%	1,662%	-4,495%	7,285%	165
B	Russell 3000 Index	R3000	0,287%	0,266%	1,694%	-4,489%	7,152%	165
A	Active Low Duration Fund	PLK	0,017%	0,000%	0,558%	-1,924%	1,998%	165
P	iShares Barclays	SHY	0,007%	0,008%	0,115%	-0,659%	0,375%	165
B	BarCap 1-3 Yr US Treasury	LHTR1T3	-0,007%	0,000%	0,127%	-0,688%	0,483%	165
A	Active Mega Cap Fund	PMA	0,250%	0,000%	1,448%	-3,673%	5,927%	165
B	Russell Top 200 Index	R200	0,267%	0,244%	1,557%	-4,150%	6,940%	165
P	Vanguard Mega Cap 300	MGC	0,271%	0,248%	1,518%	-4,032%	6,754%	165
B	MSCI US Large Cap 300	M300	0,272%	0,241%	1,577%	-4,162%	6,966%	165
A	Active US Real Estate	PSR	0,413%	0,000%	3,663%	-10,794%	14,654%	165
B	FTSE NAREIT Equity REITs	FNER	0,459%	0,207%	4,365%	-11,049%	16,970%	165
P	Vanguard REIT ETF	VNQ	0,452%	0,126%	4,152%	-10,296%	16,174%	165
B	MSCI US REIT Index	MREIT	0,468%	0,210%	4,430%	-11,215%	17,211%	165
M	S&P 500 Index	SPX	0,280%	0,278%	1,630%	-4,276%	7,098%	165

Based on the mean returns, our conclusions derived from the total sample do not differ much from the conclusions based on this sample. Moreover, these results indicate that the active equity ETFs (PQY, PQZ) underperform their corresponding benchmark. In the bull market period the PMA ETF does not outperform its passive equivalent, the benchmark index or the market index (which it did in our full sample). The active REIT ETF (PSR) is performing the worst compared to its benchmark or passive counterpart. In our total sample, PSR had the highest daily average return, but here the MSCI US REIT Index is the obvious superior. Finally the ranking order for our bond ETF group does not change, the active bond ETF is again the investment vehicle with the highest mean return.

However, to make a better comparison of the bull and bear market period we will compute relative rankings for the investment vehicles in the five groups of ETFs. Table 12 presents the rankings for our descriptive statistics. All four characteristics are ranked on a descending order irrespective of the desirability of a high or low value.

Table 12 – Descriptive statistics under different market trends

This table presents the relative rankings based on mean, standard deviation, minimum and maximum daily return respectively. All ranking are descending, that is the highest value receives the number one position. The original input sources for this computed table are Table 11 and Table A.4 in the Appendix at the end of this paper.

Type	Symbol	Mean		St.dev		Min		Max	
		Bull	*Bear*	*Bull*	*Bear*	*Bull*	*Bear*	*Bull*	*Bear*
Active	PQY	***3***	***3***	***2***	***2***	3	2	3	1
Passive	QQQ	***2***	***2***	***3***	***3***	***1***	***1***	2	3
Benchmark	NDX	***1***	***1***	***1***	***1***	2	3	1	2
Active	PQZ	***3***	***3***	***1***	***1***	***3***	***3***	3	1
Passive	IWV	***2***	***2***	***3***	***3***	2	1	1	3
Benchmark	R3000	***1***	***1***	***2***	***2***	1	2	2	2
Active	PLK	1	2	***1***	***1***	***3***	***3***	***1***	***1***
Passive	SHY	2	1	***3***	***3***	***1***	***1***	***3***	***3***
Benchmark	LHTR1T3	***3***	***3***	***2***	***2***	***2***	***2***	***2***	***2***
Active	PMA	4	1	***4***	***4***	1	4	***4***	***4***
Benchmark	R200	3	2	***2***	***2***	3	2	2	1
Passive	MGC	2	4	***3***	***3***	2	1	3	3
Benchmark	M300	1	3	***1***	***1***	4	3	1	2
Active	PSR	4	1	***4***	***4***	2	1	4	1
Benchmark	FNER	2	3	***2***	***2***	3	2	2	3
Passive	VNQ	3	4	***3***	***3***	1	3	3	4
Benchmark	MREIT	1	2	***1***	***1***	***4***	***4***	1	2

As is shown in Table 12, the ranking order based on average daily return does not change for the first two groups of ETFs. For the bond ETFs the active bond ETF has a higher average mean ranking in the bull market than in the bear market and the benchmark is in both market circumstances the worst performing. For the last two groups of ETFs, the active ETFs are least attractive in the bull market, but the most favourable in the bear market based on average daily return. The results are in line with prior findings for the total sample, in which the last two active ETFs had very low betas (below 0.5). Irrespective its relative ranking the passive ETFs have in both markets a lower average return than their corresponding benchmark. This indicates that the passively-managed ETFs fail to perfectly replicate the performance of their corresponding benchmarks.

The second column displays the standard deviation ranking and it is notable that these relative rankings do not differ under different market circumstances. The fact that the last two active ETFs (PMA and PSR) have a relatively low standard deviation also explains partly their high ranking in the bear market and subsequent low ranking in the bull market. Their returns are more smoothed.

Secondly, we focus on the performance regression. Comparing the betas in the bull market period with the bear market period, we see that in both periods the benchmark (β_b) and market betas (β_m) for the active ETFs are lower than the reported betas for the passive equivalents. These results are in line with our total sample results. However, an exception exists for our second active ETF (PQZ), the benchmark and market beta is higher than the passive ETF betas in the bear market period. This result is in line with Rompotis (2009a) who also finds the beta of PQZ to be higher than the beta of IWV in his sample period. We may argue that the betas have diminished during the roll out of the financial crisis; hence the manager of PQZ has decreased its exposure to the market due to the high volatility (uncertainty). The fact that in our bull market sample the betas are still below the betas of the passive counterparts can be seen in the light of the uncertainty of the persistence of the market rally (double-dip or not). In other words, the managers of the actively-managed ETFs perform a less aggressive investment style.

The risk-adjusted excess returns (Jensen's alphas) are in both periods not significantly different from zero. The exception for the full sample, the benchmark beta for the passive bond ETF (SHY α_b), is present in both subsamples. In the bull market this alpha is significantly different from zero at the 1% level and in the bear market at the 5% level.

Our third analysis focuses on the performance ratings. Table 13 shows the rankings based on the different performance rating measures. The table displays Total Return, Sharpe, Treynor, Sortino, Jensen's alpha and a column Total. The latter is formed by the mode of the preceding individual rankings, except Jensen's alpha which is not taken into account.[54] Our results are mixed. The first two actively-managed ETFs (PQY, PQZ) get the worst rating under most rating criteria. The active REIT ETF (PSR) gets the best rating under all circumstances except total return in a bull market. Furthermore, the benchmark receives generally a higher ranking order in a bear market period compared to the ETFs, but once more it is difficult to derive hard conclusions based on this performance rating ranking.

[54] The alpha for the performance regression of the benchmark on the corresponding benchmark is zero. Therefore in a bear market the alphas of the benchmark are likely to show the best 'performance' and the other way round in a bull market. The main emphasis in this analysis lies on the comparison between the active and passive ETFs.

Table 13 – Performance rating under different market trends

This table presents the relative rankings based on Total Return, Sharpe, Treynor, Sortino, Jensen's alpha and a summarized performance ranking based on the mode of the preceding individual ratings. The column Jensen's alpha is not taken into account for the total ranking in the last column due to non-reported results for the benchmarks. All rankings are descending, that is the highest value receives the number one position

Type	Symbol	Total Return		Sharpe		Treynor$_b$		Sortino		Jensen α_b		Total	
		Bull	*Bear*	*Bull*	*Bear*	*Bull*	*Bear*	*Bull*	*Bear*	*Bull*	*Bear*	*Bull*	*Bear*
A	PQY	***3***	***3***	***3***	***3***	2	3	***3***	***3***	***2***	***2***	***3***	***3***
P	QQQQ	***2***	***2***	1	2	1	2	1	2	***1***	***1***	1	2
B	NDX	***1***	***1***	2	1	3	1	2	1	-	-	2	1
A	PQZ	***3***	***3***	3	1	***3***	***3***	3	1	***2***	***2***	***3***	***3***
P	IWV	2	1	1	3	***2***	***2***	1	3	***1***	***1***	2	3
B	R3000	1	2	***2***	***2***	***1***	***1***	2	2	-	-	1	2
A	PLK	1	2	***2***	***2***	***1***	***1***	***2***	***2***	***1***	***1***	1	2
P	SHY	2	1	***1***	***1***	***2***	***2***	***1***	***1***	***2***	***2***	2	1
B	LHTR1T3	***3***	***3***	***3***	***3***	***3***	***3***	***3***	***3***	-	-	3	3
A	PMA	4	1	2	3	1	4	1	3	1	2	1	3
B	R200	3	2	4	2	4	1	2	4	-	-	4	2
P	MGC	2	4	1	4	2	3	4	2	2	1	2	4
B	M300	1	3	3	1	3	2	3	1	-	-	3	1
A	PSR	4	1	***1***	***1***	***1***	***1***	***1***	***1***	***1***	***1***	***1***	***1***
B	FNER	3	2	4	3	4	3	4	3	-	-	4	3
P	VNQ	2	3	2	4	2	4	2	4	***2***	***2***	2	4
B	MREIT	1	4	3	1	3	2	3	2	-	-	3	2

In our previous analysis in §7.2 we concluded that three out of five actively-managed ETFs were underperforming their passive equivalents (based on Total Return). Here, we find four underperformers in the bull market and three in the bear market respectively. Our earlier conclusions for the first two active ETFs (PQY and PQZ) do not change under a different market trend. The last active ETF (PSR), performs best under both market circumstances and the earlier statement that REITs offer a safe haven for investors (only) in times of deteriorating markets cannot hold.

Our final analysis focuses on the tracking errors. Table 14 presents the average tracking errors for the bear, bull and full sample. The conclusions that we have derived in section § 7.3 are still valid. The tracking errors of the active ETFs are higher than their passive equivalents under all market circumstances/trends and these results hold against both benchmark and S&P 500 Index.

The passive bond ETF (SHY) displays the smallest average tracking error and the active bond ETF (PLK) exhibits the smallest tracking error of all active ETFs. The results are in line with prior findings and the findings by Rompotis (2009a). Considering the 'pure' active equity EFTs, the PMA (on the Russell Top

200 Index) has the highest tracking error in the bear market sample, but the lowest in the bull market sample. Comparing the Total Returns between those three active ETFs does not explain the tracking error difference, in all occasions the PMA has the highest Total Return compared to PQY and PQZ. Further, the active REIT ETF holds the largest tracking error in all circumstances.

Table 14 – Average Tracking Errors under different market trends

This table presents the average tracking errors. The tracking error is the deviation between the return of the investment vehicle (ETF) and the underlying index. We have computed three different measures and here we display the equally-weighted average of the three tracking errors for the bear, bull and full sample.

Type	Symbol	Underlying	TE_{BEAR}		TE_{TOTAL}		TE_{BULL}
Active ETF	PQY	NASDAQ 100 Index	1.815%	>	1.476%	>	0.924%
Passive ETF	QQQQ	NASDAQ 100 Index	0.337%	>	0.284%	>	0.200%
Active ETF	PQY	S&P 500 Index	1.841%	>	1.530%	>	1.036%
Passive ETF	QQQQ	S&P 500 Index	0.858%	>	0.754%	>	0.599%
Active ETF	PQZ	Russell 3000 Index	1.852%	>	1.637%	>	1.080%
Passive ETF	IWV	Russell 3000 Index	0.227%	>	0.198%	>	0.138%
Active ETF	PQZ	S&P 500 Index	1.870%	>	1.658%	>	1.093%
Passive ETF	IWV	S&P 500 Index	0.273%	>	0.240%	>	0.165%
Active ETF	PLK	BarCap 1-3 Yr US Tr.	0.649%	>	0.586%	>	0.493%
Passive ETF	SHY	BarCap 1-3 Yr US Tr.	0.094%	>	0.079%	>	0.057%
Active ETF	PMA	Russell Top 200 Index	2.261%	>	1.768%	>	0.886%
Passive ETF	MGC	MSCI US Large Cap 300 Index	0.349%	>	0.275%	>	0.137%
Active ETF	PMA	S&P 500 Index	2.277%	>	1.782%	>	0.898%
Passive ETF	MGC	S&P 500 Index	0.361%	>	0.289%	>	0.158%
Active ETF	PSR	FTSE NAREIT Equity REITs Index	5.461%	>	3.805%	>	3.009%
Passive ETF	VNQ	MSCI US REIT Index	0.517%	>	0.472%	>	0.452%

8. Concluding Remarks

In our study we focused on the performance of actively-managed ETFs or active ETFs. They are a rather new phenomenon in the world of the investment fund industry. Passively-managed ETFs or index-trackers are already widespread known and used. Those passive ETFs were an answer to the mutual fund industry, which did not deliver the promised returns and failed to beat the benchmark (market). The central idea behind actively-managed ETFs is to combine the best of both worlds. Thus, the transparency, relatively low costs, flexibility, diversification and liquidity from the traditional passive trackers, however by further acquiring the option to outperform the benchmark and generate alpha.

To the best of our knowledge no prior research on the performance of active ETFs has been published, except a working paper by Rompotis (2009a). The active vs. passive management debate has been widely covered for the mutual fund industry. For instance Blake et al. (1993), Malkiel (1995) and Gruber (1996) show that actively-managed funds do generally not outperform the market indices or their passively-managed equivalents. This paper adds to the existing literature by expanding the comparison between active and passive management in the ETF industry.

We analysed five actively-managed ETFs over an eighteen-month period, starting May 1, 2008. Three of the active ETFs focus on a broad stock market equity index, one of them is a bond ETF and the last one invests in REITs. All investment vehicles are listed in the United States and therefore the performance is also compared to the performance of a broad market index, the S&P 500. Furthermore, because our time series covers the financial crisis of 2008, we have made two subsamples. The first sample, in which the markets follow a downward trend, runs from May 2008 till the ninth of March (2009). The second sample consequently covers the period March 10 till the end of October 2009.

Our results can be summarized as follows: Considering the raw descriptive statistics, we find that the active ETFs generally underperform their passive ETFs as well as their corresponding benchmark. One active equity ETF and the active REIT ETF displayed higher average daily returns than their passive counterparts in the full sample, but during a bull market rally they were underperformers too. We cannot conclude that active ETFs are more risky than the passive counterparts, as the standard deviations present mixed results.

Secondly, we focus on risk-adjusted performance, as expressed by Jensen's alpha. The results do not indicate that the active ETF managers achieve significant excess returns with respect to the risk-adjusted performance of their passive ETF counterparts or the average market returns of the S&P 500 Index. The results are not influenced by market circumstances, because in our subsample periods the alphas do not

differ significantly from zero either. There exists one exception, the passive bond ETF (SHY) who has a significant alpha of 0.013%, but this is awkward and the cause may lie in the benchmark dataset.

The aforementioned underperformance of actively-managed ETFs does not to be proven unanimous from the performance ratings. Based on Total Return the active ETFs deliver a worse performance than their passive equivalents. However, an exception is the active REIT ETF, who has overall the highest total return, but lacks behind in the bull market period. Furthermore, in downturns, REITs and bonds offer a safe haven for investors.

Considering the other performance ratings and comparing the bull with the bear market we obtain mixed results. We may conclude that the benchmark receives generally a higher ranking order in a bear market period compared to the ETFs. Furthermore, our first two actively-managed ETFs (PQY; PQZ) get the worst rating under most rating criteria. The active REIT ETF (PSR) gets the best rating under all circumstances except for Total Return in a bull market.

Our final analysis focuses on the tracking ability of ETFs. We find that the actively-managed have a greater tracking error than their passive counterparts. This makes perfect sense, as the aim of the active ETF is to beat the market and passive ETFs follow a replication strategy. Our conclusion does not change when taking into account different market trends.

Concluding, our empirical results about the performance of actively-managed ETFs are in line with prior work of Rompotis (2009a) or other studies focussing on active vs. passive management in the mutual fund industry. Active ETFs lack significant risk-adjusted excess returns and they are therefore not adding value compared to passive trackers. These results may indicate a lack of skills for the active ETF manager, which is also confirmed by other studies. To correct our results for the stock market crash we have split our sample period in two subsamples, however our conclusions do not change as a consequence of different market trends. The detected relative rankings for our ETFs are not specific for the ETF industry. In downward markets bonds and real estate are generally performing better than ordinary stocks and these characteristics are also observed for the bond and REIT ETFs

Returning to our subject of research and in the perspective of the recent developments in the ETF industry, one may dispute the existence of actively-managed ETFs. However, the demand by investors may be supported by psychological factors that, for instance direct influence on an asset or object will automatically result in controllability. But, at least "*to Wall Street, active ETFs make sense, as the*

majority of open-end mutual-fund assets are under active management."[55]Higher management fees can be charged than for passive index trackers and actively-managed ETFs may add to the appeal of a fund family. However, in our analysis we have not taken into account the Total Expense Ratio (TER), but as active ETFs do not offer any positive and significant alphas the higher expenses for an investor are not justified.

Finally, further research may focus on a direct comparison between active ETFs and actively-managed mutual funds. ETFs mainly address the narrower and less liquid indices or portfolios, as a consequence, at the moment it is not (yet) possible to match an active ETF with an actively-managed mutual fund which are subject to the same benchmark. Furthermore, our sample period is still rather small and can be characterized as a period with above average volatility. Expanding our analysis both in time series as in number of active ETFs would establish a solid basis in understanding the raison d'être of actively-managed ETFs. Future research will shed light on these remaining questions.

[55] Matt Hougan, editor of IndexUniverse in an article in the Wall Street Journal on Januar6, 2010: see the appendix for the full link.

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Appendix

A.1 Internet links

[091123] http://fondsnieuws.nl/speciale-producten/indexbeleggen/indexbeleggen-nieuws/5395-institutionele-beleggers-zoeken-etfs-op.html

[091026] http://www.fondsnieuws.nl/fondsen/interviews/artikelen/5126-actief-beheer-etfs-is-geen-fata-morgana.html

[071214] http://seekingalpha.com/article/57360-talking-etfs-with-powershares-founder-and-ceo-bruce-bond

[091112] http://www.reuters.com/article/idUSN1225399820091112

[091225] http://fondsnieuws.nl/fondsen/interviews/artikelen/5665-bank-moet-wegbereider-etfs-worden.html

[100106] http://online.wsj.com/article/SB10001424052748704254604574614392495471228.html

Data (Risk-free T-bills returns)

http://mba.tuck.dartmouth.edu/pages/faculty/ken.french/data_library.html

General Websites (News and Announcements)

http://www.advisorshares.com
http://www.etf.com
http://www.etfdailynews.com
http://www.etfdb.com
http://www.etftrends.com
http://www.faithshares.com
http://www.fondsnieuws.nl
http://www.fundstrategy.co.uk
http://www.grailadvisors.com
http://www.grailadvisors.com
http://www.indexuniverse.com
http://www.ishares.com
http://www.pimcoetfs.com
http://www.powershares.com
http://www.sec.gov
http://www.sectorspdr.com
http://www.seekingalpha.com
http://www.thestreet.com
https://www.spdrs.com
http://www.vanguard.com

A.2 Tickers

#	Type	Name	Symbol	DS Code	Bloomberg
0	Market Index	S&P 500 Index	SPX	S&PCOMP	SPX:IND
1	Active ETF	PowerShares Active AlphaQ Fund	PQY	U:PQY	PQY:US
	Passive ETF	PowerShares QQQ Trust Series 1	QQQQ	@QQQQ	QQQQ:US
	Benchmark	NASDAQ 100 Index	NDX	NASA100	NDX:IND
2	Active ETF	PowerShares Active Alpha Multi Cap	PQZ	U:PQZ	PQZ:US
	Passive ETF	iShares Russell 3000 Index Fund	IWV	U:IWV	IWV:US
	Benchmark	Russell 3000 Index	R3000	FRUSS3L	RAY:IND
3	Active ETF	PowerShares Active Low Duration	PLK	U:PLK	PLK:US
	Passive ETF	iShares Barclays 1-3 Yr Treasury Bond	SHY	U:SHY	SHY:US
	Benchmark	Barclays 1-3 Yr US Treasury Index	LHTR1T3	LHTR1T3	
4	Active ETF	PowerShares Active Mega Cap	PMA	U:PMA	PMA:US
	Benchmark	Russell Top 200 Index	R200	FRUS200	R200:IND
	Passive ETF	Vanguard Mega Cap 300	MGC	U:MGC	MGC:US
	Benchmark	MSCI US Large Cap 300	M300	MSUEL30	MZUSL:IND
5	Active ETF	PowerShares Active US Real Estate	PSR	U:PSR	PSR:US
	Benchmark	FTSE NAREIT Equity REITs Index	FNER		FNER:IND
	Passive ETF]a	iShares FTSE NAREIT Real Estate 50	FTY	U:FTY	FTY:US
	Benchmark	FTSE NAREIT Real Estate 50 Index	FNR5		FNR5:IND
	Passive ETF]b	Vanguard REIT ETF	VNQ	U:VNQ	VNQ:US
	Benchmark	MSCI US REIT Index	MREIT	AMXMSRE	RMZ:IND

A.3 Sector SPDRs

S&P 500	Weight	Sector SPDR	Market Value ($ bn)	Weight	Shares Outstanding
Consumer Discretionary	9.41%	XLY	1.414	4.89%	48,903,252
Consumer Staples	11.79%	XLP	2.231	7.72%	82,071,809
Energy	12.08%	XLE	6.064	20.99%	105,174,200
Financial	14.36%	XLF	6.609	22.88%	449,595,427
Health Care	12.82%	XLV	2.277	7.88%	73,665,234
Industrial	10.35%	XLI	2.065	7.15%	74,476,000
Technology	22.05%	XLK	4.061	14.06%	184,355,897
Materials	3.55%	XLB	1.807	6.25%	55,223,725
Utilities	3.59%	XLU	2.362	8.18%	79,574,160
					As of November 24, 2009

source: www.sectorspdr.com

A.4 Descriptive Statistics Bear Market Period (05/01/2008 – 03/09/2009)

This table presents the mean and median daily return, the standard deviation and the minimum and maximum return of active ETFs, passive ETFs, benchmarks and the market (S&P 500 Index) respectively. The sample period is from 05/01/2008 till 03/09/2009, except for the fifth cluster (real estate) where the period runs from 12/01/2008 till 03/09/2009 as indicated by the last column 'Observations'. In column 'Type' the following abbreviations are used: A is actively-managed, P is passively-managed, B is benchmark and M is market.

Type	Description	Symbol	Mean	Median	St.dev	Min	Max	Obs.
A	Active AlphaQ Fund	PQY	-0,251%	0,000%	2,784%	-10,412%	13,569%	215
P	PowerShares Trust 1 Ser.	QQQQ	-0,244%	-0,234%	2,719%	-8,951%	12,171%	215
B	NASDAQ 100 Index	NDX	-0,238%	-0,160%	2,889%	-10,520%	12,580%	215
A	Active Alpha Multi Cap	PQZ	-0,338%	0,000%	3,556%	-12,371%	13,924%	215
P	iShares Russell 3000 Index	IWV	-0,285%	-0,080%	2,779%	-9,067%	10,428%	215
B	Russell 3000 Index	R3000	-0,283%	-0,036%	2,887%	-9,275%	11,475%	215
A	Active Low Duration Fund	PLK	0,012%	0,000%	0,752%	-2,965%	2,965%	215
P	iShares Barclays	SHY	0,018%	0,033%	0,176%	-0,561%	0,712%	215
B	BarCap 1-3 Yr US Treasury	LHTR1T3	0,004%	0,010%	0,187%	-0,942%	0,758%	215
A	Active Mega Cap Fund	PMA	-0,242%	0,000%	2,441%	-9,172%	9,931%	215
B	Russell Top 200 Index	R200	-0,271%	-0,018%	2,818%	-8,792%	11,840%	215
P	Vanguard Mega Cap 300	MGC	-0,275%	-0,092%	2,736%	-8,735%	11,600%	215
B	MSCI US Large Cap 300	M300	-0,272%	-0,015%	2,827%	-8,850%	11,626%	215
A	Active US Real Estate	PSR	-0,027%	0,000%	4,660%	-17,200%	17,272%	67
B	FTSE NAREIT Equity REITs	FNER	-0,367%	-0,778%	6,645%	-19,372%	14,230%	67
P	Vanguard REIT ETF	VNQ	-0,377%	-1,007%	6,495%	-19,517%	13,289%	67
B	MSCI US REIT Index	MREIT	-0,361%	-0,890%	6,763%	-19,739%	14,327%	67
M	S&P 500 Index	SPX	-0,281%	-0,016%	2,868%	-9,026%	11,581%	215

A.5 Bull Market (03/10/2009 – 10/30/2009) – Risk-adjusted Performance Regression

This table presents the results of the risk-adjusted performance regression: $R_i - R_f = \alpha_i + \beta_i(R_m - R_f) + \varepsilon_i$ In which we estimate the alphas and betas by regressing the risk-adjusted daily return of the ETF i on the risk-adjusted daily return of the corresponding benchmark index or the market index (the S&P 500 Index). R_i represents the daily return for the ETF i. R_m denotes the return of the market portfolio and R_f is the risk-free rate. T-tests are performed to test whether the alpha coefficients differ significantly from zero and the estimated betas from unity.

Type	Symbol	Underlying	α	Prob.	β	Prob.	R^2	Obs.
Active ETF	PQY	NASDAQ 100 Index	0.001%	0.995	0.772	0.001	0.600	165
Passive ETF	QQQQ	NASDAQ 100 Index	0.010%	0.575	0.956	0.000	0.978	165
Active ETF	PQY	S&P 500 Index	0.038%	0.664	0.691	0.000	0.518	165
Passive ETF	QQQQ	S&P 500 Index	0.057%	0.245	0.851	0.000	0.834	165
Active ETF	PQZ	Russell 3000 Index	-0.003%	0.976	0.800	0.006	0.578	165
Passive ETF	IWV	Russell 3000 Index	0.005%	0.678	0.977	0.001	0.992	165
Active ETF	PQZ	S&P 500 Index	-0.003%	0.974	0.821	0.018	0.564	165
Passive ETF	IWV	S&P 500 Index	0.002%	0.908	1.014	0.107	0.988	165
Active ETF	PLK	Barclays 1-3 Yr US Tr. Index	0.022%	0.615	0.674	0.338	0.024	165
Passive ETF	SHY	Barclays 1-3 Yr US Tr. Index	0.013%	0.005	0.783	0.000	0.751	165
Active ETF	PMA	Russell Top 200 Index	0.058%	0.424	0.719	0.000	0.598	165
Passive ETF	MGC	MSCI US Large Cap 300 Index	0.010%	0.388	0.959	0.000	0.992	165
Active ETF	PMA	S&P 500 Index	0.056%	0.436	0.692	0.000	0.607	165
Passive ETF	MGC	S&P 500 Index	0.011%	0.343	0.927	0.000	0.991	165
Active ETF	PSR	FTSE NAREIT Equity REITs Ind.	0.194%	0.391	0.476	0.000	0.322	165
Passive ETF	VNQ	MSCI US REIT Index	0.016%	0.658	0.932	0.000	0.988	165

A.6 Bull Market (03/10/2009 – 10/30/2009) – Performance Ratings

This table presents the performance rating of our ETFs and the benchmark performance. The results are grouped and we analyse the performance with Total Return, the Sharpe Ratio, the Treynor ratio, the Sortino ratio and Jensen's alpha following the risk-adjusted performance regression. For the first, second and fourth ETF group we have regressed the returns on both the corresponding benchmark and a wide market proxy (the S&P 500). Therefore multiple Treynor and Jensen statistics are presented.

Type	Symbol	Total Return	Sharpe	$Treynor_b$	$Treynor_m$	Sortino	Jensen α_b	Jensen α_m
Active ETF	PQY	43.447	0.148	0.299	0.335	0.225	0.001%	0.038%
Passive ETF	QQQ	59.731	0.195	0.309	0.348	0.338	0.010%	0.057%
Benchmark	NDX	60.310	0.190	0.299	NA	0.332	0.000%	NA
Active ETF	PQZ	41.659	0.127	0.284	0.276	0.186	-0.003%	-0.003%
Passive ETF	IWV	56.587	0.172	0.292	0.282	0.296	0.005%	0.002%
Benchmark	R3000	56.884	0.170	0.287	NA	0.289	0.000%	NA
Active ETF	PLK	2.616	0.031	0.026	NA	0.044	0.022%	NA
Passive ETF	SHY	1.203	0.063	0.009	NA	0.086	0.013%	NA
Benchmark	LHTR1T3	-1.126	-0.053	-0.007	NA	-0.068	0.000%	NA
Active ETF	PMA	48.497	0.173	0.348	0.361	0.305	0.058%	0.056%
Benchmark	R200	52.219	0.171	0.267	NA	0.305	NA	NA
Passive ETF	MGC	53.303	0.178	0.282	0.292	0.294	0.010%	0.011%
Benchmark	M300	53.522	0.173	0.272	NA	0.297	NA	NA
Active ETF	PSR	77.134	0.113	0.868	NA	0.187	0.194%	NA
Benchmark	FNER	82.727	0.105	0.459	NA	0.173	NA	NA
Passive ETF	VNQ	83.164	0.109	0.485	NA	0.181	0.016%	NA
Benchmark	MREIT	84.595	0.106	0.468	NA	0.173	NA	NA
Market	SPX	55.307	0.172	NA	0.280	0.294	NA	0.000%

A.7 Bull Market (03/10/2009 – 10/30/2009) – Tracking Errors

This table presents the estimations of tracking error. The tracking error is the deviation between the return of the investment vehicle (ETF) and the underlying index. We have computed three different measures, where TE_1 reflects the standard error of ETF's i performance regression, TE_2 is the absolute average return difference between the ETF i and the underlying index and TE_3 is the standard deviation of the return difference between the ETF and its underlying index. The last column displays the equally-weighted average of the three tracking errors.

Type	Symbol	Underlying	TE_1	TE_2	TE_3	Average
Active ETF	PQY	NASDAQ 100 Index	0.993%	0.728%	1.052%	0.924%
Passive ETF	QQQQ	NASDAQ 100 Index	0.227%	0.137%	0.236%	0.200%
Active ETF	PQY	S&P 500 Index	1.090%	0.820%	1.198%	1.036%
Passive ETF	QQQQ	S&P 500 Index	0.621%	0.510%	0.666%	0.599%
Active ETF	PQZ	Russell 3000 Index	1.161%	0.875%	1.206%	1.080%
Passive ETF	IWV	Russell 3000 Index	0.147%	0.116%	0.152%	0.138%
Active ETF	PQZ	S&P 500 Index	1.180%	0.888%	1.212%	1.093%
Passive ETF	IWV	S&P 500 Index	0.179%	0.136%	0.180%	0.165%
Active ETF	PLK	BarCap 1-3 Yr US Tr.	0.553%	0.372%	0.553%	0.493%
Passive ETF	SHY	BarCap 1-3 Yr US Tr.	0.058%	0.049%	0.064%	0.057%
Active ETF	PMA	Russell Top 200 Index	0.921%	0.720%	1.017%	0.886%
Passive ETF	MGC	MSCI US Large Cap 300 Index	0.139%	0.117%	0.153%	0.137%
Active ETF	PMA	S&P 500 Index	0.911%	0.746%	1.037%	0.898%
Passive ETF	MGC	S&P 500 Index	0.143%	0.144%	0.186%	0.158%
Active ETF	PSR	FTSE NAREIT Equity REITs Index	3.026%	2.216%	3.786%	3.009%
Passive ETF	VNQ	MSCI US REIT Index	0.447%	0.371%	0.539%	0.452%

A.8 Bear Market (05/01/2008 – 03/09/2009) – Risk-adjusted Performance Regression

This table presents the results of the risk-adjusted performance regression: $R_i - R_f = \alpha_i + \beta_i(R_m - R_f) + \varepsilon_i$ In which we estimate the alphas and betas by regressing the risk-adjusted daily return of the ETF i on the risk-adjusted daily return of the corresponding benchmark index or the market index (the S&P 500 Index). R_i represents the daily return for the ETF i. R_m denotes the return of the market portfolio and R_f is the risk-free rate. T-tests are performed to test whether the alpha coefficients differ significantly from zero and the estimated betas from unity.

Type	Symbol	Underlying	α	Prob.	β	Prob.	R^2	Obs.
Active ETF	PQY	NASDAQ 100 Index	-0.085%	0.526	0.702	0.000	0.530	215
Passive ETF	QQQQ	NASDAQ 100 Index	-0.022%	0.413	0.932	0.001	0.981	215
Active ETF	PQY	S&P 500 Index	-0.058%	0.674	0.692	0.000	0.507	215
Passive ETF	QQQQ	S&P 500 Index	0.007%	0.912	0.893	0.001	0.888	215
Active ETF	PQZ	Russell 3000 Index	-0.061%	0.679	0.976	0.716	0.627	215
Passive ETF	IWV	Russell 3000 Index	-0.014%	0.401	0.959	0.000	0.992	215
Active ETF	PQZ	S&P 500 Index	-0.064%	0.671	0.975	0.720	0.618	215
Passive ETF	IWV	S&P 500 Index	-0.015%	0.473	0.963	0.002	0.988	215
Active ETF	PLK	Barclays 1-3 Yr US Tr. Index	0.008%	0.876	0.304	0.187	0.006	215
Passive ETF	SHY	Barclays 1-3 Yr US Tr. Index	0.013%	0.049	0.776	0.000	0.682	215
Active ETF	PMA	Russell Top 200 Index	-0.136%	0.351	0.401	0.000	0.214	215
Passive ETF	MGC	MSCI US Large Cap 300 Index	-0.014%	0.601	0.958	0.012	0.979	215
Active ETF	PMA	S&P 500 Index	-0.134%	0.358	0.395	0.000	0.216	215
Passive ETF	MGC	S&P 500 Index	-0.010%	0.724	0.944	0.001	0.979	215
Active ETF	PSR	FTSE NAREIT Equity REITs Ind.	0.058%	0.915	0.236	0.000	0.114	67
Passive ETF	VNQ	MSCI US REIT Index	-0.031%	0.638	0.957	0.000	0.993	67

A.9 Bear Market (05/01/2008 – 03/09/2009) – Performance Ratings

This table presents the performance rating of our ETFs and the benchmark performance. The results are grouped and we analyse the performance with Total Return, the Sharpe Ratio, the Treynor ratio, the Sortino ratio and Jensen's alpha following the risk-adjusted performance regression. For the first, second and fourth ETF group we have regressed the returns on both the corresponding benchmark and a wide market proxy (the S&P 500). Therefore multiple Treynor and Jensen statistics are presented.

Type	Symbol	Total Return	Sharpe	$Treynor_b$	$Treynor_m$	Sortino	Jensen α_b	Jensen α_m
Active ETF	PQY	-46.372	-0.092	-0.364	-0.369	-0.125	-0.085%	-0.058%
Passive ETF	QQQ	-45.318	-0.091	-0.266	-0.278	-0.124	-0.022%	0.007%
Benchmark	NDX	-45.244	-0.084	-0.243	NA	-0.114	0.000%	NA
Active ETF	PQZ	-57.861	-0.096	-0.351	-0.351	-0.124	-0.061%	-0.064%
Passive ETF	IWV	-50.222	-0.104	-0.302	-0.301	-0.137	-0.014%	-0.015%
Benchmark	R3000	-50.336	-0.100	-0.288	NA	-0.132	0.000%	NA
Active ETF	PLK	2.063	0.010	0.026	NA	0.015	0.008%	NA
Passive ETF	SHY	3.805	0.074	0.017	NA	0.108	0.013%	NA
Benchmark	LHTR1T3	0.825	-0.002	0.000	NA	-0.003	0.000%	NA
Active ETF	PMA	-44.318	-0.101	-0.615	-0.624	-0.132	-0.136%	-0.134%
Benchmark	R200	-48.805	-0.098	-0.276	NA	-0.136	NA	NA
Passive ETF	MGC	-48.911	-0.102	-0.291	-0.296	-0.131	-0.014%	-0.010%
Benchmark	M300	-48.908	-0.098	-0.277	NA	-0.130	NA	NA
Active ETF	PSR	-8.587	-0.006	-0.121	NA	-0.009	0.058%	NA
Benchmark	FNER	-32.593	-0.055	-0.368	NA	-0.076	NA	NA
Passive ETF	VNQ	-32.606	-0.058	-0.395	NA	-0.079	-0.031%	NA
Benchmark	MREIT	-32.722	-0.054	-0.363	NA	-0.073	NA	NA
Market	SPX	-50.001	-0.100	NA	-0.285	-0.132	NA	0.000%

A.10 Bear Market (05/01/2008 – 03/09/2009) – Tracking Errors

This table presents the estimations of tracking error. The tracking error is the deviation between the return of the investment vehicle (ETF) and the underlying index. We have computed three different measures, where TE_1 reflects the standard error of ETF's i performance regression, TE_2 is the absolute average return difference between the ETF i and the underlying index and TE_3 is the standard deviation of the return difference between the ETF and its underlying index. The last column displays the equally-weighted average of the three tracking errors.

Type	Symbol	Underlying	TE_1	TE_2	TE_3	Average
Active ETF	PQY	NASDAQ 100 Index	1.912%	1.440%	2.093%	1.815%
Passive ETF	QQQQ	NASDAQ 100 Index	0.373%	0.216%	0.421%	0.337%
Active ETF	PQY	S&P 500 Index	1.959%	1.420%	2.145%	1.841%
Passive ETF	QQQQ	S&P 500 Index	0.912%	0.704%	0.960%	0.858%
Active ETF	PQZ	Russell 3000 Index	2.177%	1.206%	2.173%	1.852%
Passive ETF	IWV	Russell 3000 Index	0.251%	0.152%	0.278%	0.227%
Active ETF	PQZ	S&P 500 Index	2.202%	1.212%	2.198%	1.870%
Passive ETF	IWV	S&P 500 Index	0.311%	0.180%	0.328%	0.273%
Active ETF	PLK	BarCap 1-3 Yr US Tr.	0.751%	0.435%	0.761%	0.649%
Passive ETF	SHY	BarCap 1-3 Yr US Tr.	0.099%	0.075%	0.107%	0.094%
Active ETF	PMA	Russell Top 200 Index	2.169%	1.870%	2.745%	2.261%
Passive ETF	MGC	MSCI US Large Cap 300 Index	0.398%	0.234%	0.415%	0.349%
Active ETF	PMA	S&P 500 Index	2.167%	1.893%	2.771%	2.277%
Passive ETF	MGC	S&P 500 Index	0.400%	0.251%	0.430%	0.361%
Active ETF	PSR	FTSE NAREIT Equity REITs Index	4.421%	5.255%	6.708%	5.461%
Passive ETF	VNQ	MSCI US REIT Index	0.529%	0.421%	0.600%	0.517%