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Exchange traded funds versus active and passive unit trusts: An economic perspective

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Abstract

Exchange traded funds (ETFs) are a relatively recent financial innovation receiving much attention from investors and media due to its low administrative costs. Literature related to ETF performance presents no sizeable records as a result of its brief history.

This study contributes to the literature on ETF performance by comparing ETFs to their respective tracking indices as well as to comparable passive unit trusts (PUTs) and active unit trusts (AUTs) after administrative costs. Data used involved ETFs that are derived from securities listed on the Johannesburg Stock Exchange (JSE) that track FTSE/JSE indices. PUTs and AUTs were selected on the basis that they use the same FTSE/JSE indices, as the ETFs, as a benchmark.

The results indicate that ETFs have a slightly lower tracking error than PUTs due to lower administrative costs. On average, ETFs and PUTs present statistically insignificant net return differences and it can be inferred that they have very similar return records. Furthermore, ETFs and AUTs, on average, also present statistically insignificant net return differences and it can be inferred that they have very similar return records.

Keywords: ETFs; index funds; unit trusts; expense ratio

Declaration

I declare that this research project is my own work. It is submitted in partial fulfillment of the requirements for the degree of Master of Business Administration at the Gordon Institute of Business Science, University of Pretoria. It has not been submitted before for any degree or examination in any other University. I further declare that I have obtained the necessary authorisation and consent to carry out this research.

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1. Introduction

1.1 Background

Exchange traded funds (ETFs) are a relatively recent example of financial innovation. The first viable open-ended exchanged traded portfolio basket was introduced in Canada only 23 years ago. The ETF began trading as the Toronto Stock Exchange Index Participations (TIPs) in 1990. The Standard & Poor's Depository Receipts (SPDRs), which is an ETF that tracks the S&P 500 index, was introduced in the United States (US) four years later.

ETFs have grown remarkably fast since then as investors, both institutional and retail, have increasingly turned to these investment options in their portfolios. In December 2011, total US domiciled ETF net assets were $1,048 billion, up from $102 billion in December 2002 (Investment Company Institute, 2012). This means that net assets invested in ETFs in the US increased tenfold in a decade, in comparison to mutual funds, which only increased by a mere twofold. This illustrates the popularity and rapid growth of ETFs as financial instruments in comparison to mutual funds.

The advent of ETFs in South Africa (SA) over the last couple of years and the attention that it has consequently received from investors and media, due its low-costs, has put the concept of index investing in the spotlight. ETFs offer a claim on the same underlying assets as conventional open-ended unit trusts but are structured differently and satisfy different investor needs. The Securities and Exchange Commission (SEC) defines ETFs as investment companies that are legally classified as open-end companies or Unit Investment Trusts. According to the SEC, ETFs differ from traditional open-ended companies (mutual funds/unit trusts) in the following respects:

> ETFs do not sell individual shares directly to investors and only issue their shares in large blocks that are known as Creation Units. Investors generally do not purchase Creation Units with cash. Instead, they buy Creation Units with a basket of securities that generally mirrors the ETF's portfolio. Those who purchase Creation Units are frequently institutions.

> After purchasing a Creation Unit, an investor often splits it up and sells the individual shares on a secondary market. This permits other investors to purchase individual shares (instead of Creation Units).
>
> Investors who want to sell their ETF shares have two options: (1) they can sell individual shares to other investors on the secondary market, or (2) they can sell the Creation Units back to the ETF. In addition, ETFs generally redeem Creation Units by giving investors the securities that comprise the portfolio instead of cash. (United States Securities and Exchange Comission, 2012, "ETFs" para. 2)

Furthermore, work done by Bhattacharya and Galpin (2005) has shown that stock picking in South Africa has been declining over the years. This is indicative of investor disenchantment with managed funds and the proliferation of ETFs in South Africa (Muller & Ward, 2011).

These developments have captured the curiosity of academics and the finance industry as to whether these low-cost investment vehicles are actually outperforming active and passive unit trusts after costs. Active investing is an investment strategy that requires fund managers to actively and continuously make decisions about the buying and selling of assets, thereby striving for superior returns in comparison to benchmark indices. Investors are more than happy to pay performance related fees to fund managers that outperform their benchmark indices. However, research by authors like Malkiel (1995) and Gruber (1996) suggests that most fund managers do not sufficiently outperform the benchmark to justify the higher costs. This raises doubts about the stock-picking ability of these fund managers.

Passive or index funds on the other hand track the market. This strategy is not concerned with asset selection or "stock-picking", but only to minimise cost. ETFs are similar to passively managed unit trusts in that they track the market. However, due to differences in management fees, shareholder transaction fees, and taxation efficiency ETFs have lower expense ratios. This means that ETFs should have better performance records than passively managed unit trusts.

1.2 Historical background of ETFs

The Toronto 35 Index Participation Fund (TIPSs) was the first ETF that was successfully listed on Canada's Toronto Stock Exchange (TSX), in 1990. TIPSs replicated the performance of the TSX 35 Index. Since then, the ETF industry has expanded tremendously internationally and, as of the end of March 2012 the total Assets under Management (AUM) reached US$1.73 trillion (BlackRock, 2012). In fact, the first quarter of 2012, attracted a record of new inflows of US$67.3bn globally, which is a 57% increase from quarter one in 2011.

In South Africa, Satrix introduced the first ETF product in 2000 with the launch of the Satrix 40 ETF, which was created to track the FTSE/JSE Top40 Index. Since then, other market players have also listed their own suites of ETF products. Examples of ETF providers in South Africa include Standard Liberty, Deutsche Bank and Absa Capital. Research by BlackRock (2012) suggests that even with a large number of new entrants, Satrix has still managed to retain its position as "the largest Middle East and African ETF provider with 59% of the AUM market share" (p. 52) followed by Standard Liberty, with 16.2% of the market share.

In terms of the ETF market in SA, there were a few new listings last year. Absa Capital launched two multi-asset ETFs in May 2011. These ETFs are called the Newfunds MAPPS Growth and Newfunds MAPPS Protect. The traditional ETF tracks a certain asset class or sector (e.g. Satrix Fini which tracks the FTSE/JSE Financial 15 Index) providing equity-exposure or replicates the nominal bond market (e.g. Newfunds GOVI). These new ETFs provide investors access to the performance of multiple asset classes including SA equities, bond and money markets instruments. As such, they provide investors with a passive retirement investment option compared to the actively managed multi-asset balanced funds (ETF SA, 2012b).

In July 2011 Nedbank listed the BettaBeta Green ETF which tracks the performance of the top "green" companies on the Johannesburg Stock Exchange (JSE). Nedbank (2012) defines green companies as "companies that

have been rated by the Carbon Disclosure Project (CDP) as being among the best disclosers on climate change issues and the strongest performers in responding to climate change" (What is the BGreen ETF?, para. 3)

There are currently 38 ETFs listed on the JSE tracking a variety of assets such as local and foreign equities, bonds and even multi-assets (ETF SA, 2012a). Out of those, there are 24 that only track South African equity indices (denominated in ZAR) as shown in Table 1.1, with their respective providers', JSE codes, inception dates and AUM.

Table 1.1: List of ETFs with underlying South African equities (ETF SA, 2012a)

Exchange Traded Funds - Domestic Equity					
No.	**Fund Name**	**Code**	**Provider**	**Inception Date**	**AUM**
1	Bgreen ETF	BGREEN	Nedbank	Dec-11	R 111 090 237
2	BettaBeta Equally Weighted TOP40	BBET40	Nedbank	Mar-10	R 52 831 014
3	NewFunds Equity Momentum ETF	NFEMOM	Absa Capital	Jan-12	R 16 563 602
4	NewFunds eRAFI SA Financial 15 Index Portfolio	RAFFIN	Absa Capital	Jun-09	R 4 670 552
5	NewFunds eRAFI SA Industrial 25 Index Portfolio	RAFIND	Absa Capital	Jun-09	R 7 211 408
6	NewFunds eRAFI SA Resource 20 Index Portfolio	RAFRES	Absa Capital	Jun-09	R 7 721 081
7	NewFunds eRAFI Overall	RAFISA	Absa Capital	Jun-08	R 98 673 143
8	NewFunds Shariah Top 40 Index ETF Portfolio	NFSH40	Absa Capital	Apr-09	R 17 374 155
9	NewFunds SWIX 40 ETF	NFSWIX	Absa Capital	Jan-12	R 8 883 906
10	NewSA Index Portfolio	NEWFSA	Absa Capital	Jan-08	R 8 435 923
11	NewFunds NewRand	NRD	Absa Capital	Jun-03	R 75 007 099
12	RMB Top 40	BIPS40	RMB	Oct-08	R 543 000 000
13	RMB Mid Cap Fund	RMBMID	RMB	Aug-12	R 92 777 406
14	Satrix 40	STX40	Satrix	Nov-00	R 7 077 000 000
15	Satrix Dividend Plus	STXDIV	Satrix	Aug-07	R 1 559 800 000
16	Satrix FINI	STXFIN	Satrix	Feb-02	R 733 600 000
17	Satrix INDI	STXIND	Satrix	Feb-02	R 701 800 000
18	Satrix RAFI 40	STXRAF	Satrix	Oct-08	R 668 000 000
19	Satrix RESI	STXRES	Satrix	Apr-06	R 257 800 000
20	Satrix SWIX	STXSWI	Satrix	Apr-06	R 323 600 000
21	STANLIB SWIX 40 Fund	STANSX	Standard Liberty	Oct-10	R 2 410 000 000
22	STANLIB Top 40 Fund	STAN40	Standard Liberty	Oct-10	R 637 000 000
23	Property Tracker Ten	PTXTEN	Proptrax	May-11	R 47 622 991
24	Property Tracker SAPY	PTXSPY	Proptrax	Sep-07	R 132 693 299

The largest domestic equity based ETF in SA is Satrix 40, which as mentioned earlier, was the first ETF to be launched in SA, with just over R7 trillion in AUM.

The latest ETF to be launched in SA is the Rand Merchant Bank (RMB) Mid Cap Fund that invests in the 41st to the 100th largest companies on the JSE in terms of market capitalisation.

1.3 Research purpose

The aim of this thesis is therefore to provide comprehensive quantitative research on the performance of ETFs in SA relative to their respective FTSE/JSE Indices as well as comparable passive unit trusts (PUTs) and active unit trusts (AUTs). All performance comparisons of ETFs, PUTs and AUTs will be net returns. That is, administrative costs (known as total expense ratio) will be subtracted from the returns of ETFs, PUTs and AUTs. This study will provide a true indication of the returns received by investors. Furthermore, this study will contribute to the 'active versus passive' debate as to whether active fund managers can outperform passively managed funds such as ETFs and PUTs.

2. Literature Review

2.1. Exchange-traded funds

Exchange-traded funds have emerged as a viable alternative for investors seeking to tie their holdings to a major market index (Kostovetsky, 2003). However in the US, ETFs still constitute a small percentage of the US$1.5 trillion index fund market (Kostovetsky, 2003). By the end of 2000, the market for ETFs totaled only US$75 billion, with just one ETF the S&P Depository Receipts 500 having assets over US$28 billion (Kostovetsky, 2003).

ETFs appeared as a financial instrument in early 1999 and much has been written about them in popular business journals (Kostovetsky, 2003). Gastineau, one of the developers of ETFs at the American Stock Exchange, outlined their history and mechanics. Despite their growth, not all practitioners are convinced of their value as indexing tools. Bogle (2007), the founder of Vanguard, has been the most vocal critic of ETFs stating that “if long-term investing was the paradigm for the classic index fund, trading ETFs can only be described as short term speculation” (para. 7).

On the other hand, Gastineau (2010) states that “early ETFs were so important that they are now serving as the basis for some revolutionary financial engineering that promises to reshape the fund industry in the United States and around the world” (An introduction to exchange traded funds, para. 2).

In some respects, ETFs resemble conventional index mutual funds (Rongala, 2009). They however differ in two important ways. First, considered the most important characteristic of ETFs, not shared with index mutual funds, is that ETFs can be traded continuously during the day at prices determined by supply and demand, rather than at the calculated net asset value (Investment Company Institute, 2012; Rongala, 2009; Swinkels & Tjong-A-Tjoe, 2008). In this sense they resemble closed-end mutual funds. Mutual fund shares can only be bought and sold directly to the issuer in comparison to ETFs that can be bought and sold on an exchange (Investment Company Institute, 2012). Also mutual funds have a single point in the day where the NAV of the fund is established and this determines the price that is used in the trade. The fact that

ETFs are traded like stocks also means that they can be purchased on margin, sold short and investors can trade using limits and stop orders (Dellva, 2001; Rompotis, 2008a; Svetina, 2010). This is not the case with index mutual funds.

The second major difference is the tax implications of ETFs compared to mutual funds. The tax efficiency most commonly associated with ETFs is essentially capital gains tax-deferral until the investor chooses to sell fund shares (Poterba & Shoven, 2002; Rompotis, 2006). ETFs rarely have capital gains distributed to investors since ETFs are not actively managed and managers do not need to sell some of the underlying securities when demand for ETFs decreases, (Chen & Strother, 2008; Rompotis, 2008a).

These differences suggest that ETFs and mutual funds may be appropriate for different types of investors. Poterba and Shoven (2002) suggest that ETFs are for investors demanding short-term liquidity and large-scale purchases in contrast to mutual fund investors that place less value on liquidity and make small-scale purchases. Agapova (2011) suggests that ETFs and index mutual funds are substitutes, but not perfect substitutes for investors. Moreover, ETFs have not replaced index mutual funds but have introduced a new investment vehicle that has added to the completeness of the market by offering new features that were previously not available (Agapova, 2011).

The debate of ETFs versus index funds has experienced great interest by academic literature (Rompotis, 2008b). However, due to the brief history of ETFs the literature presents no sizeable records of studies related to the performance of ETFs and index funds. Dellva (2001) applied a cost comparison among the trackers of the S&P 500 Index. The ETFs used in the study were the SPDRs and Barclay's iShares S&P Index Fund and these were compared to the Vanguard Index 500 Mutual Fund. His study revealed that there is significant benefit in ETFs considering their annual expenses, even though ETFs bear transaction costs and commissions paid to brokerage firms, as well as being subject to bid-ask spreads. This benefit becomes greater if an investor holds their ETF shares for a long period of time.

Bernstein (2002) suggests that the tax and cost advantage of ETFs is modified or eliminated by the temptation of investors to liquidate their shares frequently.

The statistics demonstrate that the average holding period for SPDRs during the five months of 2001 was 10 days and for Qubes (an ETF that tracks the NASDAQ 100 Index), only 4 days. The combination of short holding periods with brokerage commissions diminishes the lower expense basis of ETFs.

Elton, Gruber, Comer and Li (2002) find that the SPDRs underperform both the S&P 500 index and their index funds and futures counterparts. This underperformance can be attributed to the lost income caused by not reinvesting the dividends received on the underlying assets and holding them in non-interest bearing accounts. Another important finding from the study is that daily trading prices of SPDRs moves closely to its NAV as a result of efficient arbitrage execution.

Poterba and Shoven (2002) compare the pre-tax and post-tax returns of the SPDRs and Vanguard index fund, which both track the S&P 500 index. They conclude that these funds present a similar pre-tax and post-tax performance. Furthermore, they demonstrate that redemption in-kind is a powerful means of reducing or eliminating embedded capital gains.

Kostovetsky (2003) models the difference in costs between the ETFs and index mutual funds in terms of management fees, shareholder transaction fees and taxation efficiency. He also makes note of other qualitative differences between ETFs and index mutual funds. The author compares the sources of underperformance in relation to benchmark indices for both ETFs and index funds demonstrating that these sources are mainly different because of the structural and operating formation of these investing products.

Gastineau (2004) suggests that the pre-tax return of ETFs generally displays inferior performance in comparison to the index mutual funds, which track the same indices. The author attributes a portion of the blame for the low returns to the lack of aggressiveness of ETF managers in changing an indexed portfolio when an announcement is made. In addition, the in-kind process of ETFs creation and redemption restricts the ability of managers to follow accurately, immediately and inexpensively the adjustments of the tracking indices, resulting in lower returns.

Gallagher and Segara (2005) research the return and trading characteristics of Australian ETFs. The authors find that the classical ETFs compensate investors with returns before expenses that are proportional to performance of the benchmark index. Furthermore, ETFs present lower tracking error records relative to the comparable index funds. They also conclude that the deviations between trading and net asset values are infrequent and not sizeable.

Finally, Rompotis (2008b) provides empirical insights of ETFs return characteristics. He performs a statistical comparison between ETFs and index funds that track exactly the same benchmark indices. The author estimated average return and volatility, finding that ETFs and index funds achieve approximately similar performance and risk records. Furthermore, ETFs and index funds do not produce any excess returns relative to their indices' returns. This is an expected finding as both ETFs and index funds are passively managed and just try to replicate the return of the tracking indices. Three alternative methods to estimate tracking error are used and the findings are that ETFs and index funds, on average, present qualitatively the same tracking error records. Moreover, regression analysis revealed that a positive relation between ETF's return and expenses exist. The respective relationship for index funds is also positive but insignificant.

2.1.1. Mechanics of ETF creation and redemption

There are two advantages of the in-kind ETF creation/redemption process. First, the realisation of taxable capital gains is restricted, since redeeming investors are paid "in-kind" by receiving securities and not cash and, the fund is not obligated to sell its assets in order to meet redemptions (Gastineau, 2010; Poterba & Shoven, 2002; Rongala, 2009). Secondly, the fund shareholders who are trading fund shares ultimately pay the cost of creation and redemption (i.e. the cost of increasing or reducing the size of the fund) not the fund itself (Gastineau, 2010). Therefore shareholders in the fund are insulated from transaction costs that increase or reduce the size of the fund. This is in contrast to mutual funds where investors buy and sell fund shares at net asset value and the cost of buying securities for the fund's portfolio or selling portfolio securities to raise cash for redeeming shareholders is funded by all the shareholders of the fund (Gastineau, 2010).

To fully understand the creation/redemption process it is more complete to start with how an ETF is created, as illustrated in figure 2.1. In step 1 a fund manager along with a firm that creates and maintain indices together set procedures for determining the target market index. The fund manager then submits a detailed plan for the proposed ETF to the Securities and Exchange Commission (SEC), including its operations and where it will be listed (Investment Company Institute, 2012). The SEC approves the ETF by exempting it from certain provisions of the Investment Company Act of 1940 (ICA). The provisions of the 1940 Act from which the ETF seeks exemption are tailored towards traditional mutual funds. Once approved, the fund manager forms participation agreements with entities that are known as Authorised Participants (APs) and announces the contents of a creation basket (Investment Company Institute, 2012). APs then purchase in cash baskets of stocks from the stock market as shown in step 3 and 4 that mirror the contents of the creation basket. In the creation transaction, step 5, the APs deposit the securities and balancing cash amounts into the fund and receive newly created fund shares in step 6 (Svetina, 2010). The creation of units is a daily operational process that is used by APs to create fund shares. The securities and cash deposited into the fund in total equals the net asset value of the requisite number of fund shares (Baiden, 2011). The newly created shares are sold by APs through brokers or dealers in step 7 to beneficial owners in step 9. Beneficial owners pay cash for the fund shares in step 10 to brokers or dealers who in turn pay cash to APs in step 8.

Figure 2.1: Standard open-end stock ETF share creation process (Gastineau, 2010)

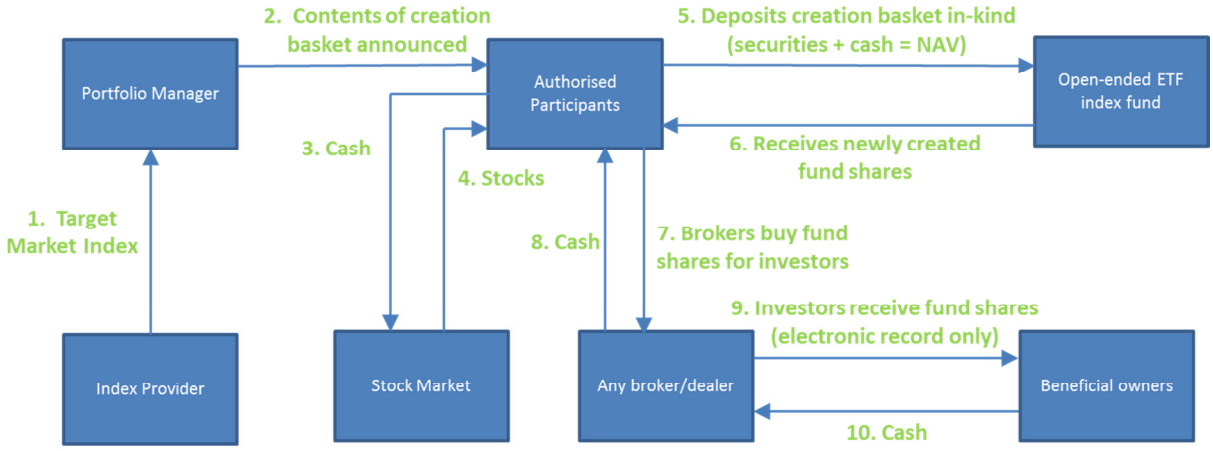
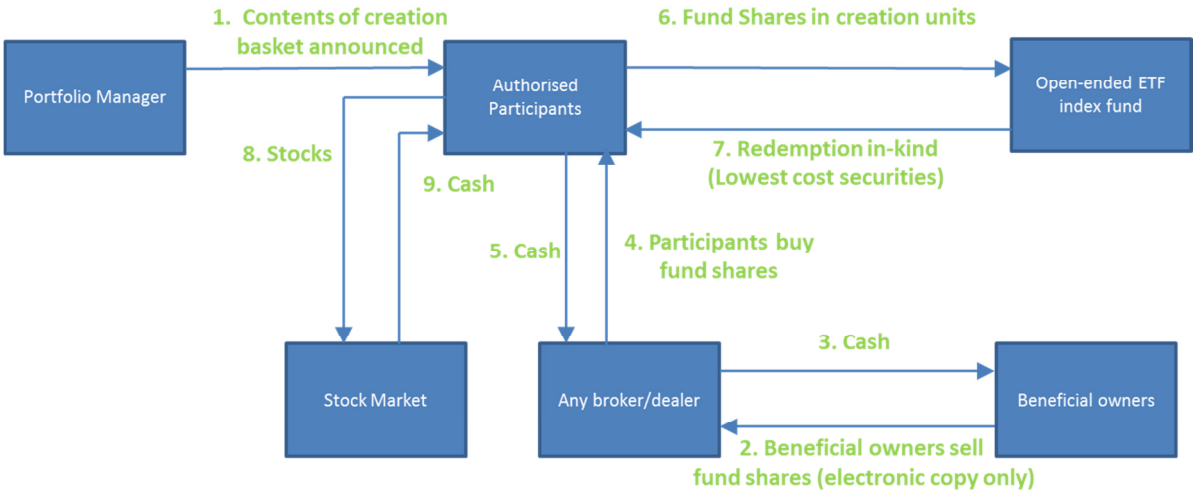


Figure 2.2 illustrates the redemption process in an open-ended ETF. This is essentially the reverse of the ETF creation process. Fund shares are pooled together to create a creation unit which is then tendered to the fund, in step 6, in exchange for a basket of portfolio securities and cash from the fund in step 7 (Gastineau, 2010). The fund, as in the creation transaction, trades primarily in-kind in the redemption transaction. This in-kind transaction process restricts the realisation of capital gains (Gastineau, 2010; Poterba & Shoven, 2002; Rompotis, 2006). APs engage in cash transactions in step 4 and 5 with brokers or dealers. They in turn trade with beneficial owners in step 2 and 3.

Figure 2.2: Standard open-end stock ETF share redemption process (Gastineau, 2010)



2.1.2. Construction of an Index

Index funds and ETFs are investment funds that are established to replicate and match the performance of a broad market index, such as the FTSE/JSE All-Share Index (ALSI) (Bodie, Kane, & Marcus, 2011). Fund managers frequently evaluate their performance and are evaluated by investors against benchmark indices designed to show how the overall stock market or some subsector of the market has performed (CFA Institute, 2012c). Stock market index characteristics are determined by four factors (CFA Institute, 2012c):

1. Boundaries of the index's universe.
2. Stock criteria for inclusion in the index.
3. Weighting method of stocks in the index.
4. Return calculation method.

The first factor, boundaries of the stock index's universe is important to determine the extent to which the index represents a specific population of stocks. For example, the ALSI can be represented by only a 160 shares listed on the JSE since these shares represent 99% of the market capitalisation on the JSE. The greater number of stocks as well as diversification of stocks by industry and size, the better the index will measure broad market performance (CFA Institute, 2012c). The second factor, criteria for inclusion establishes any specific characteristics desired for stocks within the selected universe. An example of criteria that could include or exclude a stock from an index is dividend yield or price-earnings ratio. The third factor, weighting method of stocks is usually a choice among price-weighting, value-weighting or equal weighting. The fourth factor, return calculation method includes methods such as price only and total return series that includes the reinvestment of dividends.

Once an index fund manager has created an index or selected an index benchmark to track, the fund manager then has to consider the method of constructing the replicating portfolio. The objective is to minimise the difference in performance between the index fund or ETF and the benchmark. Indexing can be accomplished in two principle forms. First it can be accomplished through the physical replication of the stock index, as is required by ETFs due to creation/redemption in-kind. This can be done by exact matching or simpler close approximations with methods such as the capitalisation method, stratified sampling and the quadratic optimisation method (Meade & Salkin, 1989). Secondly, indexing can be accomplished by using derivative contracts that seek to replicate the returns and not the holdings of an index (Brink, 2004).

Three principle weighting methods are used to determine the weight given to each stock in an index namely: price-weighted, value-weighted and equal-weighted (Brink, 2004; CFA Institute, 2012c). In a price-weighted index, each stock in the index is weighted according to its absolute share price. In a value-weighted index, each stock in the index is weighted according to its market capitalisation. Finally, in an equal-weighted index, each stock in the index is weighted equally.

2.1.3. Comparing ETFs and mutual funds

The three most important categories of indexed portfolios are conventional index mutual funds, ETFs and separate accounts or pooled accounts, mostly for institutional investors (CFA Institute, 2012c). ETFs are commonly compared to open-ended mutual funds in that they have certain similarities and the growing competition between them for market share in the investment industry. Table 2.1 summaries the differences between ETFs and open-ended mutual funds. The main reason for ETFs being so popular and growing more rapidly than mutual funds is due to characteristics like transparency, tax efficiency, diversification and flexibility (Rongala, 2009). Furthermore, ETFs on average are cheaper investment tools than index mutual funds with an average management fee of 0.41% and 0.74% respectively (Rongala, 2009). These management fees are for ETFs and mutual funds domiciled in the U.S. and listed on U.S. stock exchanges.

The qualitative differences between ETFs and open-ended mutual funds can be split into tracking error differences and non-tracking error differences. Research by Kostovetsky (2003) has shown that tracking error difference is difficult to model because a true benchmark for comparison does not exist.

Tracking error difference between ETFs and open-ended mutual funds arise due to transaction costs, cash inflows and outflows and in-and–out arbitrage trading, as shown in Table 2.2 (Kostovetsky, 2003). ETFs, at fund level, do not incur an expense to obtain shares of constituent stocks as a process known as creation/redemption in-kind is used (Kostovetsky, 2003). As discussed in section 2.1.1, APs can purchase ETF creation units only by supplying the fund with a securities portfolio that mirrors the ETF index. In contrast, index fund managers must pay fees to invest funds for clients in the form of bid-ask spreads at fund level (Kostovetsky, 2003). This forms a primary source of tracking error for index fund managers (Kostovetsky, 2003).

A second cause of tracking error in index funds is due to “cash drag” since fund managers need to keep a certain percentage of uninvested assets to meet redemption needs. Since the creation/redemption process is used, “cash drag” on ETFs are far smaller than the 2% estimated in index funds (Kostovetsky,

2003). The cash drag component in ETF transaction comes into play when there is a difference between the net asset value of the securities portfolio supplied and the ETF shares received. This cash balancing amount can be positive or negative and it is this uninvested component that can contribute to cash drag (Gastineau, 2004).

Table 2.1: ETFs and mutual funds compared (Rongala, 2009)

Comparing Exchange Traded Funds to Open-Ended Mutual Funds		
	Exchange Traded Funds	**Open-Ended Mutual Funds**
Management Type	There are both actively and passively managed ETFs. The latter dominates the former.	There are both actively and passively managed mutual funds. The former dominates the latter.
Transparency	Both passively and actively managed ETFs have to disclose their holdings every trading day.	Mutual funds have to disclose their holdings every quarter.
Tax Efficiency	When ETF shareholders redeem their shares, the ETF generally does not have to sell any of its portfolio securities to pay for the redemptions because redemptions are either done in-kind or through the sale of shares on an exchange. As a result, redemptions of ETF shares generally do not contribute to the capital gains distribution being paid to shareholders. However, actively managed ETFs may be required to pay larger capital gains distributions because of the ETF's investment objectives.	When shareholders of an open-ended mutual fund redeem their shares, they are transacting directly with the fund. Therefore, the fund must often sell portfolio securities to fund shareholder redemptions. This activity can result in capital gains distributions.
Pricing and Trading	The price of ETFs is "live" throughout the trading day and can be traded similar to any stock. ETFs can be shorted, as well as bought on margin and investors can trade options. ETFs are traded on exchanges.	The price of an open-ended mutual fund is the NAV that is determined at the end of the trading day (all trading done on a particular day is based on that NAV). Open-ended mutual funds cannot be shorted, but they can be bought on margin. There are mutual fund options and open-ended mutual funds are not traded on exchanges.
Transaction Costs/Fees	ETFs have comparatively low management fees, ranging from 0% to 0.74% for ETFs in the United States. The average management fee for ETFs is 0.41% and the range of management fees for index ETFs is 0.09% to 0.99%. ETFs, like shares, have bid-ask spreads and commissions have to be paid for each transaction. The typical brokerage commission is around $10 per trade in the United States.	The average management fee for equity mutual funds is 1.47%, while it is 0.61% for money-market mutual funds. The average fee for index or passively managed ETFs is 0.74%, but it can be lower than 0.20% for S&P indexed mutual funds. Some mutual funds charge an early withdrawal fee that typically ranges from 1.5% to 2%. Some have front loads and back loads, and in some cases, the front load can be as high as 5.75%. Mutual funds have no bid-ask spreads at shareholder level. Unlike ETFs, most indexed-based mutual funds have no commissions.
Minimums	ETF shareholders can buy one share.	Some mutual funds have minimum amounts that investors have to purchase.

Other factors, at fund level, that result in tracking error are dividend policies, index fund changes and corporate activity (Kostovetsky, 2003). The problems arising from dividend policy are similar for index and ETFs (Kostovetsky, 2003). Both ETFs and index funds have to wait a certain amount of time to receive the dividend, after a dividend has been declared. This short lag contributes to tracking error. Furthermore, ETFs and index funds face the same costs and timing mismatches due to index fund changes and corporate activity (Kostovetsky, 2003). For example, if a company leaves the index being tracked there will be a time delay in rebalancing the index, since the shares of the company leaving the index must be sold and the shares of the company entering the index must be bought. Gastineau (2004) suggests ETF managers are not as aggressive at index fund managers in modifying a portfolio when an announcement is made. This leads to a larger tracking error in ETFs and inferior returns, in comparison to index funds.

Table 2.2: ETF and mutual fund cost comparison (Kostovetsky, 2003)

Fund Level Costs		
Types of Costs	**Exchange Traded Funds**	**Index Mutual Funds**
Fund transaction costs on purchase and sales by the fund	None. All creations and redemptions are in-kind.	Bid-ask spreads (as fees to market makers..etc.)
Cash inflows and outflows	Deviations in value of creations and redemption in-kind are paid in cash.	Cash drag. Small percentage (± 2%) of assets are uninvested.
Dividend policy	Lag between ex-dividend date and receipt of dividends.	Lag between ex-dividend date and receipt of dividends.
In-and-out arbitrage trading	None. Arbitrage eliminated by creation/redemption in-kind.	Can be important for some domestic index funds. None at Vanguard.
Index fund charges	ETFs must incur costs to rebalance.	Similar costs to rebalance.
Corporate activity	ETFs must incur costs to rebalance.	Similar costs to rebalance.
Management fees	ETFs have very low expense ratios because all accounting is done at the shareholder level.	Index funds have slightly higher expense ratios because shareholder accounting is done at the fund level.
Shareholder Level Costs		
Types of Costs	**Exchange Traded Funds**	**Index Mutual Funds**
Shareholder transaction costs	Brokerage transaction fees and bid-ask spreads on ETFs.	None, except for index funds with loads, which is rare.
Taxation costs	Capital gains are distributed very rarely (almost never).	Significant share of capital gains gets distributed especially in bull markets.

At shareholder level, if an investor was to assume that ETFs and index funds can perfectly replicate the market, then the investor still has an important choice to make due to non-tracking errors differences between ETFs and index funds (Kostovetsky, 2003). As stated earlier the non-tracking errors are management

fees, shareholder transaction costs and taxation costs (CFA Institute, 2012c; Kostovetsky, 2003).

Management fees for some index funds are below 0.5% per year whereas, ETFs have been able to offer lower expense ratios than the cheapest of index funds (Dellva, 2001; Gastineau, 2004). The main reason ETFs are able to offer lower expense ratios is that at fund level shareholder accounting is not taken into account (Kostovetsky, 2003).

Shareholder transaction costs are another factor that is different for ETFs and index funds. ETFs have to be purchased on the secondary market where investors must pay a commission to the brokerage house and a fee to market makers in the form of bid-ask spreads (Dellva, 2001; Rompotis, 2008a; Svetina, 2010). Garland (2006) suggests that "concentrated (sector or industry specific) ETFs will generally have wider bid-ask spreads, wider fluctuations from NAV and larger tracking error percentage" (p. 112). This results in higher costs than the management fee suggests. The vast majority of index funds are no-load index funds meaning that commission is not charged on transactions.

ETFs are much more tax efficient in the US (CFA Institute, 2012c). Index funds experience a tax event when redemptions exceed additions (Kostovetsky, 2003). The fund manager is forced to sell stocks and distribute gains to shareholders. This event rarely occurs for ETFs (Kostovetsky, 2003).

2.2. Active and passive investing

The first indexed portfolio was launched in 1971 by Wells Fargo for a single pension fund client (CFA Institute, 2012c). Since then, there has been many active versus passive debates among practitioners and academics. Meanwhile the smaller skirmish in the war has been the debate of actively managed mutual funds versus comparable index funds (Minor, 2003).

Although controversy still exists, the majority of studies now conclude that actively managed funds on average under-perform their passively managed counterparts (Wermers, 2000). Gruber's (1996) study concluded that the average active mutual fund underperforms passive market indices by about 65 basis points per year, for the period of 1985 to 1994. Moreover, Carhart's

(1997) study concluded that net returns are negatively correlated with expense levels, which are generally much higher for actively managed funds. Further, findings by Carhart (1997) show that the more actively a mutual fund manager trades, the lower the fund's benchmark-adjusted net return to investors. These studies do not provide a promising picture for active mutual fund management (Wermers, 2000). Instead studies conclude that investors are better off, on average, buying a low expense index funds (Wermers, 2000). Studies by Jensen (1968) and Malkiel (1995) also conclude that active managers fail to outperform passive benchmark portfolios and in many cases under-perform indices even before expenses.

The classic article "The Arithmetic of Active Management" by Sharpe (1991) explains why the average investor cannot hope to beat a comprehensive equity index. Sharpe's argument is clear: if active and passive management styles are defined in sensible ways it must be the case that (Sharpe, 1991):

1) before costs, the return on the average actively managed dollar will equal the return on the average passively managed dollar and;
2) after costs, the return on the average actively managed dollar will be less than the return on the average passively managed dollar.

These assertions will hold true for any time period (Sharpe, 1991). Later in his article, Sharpe (1991) stated that it is perfectly possible for some active managers to beat their passive counterparts, even after costs. These managers must, of course, manage a minority share of the actively managed dollars within the specified market (Sharpe, 1991). Another important outcome of the article is that the best way to measure a fund manager's performance is to compare his or her return with that of a comparable passive alternative (Sharpe, 1991).

Bogle (1998) subdivided mutual funds by using the Morningstar (an index provider) categories. The study covered funds from 1992 to 1996. He found that passively managed mutual funds exceeded the returns of the actively managed funds. However, in one category, small-cap growth funds, the managed funds performed better.

Larsen and Resnick (1998) continued to address anomalies where active managed funds outpaced passive index funds. Their study was compromised of 200 high capitalisation and 200 low capitalisation funds covering the 1981 to 1995 time period. Their research inferred that the high capitalisation stock indices are more efficient than the small capitalisation indices.

Fortin and Michelson (1999) reaffirmed that anomalies exist in the active versus passive mutual fund management debate. Their study comprised 6 997 mutual funds from 1976 to 1995. The funds were grouped into seven categories: aggressive growth and growth; growth/income and equity/income; small company equity; international stock; corporate bond, government bond and municipal bond. Their results indicated that there were significant advantages to indexing. The only area indicating active mutual fund management outperformed the index was in small-caps (Fortin & Michelson, 1999).

Moreover, studies by Grinblatt and Titman (1993) and Wermers (1997) conclude that mutual fund managers have the ability to choose stocks that outperform their benchmarks, before expenses are deducted. The evidence is especially strong among growth-orientated funds that hold stocks which outperform their benchmarks by an average of two to three percent per year (before expenses).

At the turn of the century, Kjetsaa (2004) suggested in his study of active and passive fund performance that excellent portfolios can be constructed by owning shares in index funds as well as actively managed funds.

Fortin and Michelson (2005) found that internationally managed mutual funds (i.e. funds outside the US) outperformed their respective indices in four out of the five categories identified. As opposed to domestic mutual funds, they propose that it is beneficial to select actively managed international mutual funds over index funds.

Cremers and Petajisto (2009) introduced the term ‘active share’ to describe the portion of a fund which does not match the benchmark index. They conducted a study of 2650 fund managers in the US during the period 1980 to 2003. Their findings showed that funds with the highest level of active share (approximately 80%) outperformed the benchmark by 1.5% per annum. Furthermore, they

found that the level of active share had declined over the time period of their study. This adds support to the findings of Bhattacharya & Galpin (2005), that stock-picking in the US dropped by approximately 50% during the period 1960 to 2003.

Rompotis (2009) expanded the debate about 'active versus passive' management using data from active and passive ETFs listed in the US market. The results reveal that the active ETFs underperform both the corresponding passive ETFs and the market indices. Furthermore, he concludes that the lack of significant risk-adjusted performance of active ETFs due to inadequate selection and market timing skills supports existing literature on mutual fund performance and managerial behaviour.

Prondzinski (2010) examined the equity Europe and equity Asia Pacific mutual fund performance of active versus passive managers during the period from 1995 to 2008. His research adds support to the finding of Fortin and Michelson (2005) that actively managed international mutual funds outperform their benchmark indices.

Finally, Muller and Ward (2011) followed Bhattacharya & Galpin's (2005) approach to measure maximum volume of stock picking on the JSE. They conclude that the level of active share on the JSE declined from a level of 50% in 1988 to 15% in 2001, remaining at this level through to December 2010. Furthermore, they find no relationship between the level of active share and fund returns. This raises doubts about the ability of fund managers to stock-pick, and their unwillingness or inability to take active positions.

2.3. Modern portfolio theory

Modern Portfolio Theory (MPT) seeks a combination of available securities to maximise expected return while using diversification to minimise variance for investors (Markowitz, 1952). Markowitz (1952) explored and formulated the theory of optimal portfolio selection in the context of risk and return. The Markowitz model is based on the following assumptions on investor behaviour (Markowitz, 1952):

1. Investments are considered based on the probability of discounted expected returns.
2. Investors desire to maximise expected returns during the time the investment is held.
3. Risk is estimated based on the variability of expected returns.
4. Selected portfolios are a function of expected returns and variance, given the investors preference for risk.
5. Investors prefer higher returns for a given level of risk and they prefer less risk instead of more risk.

Tobin (1958) identified weakness in the Markowitz model with the discovery of the investor's preference for liquidity. Markowitz assumed in his model that investors select securities from a universe consisting entirely of risky assets. Moreover, he did not think of investors that might control risk by adding cash or other assets of very low risk. Tobin (1958) suggested that the risk of a financial portfolio can be reduced by holding cash or cash equivalents. He further suggested that different investor's attitudes towards risk would result in different combinations of money and overall exposure to risky assets.

Sharpe (1964) extended the work of Markowitz by analysing the future performance of securities to determine an efficient set of portfolios using a computer. He suggests that the returns of various securities are related through common relationships with some underlying factor. The underlying factor is the stock market as a whole. Sharpe's research proved that more than 90% of a portfolio's variability is explained by the index or stock market. Sharpe reasoned that if investors are going to buy stocks, they cannot avoid the risk of owning stocks. Furthermore, Sharpe demonstrated that there is one portfolio on the efficient frontier whose trade-off between risk and return will dominate all other portfolios. Sharpe viewed the stock market as the super-efficient portfolio that could not be beaten without taking unwarranted amount of risk. This research demonstrated that the optimal investment strategy is simply to buy and hold a widely diversified basket of stocks. In other words, a passive portfolio.

2.4. Performance evaluation

Treynor (1965) developed the first three major performance measures for the study of portfolio management. The Treynor ratio or reward-to-volatility ratio was used to assess the performance of mutual fund managers. The measure is as follows (Treynor, 1965):

$$Treynor\ Measure = {(R_i - R_f)}/{\beta}$$

Where:

$$R_i = risk\ of\ the\ investment$$

$$R_f = risk\ of\ a\ risk\ free\ investment$$

$$\beta_i = beta\ of\ the\ investment$$

The Treynor ratio is a risk-adjusted measure of return based on systematic risk. It is similar to the Sharpe ratio, with the difference being that the Treynor ratio uses beta as a measure of volatility. The greater the result the better the performance of the portfolio under analysis for varying levels of risk.

Sharpe (1966) furthered the work of Treynor by enhancing the ability of an investor to measure portfolio management with reward-to-variability ratio. The Sharpe ratio measures the mean return earned in excess of the risk-free rate per unit of volatility or total risk (CFA Institute, 2012a). By subtracting a risk-free rate from a mean return, the investor can isolate the performance associated with risk taking activity. The measure is as follows (CFA Institute, 2012a):

$$Sharpe\ Ratio = {(R_i - R_f)}/{\sigma_i}$$

Where:

$$R_i = arithmetic\ mean\ return\ of\ security\ i$$

R_f

$= average\ rate\ of\ return\ on\ a\ risk\ free\ investment\ during\ the\ same\ period$

$$\sigma_i = standard\ deviation\ of\ the\ returns\ on\ security\ i$$

Another widely used measure of performance is the information ratio (IR). This ratio is used to measure the performance of actively managed funds. The difference between the Sharpe ratio and the IR is that former uses the standard deviation of nominal returns and the later uses the standard deviation of excess returns. The IR measure is as follows (CFA Institute, 2012a):

$$IR = \frac{active\ return}{active\ risk} = \frac{R_i - R_b}{\sigma(R_i - R_b)}$$

Where:

$$R_i = arithmetic\ mean\ return\ of\ security\ i$$

$$R_b = arithmetic\ mean\ return\ of\ the\ benchmark$$

The absence of these measurement tools would mean that market participants with high risk profiles would likely be given higher marks for positive performance than they arguably deserve (CFA Institute, 2012a). This is because they might generate higher returns but it comes at a "cost" of higher risk exposure.

2.5. Efficient market hypothesis

Efficient market hypothesis (EMH) states that an efficient market is a market where share prices fully reflect available information because of the actions of a large number of rational investors (CFA Institute, 2012b). The fundamental assumption of market efficiency is the assumption that investors are rational economic beings that are acting in their own self-interest and making optimal decisions by trading off costs with benefits (CFA Institute, 2012b). Another important assumption is that whenever relevant information enters the market the population updates their expectations. Furthermore, the information is freely available to investors so this means that no insider trading occurs. Therefore in an efficient market the price of a share will match its intrinsic value which means that no investor should be able to consistently earn excess returns (CFA Institute, 2012b).

Grossman and Stiglitz (1980) however argue that share prices must offer a monetary incentive for gathering and analysing information. If information is not be gathered and analysed then the market cannot be efficient and is known as the Grossman-Stiglitz (1980) paradox. However a market is inefficient if the information gatherers can earn excess returns.

Fama (1970) proposes that there are three forms of efficient markets namely; strong, semi-strong and weak. Strong-form efficient market model is the benchmark in that the share price fully reflects all available public and private information. This means that in a strong-form efficient market, even insider trading will not generate excess returns. In the semi-strong-form efficient market model it is assumed that all publicly available information (past and present) is fully reflected in the share price but not private information. This means that technical and fundamental analysis will not generate excess returns. In the weak-form efficient market model share prices only reflect historical data and thus technical analysis will not generate excess returns.

2.6. Investment styles

There are numerous studies that have been conducted that describe anomalies or deviations from EMH. A market anomaly must persist for a substantial period of time to be considered a contradiction to market efficiency. There are three main types of anomalies that have been identified namely: fundamental, technical and calendar (CFA Institute, 2012c). Some of these anomalies have become investment styles used to gain abnormal returns.

Style is an integral component to many asset allocation strategies and is a key element of modern portfolio management. Brinson, Hood and Beebower's (1986) research shows evidence that the asset allocation decision is a significantly more important attribute of portfolio performance over time than other factors such as individual investment selection or market timing. Furthermore, the empirical evidence showed that 93.6% of performance was due to asset allocation attribution.

Muller and Ward (2012) categorise styles into financial ratio based styles, market based styles and behavioural finance based styles. Financial theory supports the idea that companies with strong accounting based results should

correspondingly better perform in terms of investor returns. Piotroski (2000) focused on enhancing the returns to value investors by creating a portfolio of shares with good fundamental to market values. Since a high book-to-market ratio can also be an indicator of a company in financial trouble, he also provides a nine point checklist to distinguish the quality of companies in a value portfolio. Furthermore, he shows that the mean return earned by a high book-to-market investor can be increased by at least 7.5% annually through the selection of financially strong book-to-market firms. Some attributes of financial ratio based styles are return on capital, return on equity and interest cover (Muller & Ward, Style-based effects on the Johannesburg Stock Exchange: A graphical time series approach, 2012).

Many researchers have shown that the size of a company is negatively correlated with returns (Muller & Ward, Style-based effects on the Johannesburg Stock Exchange: A graphical time series approach, 2012). Kruger and Lantermans (2010) observed that small firms on the JSE significantly outperformed other firms. Other financial ratios, which include current market value of a share, have been shown to differentiate between style metrics such as value and growth. Share tradability or liquidity is also considered to be a significant criterion for investment decisions. Bailey and Gilbert (2007) suggest that liquidity does play a large role in explaining why abnormal returns persist in the bottom end (low P/E) of the market. Furthermore, in South Africa there is a contrast between industrial and resource shares (Muller & Ward, Style-based effects on the Johannesburg Stock Exchange: A graphical time series approach, 2012). Some attributes of market based styles are size, price to NAV, dividend yield, industry, earning yield, cash-flow/price and liquidity.

Momentum and mean reversion are the most researched topics among behavioural indicators. Momentum is ascribed to the short-term effect of shares, which have exhibited strong returns over the last 12 months (approximately) and should continue producing strong returns over the next few months (Muller & Ward, 2012). Grinblatt, Titman and Wermers (1995) observed that 77% of mutual funds were momentum investors buying past winning stocks; however fund managers did not sell past losers. On average, funds that

invested on momentum realised significantly better performance than other funds. Mean reversion relates to shares which have performed poorly over a long period of time eventually reverting to the mean. Cubbin, Eidne, Firer, and Gilbert (2006) prove that a portfolio of low P/E shares significantly outperforms a portfolio of high P/E shares and therefore revert to the mean. Their results show that constructing portfolios of shares with a low P/E relative to the rest of the market can produce returns above the market in the longer term as these shares re-rate. Some of the most recent literature on style-based effects on markets is discussed below.

Van Rensburg (2001) examines more than 20 style strategies using a portfolio approach for industrial shares on the JSE for the period 1983 to 1999. He used dividend adjusted monthly return data and found 11 of the 20 style strategies to be statistically significant, even after adjusting for risk. The results suggest that three style factors emerge namely: earnings to price (representing the value cluster), market capitalisation (representing the quality cluster) and 12 month positive returns (representing the momentum cluster).

Van Rensburg and Robertson (2003) use size and price-to-earnings as factors to predict security returns. Furthermore, following Fama and French (1992), they investigate the relationship between these factors and the explanatory power of beta. They used dividend adjusted monthly JSE data for period from 1990 to 2000 and examine similar style strategies as Van Rensburg (2001), but using individual share characteristics. They conclude that small size firms earn higher returns on the JSE but have lower betas. Furthermore, low price-to-earnings stocks earn higher average returns and also have lower betas. This study contradicts CAPM as it suggests that on the JSE beta is inversely proportional to returns.

Mutooni and Muller's (2007) research investigates whether the style timing strategies could be profitable on the JSE. They found that from 1986 to 2006, value stocks outperformed growth stocks across the size spectrum. They also comment that style spreads was a potentially more profitable strategy than buying and holding the index or following a simple fixed style strategy.

Strugnell, Gilbert and Kruger (2011) supplement the work of Van Rensburg and Robertson (2003). They use stock returns on the JSE from 1994 to 2007, in a portfolio-based study, and find support for a size and a price-to-earnings effect as well as an inverse relationship between return and beta. They conclude that beta has no predictive power for returns on the JSE and therefore invalidates CAPM in its applied form based on the market proxy of the All-Share Index.

Swinkels and Tjong-a-Tjoe (2007) investigate the ability of mutual fund managers to successfully move between investment styles. They find empirical evidence in favour of market timing among a group of 153 US-based mutual funds with a Morningstar Midcap/Blend investment style. Furthermore, they conclude that the results for momentum are weaker than for valuation and that this can be explained by relatively high transaction costs for momentum stocks relative to other styles that can be traded on the futures markets.

Auret and Sinclaire (2006) study the relationship of book-to-market to returns, as per Fama and French (1992), and find that book-to-market has a strong role in explaining stock returns. Furthermore, when book-to-market is added to the Van Rensburg and Robertson (2003) model of price-earnings and size, it almost completely subsumes the effect of price-earnings and size.

Basiewicz and Auret (2009) test the feasibility of the Fama and French (1993) three factor model on the JSE to explain the size and value effects. They propose that their three factor model could be used in expected return estimation for firms listed on the JSE.

Auret and Cline (2011) investigate the inter-relationship between price-earnings, size and the January effect on the JSE. They use INET data from 1988 to 2006 and conclude that no significant value, size or January effect was evident during the period under observation.

Finally, Muller and Ward (2012) examine several styles on the JSE from 1985 to 2011. Their findings agree with other researcher's findings in that momentum is an important style. Momentum investing persistently outperformed the ALSI by around 9% per annum, using a 12-month formation period and a three month holding period. Furthermore, they conclude that a combination style yields the best overall result, which persistently outperformed the ALSI by around 14%

each year. In contrast to other research, however, they find no evidence of size effect (except for fledgling companies).

2.7. Literature review summary

In summary, the literature review chapter presented is an overview of the evolution of theory, thought and intellectual capital underlying ETFs as well as active and passive unit trusts (mutual funds). This chapter has depicted details of ETFs including creation/redemption in-kind, methods of replicating an index, implicit and explicit transaction costs and, research on the performance of ETFs in comparison to benchmark indices and index funds.

Research on the performance of active and passive mutual funds has also been presented in this chapter. The active versus passive debate among practitioners and academics has been around for a few decades now, but with the advent of ETFs as low cost tracking tools, this debate has resurfaced. Furthermore, studies by Bogle (1998) as well as Fortin and Michelson (1999) suggest that in the small-cap growth category, actively managed funds outperform passively managed funds. This resurrects the idea that markets may not be totally efficient. If the market is inefficient then active fund managers should be able to use various investment styles, described in this chapter, to earn returns in excess of the benchmark index as well as ETFs and PUTs.

As far as can be ascertained, no research is available on the performance of ETFs relative to actively managed funds. The chapters that follow contribute to the current gap in the literature. This is accomplished by deriving hypotheses, from the literature review, in chapter three and detailing the research methodology in chapter four.

3. Hypotheses

The literature review provides support for research in determining the performance of ETFs relative to their benchmark indices as well as comparable PUTs and AUTs. The sections that follow describe the hypotheses that were formulated. The hypotheses are categorised into nine sections according to the name of the FTSE/JSE Index.

3.1. Performance of the Top 40 Index, ETFs, passive and active unit trusts

3.1.1. Performance of ETFs on average versus the Top 40 Index

H0: ETFs on average, that track the FTSE/JSE Top 40 Index, do not significantly outperform the index after expenses.

HA: ETFs on average, that track the FTSE/JSE Top 40 Index, do significantly outperform the index after expenses.

3.1.2. Performance of passive unit trusts on average versus the Top 40 Index

H0: Passive unit trusts on average, that track the FTSE/JSE Top 40 Index, do not significantly outperform the index after expenses.

HA: Passive unit trusts on average, that track the FTSE/JSE Top 40 Index, do significantly outperform the index after expenses.

3.1.3. Performance of active unit trusts on average versus the Top 40 Index

H0: Active unit trusts on average, that use the FTSE/JSE Top 40 Index as a benchmark, do not significantly outperform the index after expenses.

HA: Active unit trusts on average, that use the FTSE/JSE Top 40 Index as a benchmark, do significantly outperform the index after expenses.

3.1.4. Performance of an average ETF versus an average passive unit trust

H0: ETFs on average, that track the FTSE/JSE Top 40 Index, do not significantly outperform the average passive unit trust counterpart after expenses.

HA: ETFs on average, that track the FTSE/JSE Top 40 Index, do significantly outperform the average passive unit trust counterpart after expenses.

3.1.5. Performance of an average ETF versus an average active unit trust

H0: ETFs on average, that track the FTSE/JSE Top 40 Index, do not significantly outperform the average active unit trust counterpart after expenses.

HA: ETFs on average, that track the FTSE/JSE Top 40 Index, do significantly outperform the average active unit trust counterpart after expenses.

3.2. Performance of the SWIX Top 40 Index, ETFs and active unit trusts

3.2.1. Performance of ETFs on average versus the SWIX Top 40 Index

H0: ETFs on average, that track the FTSE/JSE Shareholder Weighted Top 40 Index, do not significantly outperform the index after expenses.

HA: ETFs on average, that track the FTSE/JSE Shareholder Weighted Top 40 Index, do significantly outperform the index after expenses.

3.2.2. Performance of active unit trusts on average versus the SWIX Top 40 Index

H0: Active unit trusts on average, that use the FTSE/JSE Shareholder Weighted Top 40 Index as a benchmark, do not significantly outperform the index after expenses.

HA: Active unit trusts on average, that use the FTSE/JSE Shareholder Weighted Top 40 Index as a benchmark, do significantly outperform the index after expenses.

3.2.3. Performance of an average ETF versus an average active unit trust

H0: ETFs on average, that track the FTSE/JSE Shareholder Weighted Top 40 Index, do not significantly outperform the average active unit trust counterpart after expenses.

HA: ETFs on average, that track the FTSE/JSE Shareholder Weighted Top 40 Index, do significantly outperform the average active unit trust counterpart after expenses.

3.3. Performance of the Financial 15 Index, ETFs and active unit trusts

3.3.1. Performance of ETFs on average versus the Financial 15 Index

H0: ETFs on average, that track the FTSE/JSE Financial 15 Index, do not significantly outperform the index after expenses.

HA: ETFs on average, that track the FTSE/JSE Financial 15 Index, do significantly outperform the index after expenses.

3.3.2. Performance of active unit trusts on average versus the Financial 15 Index

H0: Active unit trusts on average, that use the FTSE/JSE Financial 15 Index as a benchmark, do not significantly outperform the index after expenses.

HA: Active unit trusts on average, that use the FTSE/JSE Financial 15 Index as a benchmark, do significantly outperform the index after expenses.

3.3.3. Performance of the average ETF versus the average active unit trust

H0: ETFs on average, that track the FTSE/JSE Financial 15 Index, do not significantly outperform the average active unit trust counterpart after expenses.

HA: ETFs on average, that track the FTSE/JSE Financial 15 Index, do significantly outperform the average active unit trust counterpart after expenses.

3.4. Performance of the Industrial 25 Index, ETFs and active unit trusts

3.4.1. Performance of ETFs on average versus the Industrial 25 Index

H0: ETFs on average, that track the FTSE/JSE Industrial 25 Index, do not significantly outperform the index after expenses.

HA: ETFs on average, that track the FTSE/JSE Industrial 25 Index, do significantly outperform the index after expenses.

3.4.2. Performance of active unit trusts on average versus the Industrial 25 Index

H0: Active unit trusts on average, that use the FTSE/JSE Industrial 25 Index as a benchmark, do not significantly outperform the index after expenses.

HA: Active unit trusts on average, that use the FTSE/JSE Industrial 25 Index as a benchmark, do significantly outperform the index after expenses.

3.4.3. Performance of the average ETF versus the average active unit trust

H0: ETFs on average, that track the FTSE/JSE Industrial 25 Index, do not significantly outperform the average active unit trust counterpart after expenses.

HA: ETFs on average, that track the FTSE/JSE Industrial 25 Index, do significantly outperform the average active unit trust counterpart after expenses.

3.5. Performance of the Resource 10 Index, ETFs and active unit trusts

3.5.1. Performance of ETFs on average versus the Resource 10 Index

H0: ETFs on average, that track the FTSE/JSE Resource 10 Index, do not significantly outperform the index after expenses.

HA: ETFs on average, that track the FTSE/JSE Resource 10 Index, do significantly outperform the index after expenses.

3.5.2. Performance of active unit trusts on average versus the Resource 10 Index

H0: Active unit trusts on average, that use the FTSE/JSE Resource 10 Index as a benchmark, do not significantly outperform the index after expenses.

HA: Active unit trusts on average, that use the FTSE/JSE Resource 10 Index as a benchmark, do significantly outperform the index after expenses.

3.5.3. Performance of the average ETF versus the average active unit trust

H0: ETFs on average, that track the FTSE/JSE Resource 10 Index, do not significantly outperform the average active unit trust counterpart after expenses.

HA: ETFs on average, that track the FTSE/JSE Resource 10 Index, do significantly outperform the average active unit trust counterpart after expenses.

3.6. Performance of the SA Listed Property Index, ETFs and active unit trusts

3.6.1. Performance of ETFs on average versus the SA Listed Property Index

H0: ETFs on average, that track the FTSE/JSE SA Listed Property Index, do not significantly outperform the index after expenses.

HA: ETFs on average, that track the FTSE/JSE SA Listed Property Index, do significantly outperform the index after expenses.

3.6.2. Performance of active unit trusts on average versus the SA Listed Property Index

H0: Active unit trusts on average, that use the FTSE/JSE SA Listed Property Index as a benchmark, do not significantly outperform the index after expenses.

HA: Active unit trusts on average, that use the FTSE/JSE SA Listed Property Index as a benchmark, do significantly outperform the index after expenses.

3.6.3. Performance of the average ETF versus the average active unit trust

H0: ETFs on average, that track the FTSE/JSE SA Listed Property Index, do not significantly outperform the average active unit trust counterpart after expenses.

HA: ETFs on average, that track the FTSE/JSE SA Listed Property Index, do significantly outperform the average active unit trust counterpart after expenses.

3.7. Performance of the Dividend Plus Index and ETFs

3.7.1. Performance of ETFs on average versus the Dividend Plus Index

H0: ETFs on average, that track the FTSE/JSE Dividend Plus Index, do not significantly outperform the index after expenses.

HA: ETFs on average, that track the FTSE/JSE Dividend Plus Index, do significantly outperform the index after expenses.

3.8. Performance of the RAFI 40 TR Index and ETFs

3.8.1. Performance of ETFs on average versus the RAFI 40 TR Index

H0: ETFs on average, that track the FTSE/JSE RAFI 40 TR Index, do not significantly outperform the index after expenses.

HA: ETFs on average, that track the FTSE/JSE RAFI 40 TR Index, do significantly outperform the index after expenses.

3.9. Performance of the Equally Weighted Top 40 Index and ETFs

3.9.1. Performance of ETFs on average versus the Equally Weighted Top 40 Index

H0: ETFs on average, that track the FTSE/JSE Equally Weighted Top 40 Index, do not significantly outperform the index after expenses.

HA: ETFs on average, that track the FTSE/JSE RAFI Equally Weighted Top 40 Index, do significantly outperform the index after expenses.

4. Research Methodology

4.1. Research design

For this quantitative study, a quasi-experimental design was employed using secondary public time-series data of monthly share closing prices for ETFs and NAV prices for unit trusts (both active and passive) listed on the JSE (Saunders & Lewis, 2012). Only PUTs and AUTs comparable to ETFs were selected for this study. This study therefore adheres to Sharpe's conclusion that the best way to measure fund performance is to compare it with other comparable funds (Sharpe, 1991).

4.2. Universe/population and sampling

The scope of this study was limited to ETFs that are created from equities listed on the JSE that track a FTSE/JSE Index. Thereafter, comparable PUTs and AUTs were selected to conduct the research. Comparable meaning unit trusts that invest in securities listed on the JSE and use the same FSTE/JSE index, as the respective ETF, as a benchmark.

A total of 38 ETFs were listed on the JSE in September 2012 (ETF SA, 2012b). Out of the 38 ETFs, 22 were removed from the data set because the benchmark index was not a FTSE/JSE index or if the underlying assets were foreign equities, bonds or multi-assets. The remaining ETFs, totalling 15, formed the universe. Out of the 15 ETFs, 10 were used in this study because three of the ETFs were formed after August 2010 (therefore insufficient monthly share price data was available), and share data was not available on Bloomberg for two ETFs. The 10 ETFs used in this study cover nine FTSE/JSE indices/categories as shown in Table 4.1. Moreover, the time period under investigation varied across indices since new 'first time' ETFs were created by various providers to track a particular index since 2001. The time period under investigation for each index is also shown in Table 4.1.

Table 4.1: Summary of Indices, number of ETFs, Passive Unit Trusts and Active Unit Trusts and Time Periods included in the Data Sets

Data Summary				
Index	ETFs	Passive Unit Trusts	Active Unit Trusts	Time Period
FTSE/JSE Top 40	2	4	3	Jan 2001 - Sep 2012
FTSE/JSE Shareholder Weighted Top 40	1	0	9	June 2006 - Sep 2012
FTSE/JSE Financial 15	1	0	4	April 2002 - Sep 2012
FTSE/JSE Industrial 25	1	0	5	April 2002 - Sep 2012
FTSE/JSE Resource 10	1	0	4	June 2006 - Sep 2012
FTSE/JSE SA Listed Property	1	0	1	Nov 2007 - Sep 2012
FTSE/JSE Dividend Plus	1	0	0	Oct 2007 - Sep 2012
FTSE/JSE RAFI 40 TR	1	0	0	Sep 2009 - Sep 2012
FTSE/JSE Equally Weighted Top 40 Index	1	0	0	Sep 2010 - Sep 2012

A total of 236 unit trusts were listed on the Bloomberg database under domestic equity funds in October 2012, as shown in Appendix A. Out of the 236 unit trusts, 206 were removed from the data set because the benchmark index was not one of the nine FTSE/JSE indices used in this study, or if the unit trust was a fund of a fund. The universe of unit trust data used in this study comprises 4 PUTs and 26 AUTs. Table 4.2 shows the ETFs used in this study, their respective benchmark indices as well as comparable PUTs and AUTs.

Table 4.2: List of comparable Indices, ETFs, passive and active unit trusts

No.	Exchange Listed Indices	ETFs	Passive Unit Trusts	Active Unit Trusts
1	FTSE/JSE TOP40 Index	RMB TOP 40 and SATRIX 40.	SIM Index Fund, Old Mutual Top40 Fund, Momentum Top40 Index and Kagiso Top 40 Tracker.	Coronation Top 20 Fund-B, Coronation Top 20 Fund and Coronation Top 20 Fund-B2.
2	FTSE/JSE Shareholder Weighted TOP40 Index	Satrix Swix		Cadiz Mastermind Fund, Symmetry Equity Fund A, Investec Active Quants-R, Met-General Equity-Fund, N-E-FG Equity Fund, Old Mutual Top Companies-A, Old Mutual Value Fund-A, Momentum Equity Fund Class-R, Sasfin Value Fund and Old Mutual Investors Fund-R.
3	FTSE/JSE Financial 15 Index	Satrix Fini		Coronation Financial Fund, StanLib Financial Fund, Momentum Financial Fund and SIM Financial Fund.
4	FTSE/JSE Industrial 25 Index	Satrix Indi		Coronation Industrial Fund, StanLib Industrial Fund-R, StanLib Industrial Fund-A,Momentum Industrial Fund and SIM Industrial Fund.
5	FTSE/JSE Resource 10 Index	Satrix Resi		Coronation Resources Fund, StanLib Resources Fund and Momentum Resources Fund
6	FTSE/JSE SA Listed Property Index	Property Index Tracker Managers		Momentum Property Fund
7	FTSE/JSE Dividend Plus Index	Satrix Dividend Plus	SIM Dividend+ Index Fund (Not enough data)	
8	FTSE/JSE RAFI 40 TR Index	Satrix Rafi 40 TR Index		
9	FTSE/JSE Equally Weighted TOP40 Index	BettaBeta Equally Weighted TOP40	SIM Equally Weighted Top40 Index Fund (Not enough data)	

4.3. Data sourcing

All monthly share closing price data for indices and ETFs as well as monthly NAV data for unit trusts were sourced using Bloomberg Financial Data Services. A sample of monthly share closing price data, extracted from Bloomberg, for the FTSE/JSE Top 40 Index, FTSE/JSE Financial 15 Index and FTSE/FSE Industrial 25 Index is shown in Appendix B. All total expense ratios (TERs) was sourced from the Association for Savings and Investment SA (ASISA) database.

4.4. Data analysis approach

The aim of the data analysis was to compare the monthly returns of ETFs to its respective benchmarks as well as PUTs and AUTS, after deducting administrative costs. As shown in Table 4.2, PUTs are represented in one category, namely the FTSE/JSE Top 40 Index, whereas AUTs are represented in six categories. In the last three categories ETFs could only be compared to the respective benchmark index as comparable PUTs and AUTs were not available.

Figure 4.1 presents the research model. Its details the relationship among variables and presents a general flow of the study's logic and potential outcomes. It can be seen from figure 4.1 that the share prices for ETFs and benchmark indices as well as NAVs for PUTs and AUTs were converted into monthly returns. The monthly returns were calculated using the following formula (Rompotis, 2008b):

$$R_i = \frac{Share\ Price_i - Share\ Price_{i-1}}{Share\ Price_{i-1}}\ x\ 100$$

Where:

$R_i = Percentage\ return\ in\ month\ i$

$Share\ Price_{\ i}$
$= Share\ Price\ in\ month\ i\ for\ indices\ and\ ETFs\ or\ NAV\ for\ unit\ trusts$

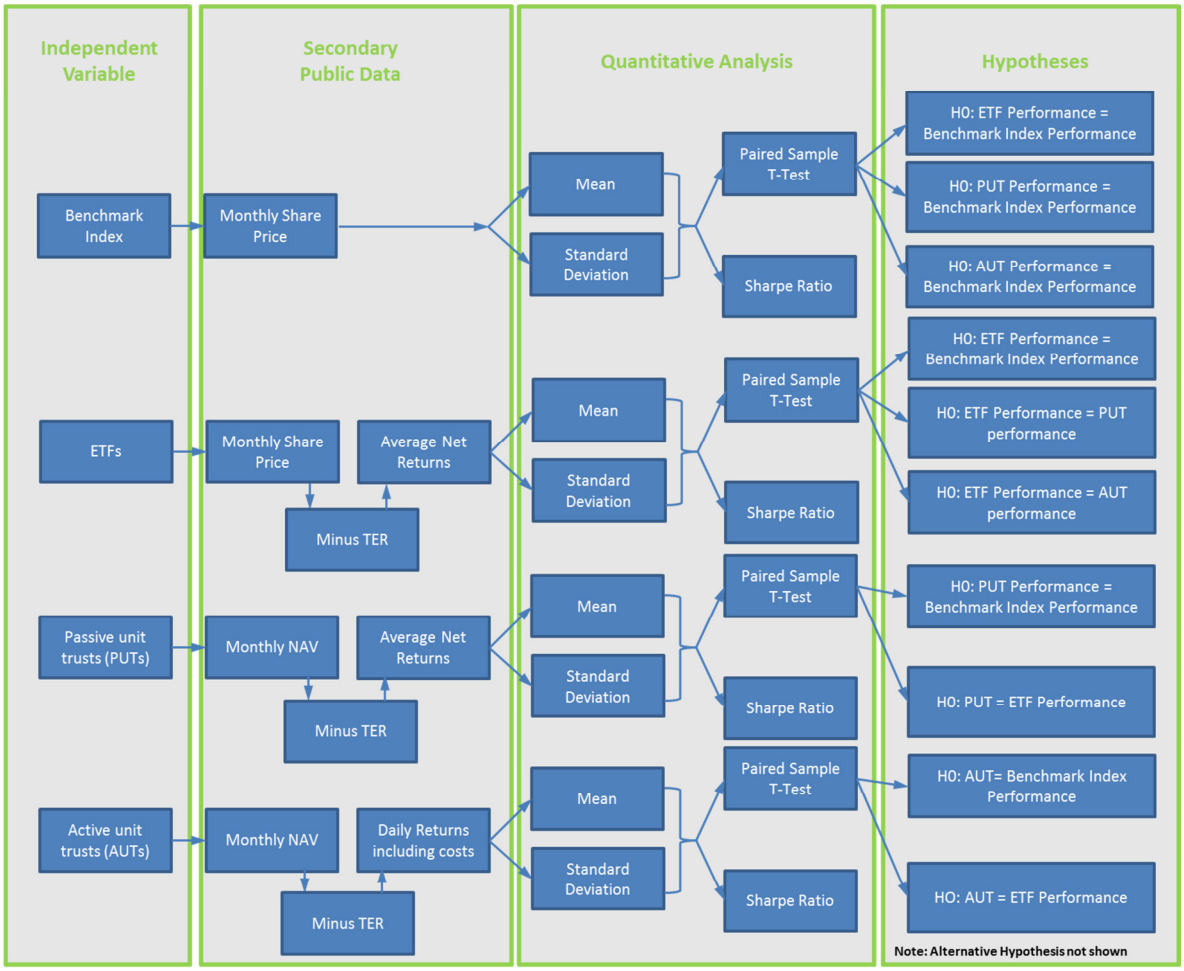
The net return was then calculated by subtracting the monthly return from the monthly TER. The TER, expressed as a percentage, measures the

management and operating expenses of a fund over a year. This yearly percentage cost was converted to a monthly cost using the following equation (Bodie, Kane, & Marcus, 2011; CFA Institute, 2010):

$$Monthly\ TER = (1 + TER)^{1/12} - 1$$

Thereafter, average net returns for the ETFs, PUTs and AUTs were calculated (as shown in Appendix C). The net returns of the ETFs, PUTs and AUTs were then statistically compared to their respective benchmark indices, using the paired sample *t*-test. This was then followed by average net returns of ETFs being statistically compared to the average net returns of PUTs and AUTs within the various categories. The paired sample *t*-test statistically validated, if there was a significant difference in the performance of ETFs, PUTs and AUTs relative to the benchmark index. The paired sample *t*-test also statistically validated if there was a significant difference in the performance of ETFs relative to comparable PUTs and AUTs.

Figure 4.1: Research model and variables



Risk adjusted returns of the benchmark indices, ETFs, PUTs and AUTs were measured using the Sharpe ratio. The Sharpe ratio measures the mean return earned in excess of the risk-free rate per unit of volatility or total risk (CFA Institute, 2012a). By subtracting a risk-free rate from a mean return, the investor can isolate the performance associated with risk taking activity. The measure is as follows (CFA Institute, 2012a):

$$Sharpe\ Ratio = {}^{(R_i - R_f)}/_{\sigma_i}$$

Where:

$R_i = arithmetic\ mean\ return\ of\ the\ Index, ETF, PUT\ or\ AUT$

$R_f = average\ rate\ of\ return\ on\ a\ risk\ free\ investment\ during\ the$

$same\ period$

$\sigma_i = standard\ deviation\ of\ the\ returns\ of\ the\ Index, ETF, PUT\ or\ AUT$

4.5. Assumptions

4.5.1. Total expense ratio

As far as can be ascertained, a database of historical TERs does not exist. Therefore the current TER, of the ETFs and unit trusts used in this study, has been assumed to be constant over the years under observation.

4.5.2. Sharpe ratio

To simplify the Sharpe ratio calculation, the risk–free rate (R_f), has been assumed to be zero. This assumption has been used by other researchers such as Rompotis (2008b).

4.5.3. Normal distribution

The net return data, for benchmark indices, ETFs, PUTs and AUTs, used in the t-tests have been assumed to be normal since 25 or more data points have been used (Albright, Winston, & Zappe, 2009). In situations where less than 25 data points were available, the ETFs were removed from the data set.

4.6. Research limitations

Due to the nature of this study, including time constraints, various limitations have been identified. These include:

- This study is limited to South Africa since only domestic ETFs and unit trusts have been used in this study.
- Measures such as risk adjusted return could be distorted since a global recession occurred in 2008.
- Survivorship bias exists, which may have caused an overestimation of past returns of certain fund categories as terminated funds have not been included in this study.

5. Results

5.1. Sample description

As was elaborated in Chapter four, data sets were constructed using monthly NAV data for all domestic equity PUTs and AUTs comparable to ETFs which track FTSE/JSE Indices. A list of the domestic equity ETFs, PUTs and AUTs used in this study are shown in Table 5.1. Table 5.2 shows the ETFs that were excluded from the data sets as well as the reason for exclusion.

Table 5.1: Summary of Domestic Equity ETFs, Passive Unit Trusts and Active Unit Trusts included in the Data Sets

Exchange Traded Funds						
Code	**Name**	**Provider**	**Benchmark Index**	**Inception Date**	**AUM (Rm)**	**Observations**
STX40	Satrix 40	Satrix	Top 40	Nov 2000	7 077	141
RMBT40	RMB Top 40	RMB	Top 40	Oct 2008	543	46
STXSWX	Satrix SWIX	Satrix	Shareholder Weighted Top 40	Apr 2006	323	76
STXFIN	Satrix Fini	Satrix	Financial 15	Feb 2002	733	126
STXIND	Satrix Industrial	Satrix	Industrial 25	Feb 2002	701	126
STXRES	Satrix RESI	Satrix	Resource 10	Apr 2006	257	76
PTXSPY	Property Index Tracker	Property Index Tracker	SA Listed Property	Sep 2007	132	59
STXDIV	Satrix Dividend Plus	Satrix	Dividend Plus	Aug 2007	1 559	60
STXRAF	Satrix RAFI TR Index	Satrix	RAFI 40 TR	Oct 2008	668	37
BBET40	Bettabeta Equally Weighted Top 40	Nedbank	Equally Weighted Top 40	Mar 2010	52	25
Passive Unit Trusts						
Code	**Name**	**Provider**	**Benchmark Index**	**Inception Date**	**AUM (Rm)**	**Observations**
CORALSI	Kagiso Top 40 Tracker	Coronation	Top 40	Aug 1997	66	141
SIMINDR	SIM Index Fund	Sanlam	Top 40	Oct 1965	1 527	47
OLMALSI	Old Mutual Top 40 Fund	Old Mutual	Top 40	Jan 2001	374	114
RMBT40I	Momentum Top 40 Index	Momentum	Top 40	Jun 1996	272	141
Active Unit Trusts						
Code	**Name**	**Provider**	**Benchmark Index**	**Inception Date**	**AUM (Rm)**	**Observations**
CORTOPB	Coronation Top 20 Fund-B	Coronation	Top 40	Jul 2006	10 727	73
CORTP20	Coronation Top 20	Coronation	Top 40	Oct 2000	10 727	141
CORTPB2	Coronation Top 20 Fund-B2	Coronation	Top 40	Oct 2000	10 727	64
CADMMND	Cadiz Mastermind Fund	Cadiz	Shareholder Weighted Top 40	Mar 2006	85	76
INVINDX	Investec Active Quants Fund	Investec	Shareholder Weighted Top 40	Apr 2005	918	109
METGENE	MET General Equity Fund	Mazi Capital	Shareholder Weighted Top 40	Aug 1991	313	109
NEEQUIT	N-e-FG Equity Fund	N-e-FG Fund Management	Shareholder Weighted Top 40	Aug 2008	42	47
OLDMTCA	Old Mutual Top Companies Fund	Old Mutual	Shareholder Weighted Top 40	Nov 1991	1 700	47
OLDMVAA	Old Mutual Value Fund	Old Mutual	Shareholder Weighted Top 40	Mar 1998	807	47
RMBEQTY	Momentum Equity Fund Class R	Momentum	Shareholder Weighted Top 40	Nov 1987	2 620	109
SASTWEN	Sasfin Value Fund	Sasfin	Shareholder Weighted Top 40	Oct 2005	66	47
OMLOMIR	Old Mutual Investors Fund R	Old Mutual	Shareholder Weighted Top 40	Oct 1996	9 400	50
CORFINB	Coronation Financial Fund-B	Coronation	Financial 15	Jul 1998	222	73
LIBFINA	Stanlib Financial Fund-A	Stanlib	Financial 15	Mar 2000	190	119
RMBFNSV	Momentum Financials Fund	Momentum	Financial 15	Jul 1998	353	126
SANFINL	SIM Financial Fund	Sanlam	Financial 15	Aug 2000	217	125
CORCGRO	Coronation Industrial Fund	Coronation	Industrial 25	Jul 1998	259	141
LIBINDR	Stanlib Industrial Fund-R	Stanlib	Industrial 25	Apr 1992	818	119
LIBINDU	Stanlib Industrial Fund-A	Stanlib	Industrial 25	Jun 2000	818	119
RMBINDF	Momentum Industrial Fund	Momentum	Industrial 25	Jul 1998	140	115
SIMINDR	SIM Industrial Fund-R	Sanlam	Industrial 25	Aug 1966	899	47
CORVALU	Coronation Resources Fund	Coronation	Resource 10	Oct 1999	221	130
LIBRESR	Stanlib Resources Fund-A	Stanlib	Resource 10	Jun 2000	770	119
LIBRSRR	Stanlib Resources Fund-R	Stanlib	Resource 10	Apr 1987	770	119
RMBRESO	Momentum Resources Fund	Momentum	Resource 10	Aug 1987	173	43
RMBPROP	Momentum Property Fund	Momentum	SA Listed Property	Sep 2004	589	67

Table 5.2: Summary of Domestic Equity ETFs excluded from the Data Set

Domestic Equity Exchange Traded Funds excluded from Data Set					
Code	Name	Provider	Benchmark Index	Inception Date	Reason for exclusion
BGREEN	Bgreen ETF	Nedbank	Nedbank Green Index	Dec 2011	Does not track a FTSE/JSE Index
NFEMOM	NewFunds Equity Momentum	ABSA Capital	Momentum Index	Jan 2012	Does not track a FTSE/JSE Index
RAFFIN	NewFunds eRAFI SA Financial 15 Index Portfolio	ABSA Capital	eRAFI Financial 15 Index	Jun 2009	Does not track a FTSE/JSE Index
RAFIND	NewFunds eRAFI SA Industrial 25 Index Portfolio	ABSA Capital	eRAFI Industrial 25 Index	Jun 2009	Does not track a FTSE/JSE Index
RAFRES	NewFunds eRAFI SA Resource 20 Index Portfolio	ABSA Capital	eRAFI Resource 20 Index	Jun 2009	Does not track a FTSE/JSE Index
RAFISA	NewFunds eRAFI Overall	ABSA Capital	eRAFI Overall Index	Jun 2008	Does not track a FTSE/JSE Index
NFSH40	NewFunds Shariah Top 40 Index ETF Portfolio	ABSA Capital	FTSE/JSE Shariah Top 40 Index	Apr 2009	Data not available on Bloomberg
NEWFSA	NewSA Index Portfolio	ABSA Capital	FTSE/JSE Shareholder Weighted Top 40 TR	Jan 2008	Data not available on Bloomberg
NRD	NewFunds NewRand	ABSA Capital	NewRand Index	Jun 2003	Does not track a FTSE/JSE Index
RMBMID	RMB Mid Cap Fund	RMB	FTSE/JSE Mid Cap Index	Aug 2012	Insufficient data
STANSX	Stanlib SWIX 40 Fund	Stanlib	FTSE/JSE SWIX Top 40 Index	Oct 2010	Insufficient data
STAN40	Stanlib Top 40 Fund	Stanlib	FTSE/JSE Top 40 TR Index	Oct 2010	Insufficient data
PTXTEN	Property Tracker Ten	Property Index Tracker	Proptrax Top Ten Index	May 2011	Does not track a FTSE/JSE Index

5.2. Performance of the Top 40 Index, ETFs, passive and active unit trusts

5.2.1. Performance of ETFs on average versus the Top 40 Index

H0: ETFs on average, that track the FTSE/JSE Top 40 Index, do not significantly outperform the index after expenses.

HA: ETFs on average, that track the FTSE/JSE Top 40 Index, do significantly outperform the index after expenses.

Table 5.3: Descriptive Statistics, TERs and R1000 Invested for the Top 40 Index and ETFs (Period 2001-2012)

Top 40 Index											
Name	Mean Return		TER	Std. Dev.		Sharpe Ratio		R1000 Invested	Mdn.	Min.	Max.	Obs.
Top 40 Index	1.18%		-	5.68%		20.85%		R 4 206.54	1.26%	-14.91%	14.67%	141
Exchange Traded Funds												
Name	Mean Net Return		TER	Std. Dev.		Sharpe Ratio		R1000 Invested	Mdn.	Min.	Max.	Obs.
	ETF	Index		ETF	Index	ETF	Index					
Satrix 40	1.15%	1.18%	0.46%	5.79%	5.68%	19.91%	20.85%	-	1.12%	-16.29%	16.12%	141
RMB Top 40	1.20%	1.19%	0.21%	5.17%	4.96%	23.26%	24.03%	-	0.56%	-12.08%	13.40%	46
ETF Average	1.16%	1.18%	0.34%	5.80%	5.68%	19.96%	20.85%	R 4 011.67	1.12%	-16.29%	16.12%	141

Table 5.4: Statistics for the mean difference in net returns for the Top 40 Index and an average ETF

Conf. Intervals (Paired-Sample)	Top 40 Index Return - Avg. ETF Net Return
Sample Size	141
Sample Mean	0.000267356
Sample Std Dev	0.006840572
Confidence Level	95.0%
Degrees of Freedom	140
Low er Limit	-0.000871586
Upper Limit	0.001406297
Paired-Sample T-Test	**Top 40 Index Return - Avg. ETF Net Return**
Sample Size	141
Sample Mean	0.000267356
Sample Std Dev	0.006840572
Hypothesized Mean	0
Alternative Hypothesis	<> 0
Standard Error of Mean	0.00057608
Degrees of Freedom	140
t-Test Statistic	0.4641
p-Value	0.6433
Null Hypoth. at 10% Significance	Don't Reject
Null Hypoth. at 5% Significance	Don't Reject
Null Hypoth. at 1% Significance	Don't Reject

5.2.2. Performance of passive unit trusts on average versus the Top 40 Index

H0: Passive unit trusts on average, that track the FTSE/JSE Top 40 Index, do not significantly outperform the index after expenses.

HA: Passive unit trusts on average, that track the FTSE/JSE Top 40 Index, do significantly outperform the index after expenses.

Table 5.5: Descriptive Statistics, TERs and R1000 Invested for the Top 40 Index and passive unit trusts (Period 2001-2012)

Top 40 Index												
Name	**Mean Return**		**TER**	**Std. Dev.**		**Sharpe Ratio**		**R1000 Invested**	**Mdn.**	**Min.**	**Max.**	**Obs.**
Top 40 Index	1.18%		-	5.68%		20.85%		R 4 206.54	1.26%	-14.91%	14.67%	141
Passive Unit Trusts												
Name	**Mean Net Return**		**TER**	**Std. Dev.**		**Sharpe Ratio**		**R1000 Invested**	**Mdn.**	**Min.**	**Max.**	**Obs.**
	PUT	**Index**		**PUT**	**Index**	**PUT**	**Index**					
Kagiso Top 40 Tracker	1.06%	1.18%	0.69%	5.61%	5.68%	18.89%	20.85%	-	1.31%	-14.25%	14.37%	141
SIM Index Fund	0.73%	0.90%	1.14%	5.21%	5.28%	14.04%	17.13%	-	0.41%	-12.01%	12.14%	47
Old Mutual Top 40 Fund	1.19%	1.36%	0.73%	5.23%	5.35%	22.75%	25.51%	-	1.28%	-16.35%	14.26%	114
Momentum Top 40 Index	1.05%	1.18%	0.70%	5.57%	5.68%	18.83%	20.85%	-	0.92%	-15.83%	14.59%	141
Passive UT Avg.	1.04%	1.18%	0.82%	5.50%	5.68%	18.92%	20.85%	R 3 487.78	1.15%	-15.48%	14.41%	141

Table 5.6: Statistics for the mean difference in net returns for the Top 40 Index and an average passive unit trust

Conf. Intervals (Paired-Sample)	Top 40 Index Return - Avg. Passive UT Net Return
Sample Size	141
Sample Mean	0.001441941
Sample Std Dev	0.007610187
Confidence Level	95.0%
Degrees of Freedom	140
Lower Limit	0.00017486
Upper Limit	0.002709021
Paired-Sample T-Test	Top 40 Index Return - Avg. Passive UT Net Return
Sample Size	141
Sample Mean	0.001441941
Sample Std Dev	0.007610187
Hypothesized Mean	0
Alternative Hypothesis	<> 0
Standard Error of Mean	0.000640893
Degrees of Freedom	140
t-Test Statistic	2.2499
p-Value	0.0260
Null Hypoth. at 10% Significance	Reject
Null Hypoth. at 5% Significance	Reject
Null Hypoth. at 1% Significance	Don't Reject

5.2.3. Performance of active unit trusts on average versus the Top 40 Index

H0: Active unit trusts on average, that use the FTSE/JSE Top 40 Index as a benchmark, do not significantly outperform the index after expenses.

HA: Active unit trusts on average, that use the FTSE/JSE Top 40 Index as a benchmark, do significantly outperform the index after expenses.

Table 5.7: Descriptive Statistics, TERs and R1000 Invested for the Top 40 Index and active unit trusts (Period 2001-2012)

Top 40 Index											
Name	Mean Return		TER	Std. Dev.		Sharpe Ratio		R1000 Invested	Mdn.	Min.	Max.	Obs.
Top 40 Index	1.18%		-	5.68%		20.85%		R 4 206.54	1.26%	-14.91%	14.67%	141
Active Unit Trusts												
Name	Mean Net Return		TER	Std. Dev.		Sharpe Ratio		R1000 Invested	Mdn.	Min.	Max.	Obs.
	AUT	Index		AUT	Index	AUT	Index					
Coronation Top 20 Fund-B	1.00%	0.81%	2.92%	6.77%	5.33%	14.71%	15.23%	-	0.93%	-21.91%	30.50%	73
Coronation Top 20	1.49%	1.18%	1.66%	5.15%	5.68%	28.93%	20.85%	-	1.18%	-13.48%	15.64%	141
Coronation Top 20 Fund-B2	0.65%	0.49%	1.38%	4.78%	5.59%	13.67%	8.68%	-	0.63%	-9.64%	11.82%	64
Active UT Avg.	1.32%	1.18%	1.99%	5.09%	5.68%	26.01%	20.85%	R 6 755.84	1.28%	-13.48%	15.64%	141

Table 5.8: Statistics for the mean difference in net returns for the Top 40 Index and an average active unit trust

Conf. Intervals (Paired-Sample)	Top 40 Index Return - Avg. Active UT Net Return
Sample Size	141
Sample Mean	-0.00307289
Sample Std Dev	0.028554674
Confidence Level	95.0%
Degrees of Freedom	140
Lower Limit	-0.007827184
Upper Limit	0.001681405
Paired-Sample T-Test	Top 40 Index Return - Avg. Active UT Net Return
Sample Size	141
Sample Mean	-0.00307289
Sample Std Dev	0.028554674
Hypothesized Mean	0
Alternative Hypothesis	<> 0
Standard Error of Mean	0.002404737
Degrees of Freedom	140
t-Test Statistic	-1.2778
p-Value	0.2034
Null Hypoth. at 10% Significance	Don't Reject
Null Hypoth. at 5% Significance	Don't Reject
Null Hypoth. at 1% Significance	Don't Reject

5.2.4. Performance of an average ETF versus an average passive unit trust

H0: ETFs on average, that track the FTSE/JSE Top 40 Index, do not significantly outperform the average passive unit trust counterpart after expenses.

HA: ETFs on average, that track the FTSE/JSE Top 40 Index, do significantly outperform the average passive unit trust counterpart after expenses.

Table 5.9: Descriptive Statistics, TERs and R1000 Invested for ETFs and passive unit trusts (Period 2001-2012)

Exchange Traded Funds												
Name	Mean Net Return		TER	Std. Dev.		Sharpe Ratio		R1000 Invested	Mdn.	Min.	Max.	Obs.
	ETF	Index		ETF	Index	ETF	Index					
Satrix 40	1.15%	1.18%	0.46%	5.79%	5.68%	19.91%	20.85%	-	1.12%	-16.29%	16.12%	141
RMB Top 40	1.20%	1.19%	0.21%	5.17%	4.96%	23.26%	24.03%	-	0.56%	-12.08%	13.40%	46
ETF Average	1.16%	1.18%	0.34%	5.80%	5.68%	19.96%	20.85%	R 4 011.67	1.12%	-16.29%	16.12%	141
Passive Unit Trusts												
Name	Mean Net Return		TER	Std. Dev.		Sharpe Ratio		R1000 Invested	Mdn.	Min.	Max.	Obs.
	PUT	Index		PUT	Index	PUT	Index					
Kagiso Top 40 Tracker	1.06%	1.18%	0.69%	5.61%	5.68%	18.89%	20.85%	-	1.31%	-14.25%	14.37%	141
SIM Index Fund	0.73%	0.90%	1.14%	5.21%	5.28%	14.04%	17.13%	-	0.41%	-12.01%	12.14%	47
Old Mutual Top 40 Fund	1.19%	1.36%	0.73%	5.23%	5.35%	22.75%	25.51%	-	1.28%	-16.35%	14.26%	114
Momentum Top 40 Index	1.05%	1.18%	0.70%	5.57%	5.68%	18.83%	20.85%	-	0.92%	-15.83%	14.59%	141
Passive UT Avg.	1.04%	1.18%	0.82%	5.50%	5.68%	18.92%	20.85%	R 3 487.78	1.15%	-15.48%	14.41%	141

Table 5.10: Statistics for the mean difference in net returns for an average ETF and an average passive unit trust

Conf. Intervals (Paired-Sample)	Avg.ETF Net Return - Avg. Passive UT Net Return
Sample Size	141
Sample Mean	0.001174585
Sample Std Dev	0.008952452
Confidence Level	95.0%
Degrees of Freedom	140
Lower Limit	-0.00031598
Upper Limit	0.00266515
Paired-Sample T-Test	Avg.ETF Net Return - Avg. Passive UT Net Return
Sample Size	141
Sample Mean	0.001174585
Sample Std Dev	0.008952452
Hypothesized Mean	0
Alternative Hypothesis	<> 0
Standard Error of Mean	0.000753932
Degrees of Freedom	140
t-Test Statistic	1.5579
p-Value	0.1215
Null Hypoth. at 10% Significance	Don't Reject
Null Hypoth. at 5% Significance	Don't Reject
Null Hypoth. at 1% Significance	Don't Reject

5.2.5. Performance of an average ETF versus an average active unit trust

H0: ETFs on average, that track the FTSE/JSE Top 40 Index, do not significantly outperform the average active unit trust counterpart after expenses.

HA: ETFs on average, that track the FTSE/JSE Top 40 Index, do significantly outperform the average active unit trust counterpart after expenses.

Table 5.11: Descriptive Statistics, TERs and R1000 Invested for ETFs and active unit trusts (Period 2001-2012)

Exchange Traded Funds												
Name	Mean Net Return		TER	Std. Dev.		Sharpe Ratio		R1000 Invested	Mdn.	Min.	Max.	Obs.
	ETF	Index		ETF	Index	ETF	Index					
Satrix 40	1.15%	1.18%	0.46%	5.79%	5.68%	19.91%	20.85%	-	1.12%	-16.29%	16.12%	141
RMB Top 40	1.20%	1.19%	0.21%	5.17%	4.96%	23.26%	24.03%	-	0.56%	-12.08%	13.40%	46
ETF Average	1.16%	1.18%	0.34%	5.80%	5.68%	19.96%	20.85%	R 4 011.67	1.12%	-16.29%	16.12%	141
Active Unit Trusts												
Name	Mean Net Return		TER	Std. Dev.		Sharpe Ratio		R1000 Invested	Mdn.	Min.	Max.	Obs.
	AUT	Index		AUT	Index	AUT	Index					
Coronation Top 20 Fund-B	1.00%	0.81%	2.92%	6.77%	5.33%	14.71%	15.23%	-	0.93%	-21.91%	30.50%	73
Coronation Top 20	1.49%	1.18%	1.66%	5.15%	5.68%	28.93%	20.85%	-	1.18%	-13.48%	15.64%	141
Coronation Top 20 Fund-B2	0.65%	0.49%	1.38%	4.78%	5.59%	13.67%	8.68%	-	0.63%	-9.64%	11.82%	64
Active UT Avg.	1.32%	1.18%	1.99%	5.09%	5.68%	26.01%	20.85%	R 6 755.84	1.28%	-13.48%	15.64%	141

Table 5.12: Statistics for the mean difference in net returns for an average ETF and an average active unit trust

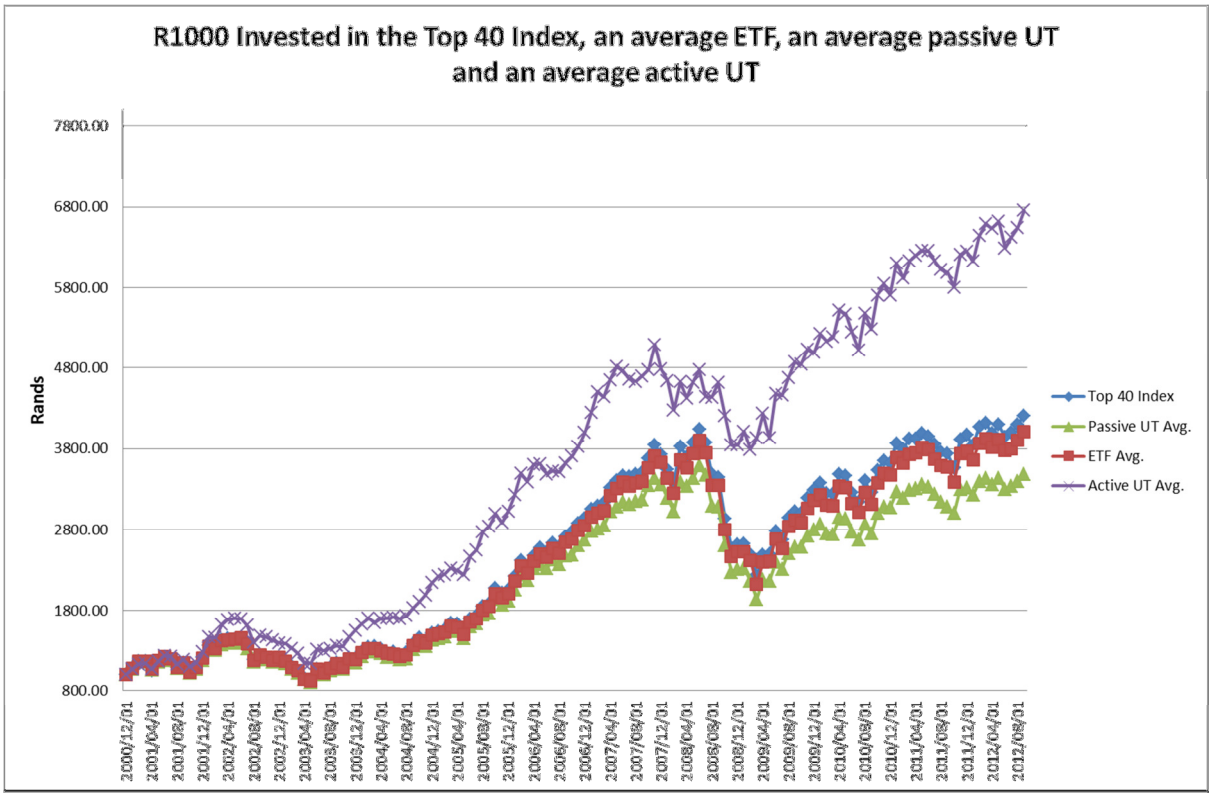
Conf. Intervals (Paired-Sample)	Avg. ETF Net Return - Avg. Active UT Net Return
Sample Size	141
Sample Mean	-0.003340245
Sample Std Dev	0.029400126
Confidence Level	95.0%
Degrees of Freedom	140
Lower Limit	-0.008235306
Upper Limit	0.001554816
Paired-Sample T-Test	Avg. ETF Net Return - Avg. Active UT Net Return
Sample Size	141
Sample Mean	-0.003340245
Sample Std Dev	0.029400126
Hypothesized Mean	0
Alternative Hypothesis	<> 0
Standard Error of Mean	0.002475937
Degrees of Freedom	140
t-Test Statistic	-1.3491
p-Value	0.1795
Null Hypoth. at 10% Significance	Don't Reject
Null Hypoth. at 5% Significance	Don't Reject
Null Hypoth. at 1% Significance	Don't Reject

5.2.6. Summary of results for the Top 40 Index, ETFs, passive and active unit trusts

Figure 5.1 shows a plot of one thousand rand invested in the FTSE/JSE Top 40 Index, an average ETF, an average PUT and an average AUT for a period from January 2001 to September 2012.

At a 10% and 5% significance level, the null hypothesis was not rejected for four of the five tests. Similarly, four of the five 95% confidence intervals of the mean difference in net returns, extended from negative values to positive values. At the 1% significance level, the null hypothesis was not rejected for all five tests, since the *p*-values all exceeded 0.01.

Figure 5.1: Plot of R1000 invested in the Top 40 Index, an average ETF, an average passive UT and an average active UT



5.3. Performance of the SWIX Top 40 Index, ETFs and active unit trusts

5.3.1. Performance of ETFs on average versus the SWIX Top 40 Index

H0: ETFs on average, that track the FTSE/JSE Shareholder Weighted Top 40 Index, do not significantly outperform the index after expenses.

HA: ETFs on average, that track the FTSE/JSE Shareholder Weighted Top 40 Index, do significantly outperform the index after expenses.

Table 5.13: Descriptive Statistics, TERs and R1000 Invested for the SWIX Top 40 Index and ETFs (Period 2006-2012)

Shareholder Weighted Top 40 Index											
Name	Mean Return		TER	Std. Dev.		Sharpe Ratio		R1000 Invested	Mdn	Min.	Max.	Obs.
SWIX Top 40 Index	0.80%		n/a	4.95%		16.12%		R 1 668.85	1.19%	-12.99%	11.56%	76
Exchange Traded Funds												
Name	Mean Net Return		TER	Std. Dev.		Sharpe Ratio		R1000 Invested	Mdn	Min.	Max.	Obs.
	ETF	Index		ETF	Index	ETF	Index					
Satrix SWIX	0.75%	0.80%	0.46%	5.03%	4.95%	14.98%	16.10%	-	1.50%	-13.30%	11.58%	76
ETF Average	0.75%	0.80%	0.46%	5.03%	4.95%	14.98%	16.12%	R 1 626.06	1.50%	-13.30%	11.58%	76

Table 5.14: Statistics for the mean difference in net returns for the SWIX Top 40 Index and an average ETF

Conf. Intervals (Paired-Sample)	Shareholder Weighted Top 40 Index - Avg. ETF Net Return
Sample Size	76
Sample Mean	0.000444404
Sample Std Dev	0.010005763
Confidence Level	95.0%
Degrees of Freedom	75
Lower Limit	-0.001842011
Upper Limit	0.002730819
Paired-Sample T-Test	Shareholder Weighted Top 40 Index - Avg. ETF Net Return
Sample Size	76
Sample Mean	0.000444404
Sample Std Dev	0.010005763
Hypothesized Mean	0
Alternative Hypothesis	<> 0
Standard Error of Mean	0.00114774
Degrees of Freedom	75
t-Test Statistic	0.3872
p-Value	0.6997
Null Hypoth. at 10% Significance	Don't Reject
Null Hypoth. at 5% Significance	Don't Reject
Null Hypoth. at 1% Significance	Don't Reject

5.3.2. Performance of active unit trusts on average versus the SWIX Top 40 Index

H0: Active unit trusts on average, that use the FTSE/JSE Shareholder Weighted Top 40 Index as a benchmark, do not significantly outperform the index after expenses.

HA: Active unit trusts on average, that use the FTSE/JSE Shareholder Weighted Top 40 Index as a benchmark, do significantly outperform the index after expenses.

Table 5.15: Descriptive Statistics, TERs and R1000 Invested for the SWIX Top 40 Index and active unit trusts (Period 2006-2012)

Shareholder Weighted Top 40 Index												
Name	Mean Return		TER	Std. Dev.		Sharpe Ratio		R1000 Invested	Mdn	Min.	Max.	Obs.
SWIX Top 40 Index	0.80%		n/a	4.95%		16.12%		R 1 668.85	1.19%	-12.99%	11.56%	76
Active Unit Trusts												
Name	Mean Net Return		TER	Std. Dev.		Sharpe Ratio		R1000 Invested	Mdn	Min.	Max.	Obs.
	AUT	Index		AUT	Index	AUT	Index					
Cadiz Mastermind Fund	0.69%	0.80%	1.54%	4.89%	4.95%	14.08%	16.10%	-	0.88%	-14.08%	9.54%	76
Investec Active Quants Fund	1.29%	1.41%	0.43%	4.99%	4.83%	25.90%	29.17%	-	1.06%	-16.76%	13.18%	109
MET General Equity Fund	1.18%	1.41%	1.47%	4.49%	4.83%	26.26%	29.17%	-	1.37%	-12.23%	10.60%	109
N-e-FG Equity Fund	0.50%	0.94%	1.84%	4.30%	4.99%	11.53%	18.85%	-	0.19%	-10.51%	9.58%	47
Old Mutual Top Companies Fund	0.77%	0.94%	0.93%	4.54%	4.99%	16.87%	18.85%	-	1.14%	-11.60%	12.16%	47
Old Mutual Value Fund	0.59%	0.94%	0.87%	4.96%	4.99%	11.92%	18.85%	-	0.36%	-13.87%	10.75%	47
Momentum Equity Fund Class R	1.32%	1.41%	1.15%	4.46%	4.83%	29.48%	29.17%	-	0.94%	-12.79%	9.45%	109
Sasfin Value Fund	0.74%	0.94%	1.51%	4.46%	4.99%	16.59%	18.85%	-	1.41%	-13.60%	8.40%	47
Old Mutual Investors Fund R	0.43%	0.50%	1.14%	4.96%	5.29%	8.58%	9.45%	-	0.96%	-12.61%	8.90%	50
Active UT Avg.	0.59%	0.80%	1.21%	4.54%	4.95%	12.94%	16.12%	R 1 443.51	1.07%	-12.02%	9.18%	76

Table 5.16: Statistics for the mean difference in net returns for the SWIX Top 40 Index and an average active unit trust

Conf. Intervals (Paired-Sample)	Shareholder Weighted Top 40 Index - Avg. Active UT Net Return
Sample Size	76
Sample Mean	0.002099757
Sample Std Dev	0.015049651
Confidence Level	95.0%
Degrees of Freedom	75
Lower Limit	-0.001339236
Upper Limit	0.005538749
Paired-Sample T-Test	Shareholder Weighted Top 40 Index - Avg. Active UT Net Return
Sample Size	76
Sample Mean	0.002099757
Sample Std Dev	0.015049651
Hypothesized Mean	0
Alternative Hypothesis	<> 0
Standard Error of Mean	0.001726313
Degrees of Freedom	75
t-Test Statistic	1.2163
p-Value	0.2277
Null Hypoth. at 10% Significance	Don't Reject
Null Hypoth. at 5% Significance	Don't Reject
Null Hypoth. at 1% Significance	Don't Reject

5.3.3. Performance of an average ETF versus an average active unit trust

H0: ETFs on average, that track the FTSE/JSE Shareholder Weighted Top 40 Index, do not significantly outperform the average active unit trust counterpart after expenses.

HA: ETFs on average, that track the FTSE/JSE Shareholder Weighted Top 40 Index, do significantly outperform the average active unit trust counterpart after expenses.

Table 5.17: Descriptive Statistics, TERs and R1000 Invested for ETFs and active unit trusts (Period 2006-2012)

Exchange Traded Funds												
Name	**Mean Net Return**		**TER**	**Std. Dev.**		**Sharpe Ratio**		**R1000 Invested**	**Mdn**	**Min.**	**Max.**	**Obs.**
	ETF	**Index**		**ETF**	**Index**	**ETF**	**Index**					
Satrix SWIX	0.75%	0.80%	0.46%	5.03%	4.95%	14.98%	16.10%	-	1.50%	-13.30%	11.58%	76
ETF Average	0.75%	0.80%	0.46%	5.03%	4.95%	14.98%	16.12%	R 1 626.06	1.50%	-13.30%	11.58%	76
Active Unit Trusts												
Name	**Mean Net Return**		**TER**	**Std. Dev.**		**Sharpe Ratio**		**R1000 Invested**	**Mdn**	**Min.**	**Max.**	**Obs.**
	AUT	**Index**		**AUT**	**Index**	**AUT**	**Index**					
Cadiz Mastermind Fund	0.69%	0.80%	1.54%	4.89%	4.95%	14.08%	16.10%	-	0.88%	-14.08%	9.54%	76
Investec Active Quants Fund	1.29%	1.41%	0.43%	4.99%	4.83%	25.90%	29.17%	-	1.06%	-16.76%	13.18%	109
MET General Equity Fund	1.18%	1.41%	1.47%	4.49%	4.83%	26.26%	29.17%	-	1.37%	-12.23%	10.60%	109
N-e-FG Equity Fund	0.50%	0.94%	1.84%	4.30%	4.99%	11.53%	18.85%	-	0.19%	-10.51%	9.58%	47
Old Mutual Top Companies Fund	0.77%	0.94%	0.93%	4.54%	4.99%	16.87%	18.85%	-	1.14%	-11.60%	12.16%	47
Old Mutual Value Fund	0.59%	0.94%	0.87%	4.96%	4.99%	11.92%	18.85%	-	0.36%	-13.87%	10.75%	47
Momentum Equity Fund Class R	1.32%	1.41%	1.15%	4.46%	4.83%	29.48%	29.17%	-	0.94%	-12.79%	9.45%	109
Sasfin Value Fund	0.74%	0.94%	1.51%	4.46%	4.99%	16.59%	18.85%	-	1.41%	-13.60%	8.40%	47
Old Mutual Investors Fund R	0.43%	0.50%	1.14%	4.96%	5.29%	8.58%	9.45%	-	0.96%	-12.61%	8.90%	50
Active UT Avg.	0.59%	0.80%	1.21%	4.54%	4.95%	12.94%	16.12%	R 1 443.51	1.07%	-12.02%	9.18%	76

Table 5.18: Statistics for the mean difference in net returns for an average ETF and an average active unit trust

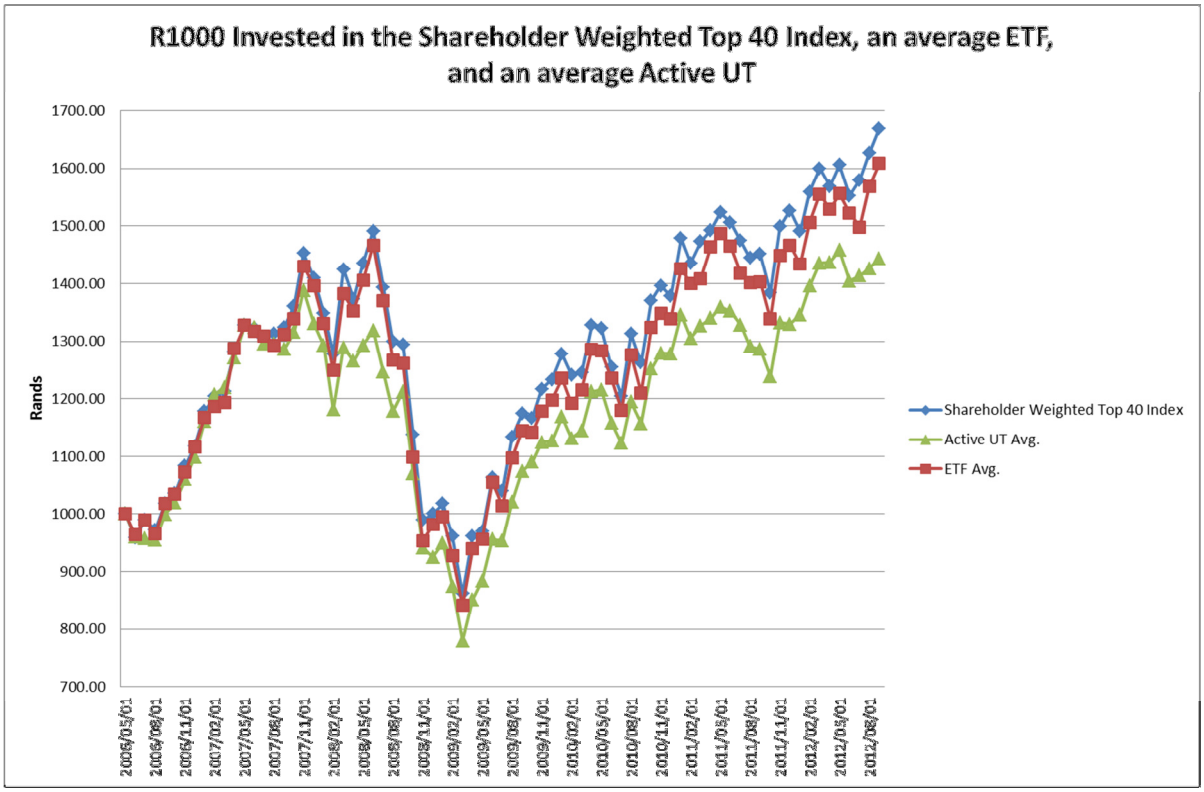
Conf. Intervals (Paired-Sample)	Avg. ETF Net Return - Avg. Active UT Net Return
Sample Size	76
Sample Mean	0.001655353
Sample Std Dev	0.017522025
Confidence Level	95.0%
Degrees of Freedom	75
Lower Limit	-0.002348601
Upper Limit	0.005659307
Paired-Sample T-Test	Avg. ETF Net Return - Avg. Active UT Net Return
Sample Size	76
Sample Mean	0.001655353
Sample Std Dev	0.017522025
Hypothesized Mean	0
Alternative Hypothesis	> 0
Standard Error of Mean	0.002009914
Degrees of Freedom	75
t-Test Statistic	0.8236
p-Value	0.2064
Null Hypoth. at 10% Significance	Don't Reject
Null Hypoth. at 5% Significance	Don't Reject
Null Hypoth. at 1% Significance	Don't Reject

5.3.4. Summary of results for the SWIX Top 40 Index, ETFs and active unit trusts

Figure 5.2 shows a plot of one thousand rand invested in the FTSE/JSE SWIX Top 40 Index, an average ETF and an average AUT for a period from June 2006 to September 2012.

At a 10%, 5% and 1% significance level, the null hypothesis was not rejected for all three tests as the *p*-values all exceeded 0.1. All three 95% confidence intervals of the mean difference in net returns, extended from negative values to positive values.

Figure 5.2: Plot of R1000 invested in the SWIX Top 40 Index, an average ETF and an average active UT



5.4. Performance of the Financial 15 Index, ETFs and active unit trusts

5.4.1. Performance of ETFs on average versus the Financial 15 Index

H0: ETFs on average, that track the FTSE/JSE Financial 15 Index, do not significantly outperform the index after expenses.

HA: ETFs on average, that track the FTSE/JSE Financial 15 Index, do significantly outperform the index after expenses.

Table 5.19: Descriptive Statistics, TERs and R1000 Invested for the Financial 15 Index and ETFs (Period 2002-2012)

Financial 15 Index											
Name	**Mean Return**		**TER**	**Std. Dev.**		**Sharpe Ratio**		**R1000 Invested**	**Mdn**	**Min.**	**Max.**	**Obs.**
Financial 15 Index	1.00%		n/a	5.36%		18.67%		R 2 934.37	1.09%	-14.01%	12.90%	126
Exchange traded Funds												
Name	**Mean Net Return**		**TER**	**Std. Dev.**		**Sharpe Ratio**		**R1000 Invested**	**Mdn**	**Min.**	**Max.**	**Obs.**
	ETF	**Index**		**ETF**	**Index**	**ETF**	**Index**					
Satrix Fini	0.97%	1.00%	0.46%	5.68%	5.36%	17.16%	18.67%	-	0.59%	-13.33%	13.87%	126
ETF Average	0.97%	1.00%	0.46%	5.68%	5.36%	17.16%	18.67%	R 2 781.24	0.59%	-13.33%	13.88%	126

Table 5.20: Statistics for the mean difference in net returns for the Financial 15 Index and an average ETF

Conf. Intervals (Paired-Sample)	Financials 15 Index - Avg. ETF Net Return
Sample Size	126
Sample Mean	0.000264243
Sample Std Dev	0.019235241
Confidence Level	95.0%
Degrees of Freedom	125
Lower Limit	-0.003127207
Upper Limit	0.003655692
Paired-Sample T-Test	Financials 15 Index - Avg. ETF Net Return
Sample Size	126
Sample Mean	0.000264243
Sample Std Dev	0.019235241
Hypothesized Mean	0
Alternative Hypothesis	<> 0
Standard Error of Mean	0.001713611
Degrees of Freedom	125
t-Test Statistic	0.1542
p-Value	0.8777
Null Hypoth. at 10% Significance	Don't Reject
Null Hypoth. at 5% Significance	Don't Reject
Null Hypoth. at 1% Significance	Don't Reject

5.4.2. Performance of active unit trusts on average versus the Financial 15 Index

H0: Active unit trusts on average, that use the FTSE/JSE Financial 15 Index as a benchmark, do not significantly outperform the index after expenses.

HA: Active unit trusts on average, that use the FTSE/JSE Financial 15 Index as a benchmark, do significantly outperform the index after expenses.

Table 5.21: Descriptive Statistics, TERs and R1000 Invested for the Financial 15 Index and active unit trusts (Period 2002-2012)

Financial 15 Index												
Name	Mean Return		TER	Std. Dev.		Sharpe Ratio		R1000 Invested	Mdn	Min.	Max.	Obs.
Financial 15 Index	1.00%		n/a	5.36%		18.67%		R 2 934.37	1.09%	-14.01%	12.90%	126
Active Unit Trusts												
Name	Mean Net Return		TER	Std. Dev.		Sharpe Ratio		R1000 Invested	Mdn	Min.	Max.	Obs.
	AUT	Index		AUT	Index	AUT	Index					
Coronation Financial Fund-B	0.67%	0.62%	2.70%	6.28%	5.63%	10.62%	10.99%	-	0.31%	-18.68%	21.92%	73
Stanlib Financial Fund-A	1.11%	1.11%	1.71%	4.72%	5.27%	23.61%	21.13%	-	1.15%	-14.18%	10.56%	119
Momentum Financials Fund	1.16%	1.00%	1.44%	4.50%	5.36%	25.71%	18.67%	-	0.91%	-12.81%	9.74%	126
SIM Financial Fund	1.10%	1.02%	1.73%	5.18%	5.38%	21.25%	18.89%	-	1.12%	-13.29%	19.88%	125
Active UT Avg.	1.10%	1.00%	1.90%	4.48%	5.36%	24.53%	18.67%	R 3 502.93	0.86%	-12.35%	13.31%	126

Table 5.22: Statistics for the mean difference in net returns for the Financial 15 Index and an average active unit trust

Conf. Intervals (Paired-Sample)	Financials 15 Index - Avg. Active UT Net Return
Sample Size	126
Sample Mean	-0.000985537
Sample Std Dev	0.023045643
Confidence Level	95.0%
Degrees of Freedom	125
Lower Limit	-0.005048816
Upper Limit	0.003077741
Paired-Sample T-Test	Financials 15 Index - Avg. Active UT Net Return
Sample Size	126
Sample Mean	-0.000985537
Sample Std Dev	0.023045643
Hypothesized Mean	0
Alternative Hypothesis	<> 0
Standard Error of Mean	0.002053069
Degrees of Freedom	125
t-Test Statistic	-0.4800
p-Value	0.6320
Null Hypoth. at 10% Significance	Don't Reject
Null Hypoth. at 5% Significance	Don't Reject
Null Hypoth. at 1% Significance	Don't Reject

5.4.3. Performance of the average ETF versus the average active unit trust

H0: ETFs on average, that track the FTSE/JSE Financial 15 Index, do not significantly outperform the average active unit trust counterpart after expenses.

HA: ETFs on average, that track the FTSE/JSE Financial 15 Index, do significantly outperform the average active unit trust counterpart after expenses.

Table 5.23: Descriptive Statistics, TERs and R1000 Invested for ETFs and active unit trusts (Period 2002-2012)

Exchange traded Funds												
Name	Mean Net Return		TER	Std. Dev.		Sharpe Ratio		R1000 Invested	Mdn	Min.	Max.	Obs.
	ETF	Index		ETF	Index	ETF	Index					
Satrix Fini	0.97%	1.00%	0.46%	5.68%	5.36%	17.16%	18.67%	-	0.59%	-13.33%	13.87%	126
ETF Average	0.97%	1.00%	0.46%	5.68%	5.36%	17.16%	18.67%	R 2 781.24	0.59%	-13.33%	13.88%	126
Active Unit Trusts												
Name	Mean Net Return		TER	Std. Dev.		Sharpe Ratio		R1000 Invested	Mdn	Min.	Max.	Obs.
	AUT	Index		AUT	Index	AUT	Index					
Coronation Financial Fund-B	0.67%	0.62%	2.70%	6.28%	5.63%	10.62%	10.99%	-	0.31%	-18.68%	21.92%	73
Stanlib Financial Fund-A	1.11%	1.11%	1.71%	4.72%	5.27%	23.61%	21.13%	-	1.15%	-14.18%	10.56%	119
Momentum Financials Fund	1.16%	1.00%	1.44%	4.50%	5.36%	25.71%	18.67%	-	0.91%	-12.81%	9.74%	126
SIM Financial Fund	1.10%	1.02%	1.73%	5.18%	5.38%	21.25%	18.89%	-	1.12%	-13.29%	19.88%	125
Active UT Avg.	1.10%	1.00%	1.90%	4.48%	5.36%	24.53%	18.67%	R 3 502.93	0.86%	-12.35%	13.31%	126

Table 5.24: Statistics for the mean difference in net returns for an average ETF and an average active unit trust

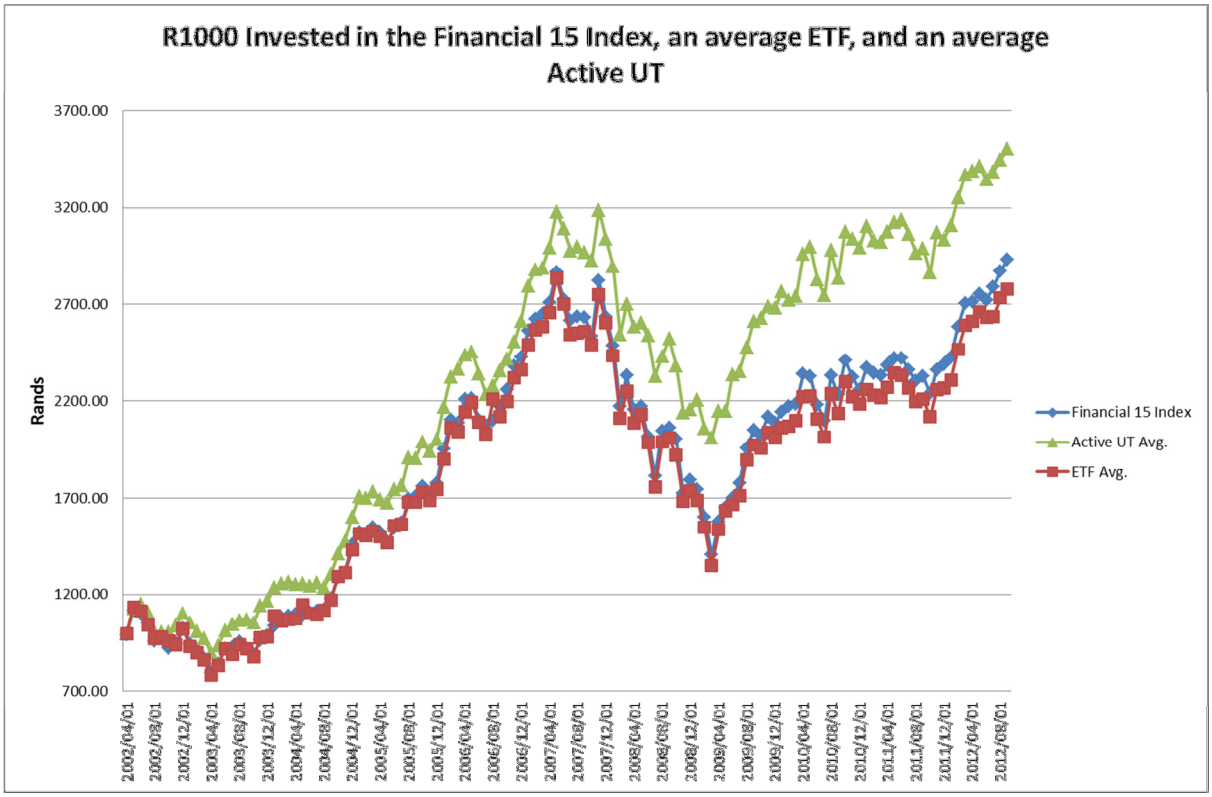
Conf. Intervals (Paired-Sample)	Avg. ETF Net Return - Avg. Active UT Net Return
Sample Size	126
Sample Mean	-0.00124978
Sample Std Dev	0.028027641
Confidence Level	95.0%
Degrees of Freedom	125
Lower Limit	-0.006191456
Upper Limit	0.003691897
Paired-Sample T-Test	ETF Avg. Net Return - Active UT Avg. Net Return
Sample Size	126
Sample Mean	-0.00124978
Sample Std Dev	0.028027641
Hypothesized Mean	0
Alternative Hypothesis	<> 0
Standard Error of Mean	0.002496901
Degrees of Freedom	125
t-Test Statistic	-0.5005
p-Value	0.6176
Null Hypoth. at 10% Significance	Don't Reject
Null Hypoth. at 5% Significance	Don't Reject
Null Hypoth. at 1% Significance	Don't Reject

5.4.4. Summary of results for the Financial 15 Index, ETFs and active unit trusts

Figure 5.3 shows a plot of one thousand rand invested in the FTSE/JSE Financial 15 Index, an average ETF and an average AUT for a period from April 2006 to September 2012.

At a 10%, 5% and 1% significance level, the null hypothesis was not rejected for all three tests as the *p*-values all exceeded 0.1. All three 95% confidence intervals of the mean difference in net returns, extended from negative values to positive values.

Figure 5.3: Plot of R1000 invested in the Financial 15 Index, an average ETF and an average active UT



5.5. Performance of the Industrial 25 Index, ETFs and active unit trusts

5.5.1. Performance of ETFs on average versus the Industrial 25 Index

H0: ETFs on average, that track the FTSE/JSE Industrial 25 Index, do not significantly outperform the index after expenses.

HA: ETFs on average, that track the FTSE/JSE Industrial 25 Index, do significantly outperform the index after expenses.

Table 5.25: Descriptive Statistics, TERs and R1000 Invested for the Industrial 25 Index and ETFs (Period 2002-2012)

Industrial 25 Index											
Name	**Mean Return**		**TER**	**Std. Dev.**		**Sharpe Ratio**		**R1000 Invested**	**Mdn.**	**Min.**	**Max.**	**Obs.**
Industrial 25 Index	1.43%		n/a	4.97%		28.70%		R 5 105.23	1.73%	-12.49%	10.80%	126
Exchange traded Funds												
Name	**Mean Net Return**		**TER**	**Std. Dev.**		**Sharpe Ratio**		**R1000 Invested**	**Mdn.**	**Min.**	**Max.**	**Obs.**
	ETF	**Index**		**ETF**	**Index**	**ETF**	**Index**					
Satrix Industrial	1.40%	1.43%	0.46%	5.18%	4.97%	27.02%	28.70%	-	1.21%	-12.73%	13.35%	126
ETF Average	1.40%	1.43%	0.46%	5.18%	4.97%	27.02%	28.70%	R 4 871.93	1.21%	-12.73%	13.35%	126

Table 5.26: Statistics for the mean difference in net returns for the Industrial 25 Index and an average ETF

Conf. Intervals (Paired-Sample)	Industrials 25 Index - Avg. ETF Net Return
Sample Size	126
Sample Mean	0.000271399
Sample Std Dev	0.010634802
Confidence Level	95.0%
Degrees of Freedom	125
Lower Limit	-0.00160367
Upper Limit	0.002146467
Paired-Sample T-Test	Industrials 25 Index - Avg. ETF Net Return
Sample Size	126
Sample Mean	0.000271399
Sample Std Dev	0.010634802
Hypothesized Mean	0
Alternative Hypothesis	<> 0
Standard Error of Mean	0.000947423
Degrees of Freedom	125
t-Test Statistic	0.2865
p-Value	0.7750
Null Hypoth. at 10% Significance	Don't Reject
Null Hypoth. at 5% Significance	Don't Reject
Null Hypoth. at 1% Significance	Don't Reject

5.5.2. Performance of active unit trusts on average versus the Industrial 25 Index

H0: Active unit trusts on average, that use the FTSE/JSE Industrial 25 Index as a benchmark, do not significantly outperform the index after expenses.

HA: Active unit trusts on average, that use the FTSE/JSE Industrial 25 Index as a benchmark, do significantly outperform the index after expenses.

Table 5.27: Descriptive Statistics, TERs and R1000 Invested for the Industrial 25 Index and active unit trusts (Period 2002-2012)

Industrial 25 Index												
Name	Mean Return		TER	Std. Dev.		Sharpe Ratio		R1000 Invested	Mdn.	Min.	Max.	Obs.
Industrial 25 Index	1.43%		n/a	4.97%		28.70%		R 5 105.23	1.73%	-12.49%	10.80%	126
Active Unit Trusts												
Name	Mean Net Return		TER	Std. Dev.		Sharpe Ratio		R1000 Invested	Mdn.	Min.	Max.	Obs.
	AUT	Index		AUT	Index	AUT	Index					
Coronation Industrial Fund	1.57%	1.27%	1.18%	4.31%	5.31%	36.46%	23.94%	-	1.56%	-13.37%	10.99%	141
Stanlib Industrial Fund-R	1.63%	1.66%	1.13%	4.46%	4.81%	36.48%	34.53%	-	1.81%	-14.99%	10.96%	119
Stanlib Industrial Fund-A	1.58%	1.66%	1.70%	4.43%	4.81%	35.68%	34.53%	-	1.89%	-14.64%	10.90%	119
Momentum Industrial Fund	1.52%	1.76%	1.55%	4.14%	4.78%	36.77%	36.77%	-	1.48%	-11.90%	12.03%	115
SIM Industrial Fund-R	1.20%	1.62%	1.14%	3.99%	4.54%	30.18%	35.62%	-	1.95%	-8.59%	8.61%	47
Active UT Avg.	1.53%	1.43%	1.34%	4.16%	4.97%	36.88%	28.70%	R 6 109.23	1.52%	-13.72%	10.19%	126

Table 5.28: Statistics for the mean difference in net returns for the Resource 10 Index and an average active unit trust

Conf. Intervals (Paired-Sample)	Industrials 25 Index - Avg. Active UT Net Return
Sample Size	126
Sample Mean	-0.001070127
Sample Std Dev	0.02190447
Confidence Level	95.0%
Degrees of Freedom	125
Lower Limit	-0.004932201
Upper Limit	0.002791946
Paired-Sample T-Test	Industrials 25 Index - Avg. Active UT Net Return
Sample Size	126
Sample Mean	-0.001070127
Sample Std Dev	0.02190447
Hypothesized Mean	0
Alternative Hypothesis	<> 0
Standard Error of Mean	0.001951405
Degrees of Freedom	125
t-Test Statistic	-0.5484
p-Value	0.5844
Null Hypoth. at 10% Significance	Don't Reject
Null Hypoth. at 5% Significance	Don't Reject
Null Hypoth. at 1% Significance	Don't Reject

5.5.3. Performance of the average ETF versus the average active unit trust

H0: ETFs on average, that track the FTSE/JSE Industrial 25 Index, do not significantly outperform the average active unit trust counterpart after expenses.

HA: ETFs on average, that track the FTSE/JSE Industrial 25 Index, do significantly outperform the average active unit trust counterpart after expenses.

Table 5.29: Descriptive Statistics, TERs and R1000 Invested for ETFs and active unit trusts (Period 2002-2012)

Exchange traded Funds												
Name	Mean Net Return		TER	Std. Dev.		Sharpe Ratio		R1000 Invested	Mdn.	Min.	Max.	Obs.
	ETF	Index		ETF	Index	ETF	Index					
Satrix Industrial	1.40%	1.43%	0.46%	5.18%	4.97%	27.02%	28.70%	-	1.21%	-12.73%	13.35%	126
ETF Average	1.40%	1.43%	0.46%	5.18%	4.97%	27.02%	28.70%	R 4 871.93	1.21%	-12.73%	13.35%	126
Active Unit Trusts												
Name	Mean Net Return		TER	Std. Dev.		Sharpe Ratio		R1000 Invested	Mdn.	Min.	Max.	Obs.
	AUT	Index		AUT	Index	AUT	Index					
Coronation Industrial Fund	1.57%	1.27%	1.18%	4.31%	5.31%	36.46%	23.94%	-	1.56%	-13.37%	10.99%	141
Stanlib Industrial Fund-R	1.63%	1.66%	1.13%	4.46%	4.81%	36.48%	34.53%	-	1.81%	-14.99%	10.96%	119
Stanlib Industrial Fund-A	1.58%	1.66%	1.70%	4.43%	4.81%	35.68%	34.53%	-	1.89%	-14.64%	10.90%	119
Momentum Industrial Fund	1.52%	1.76%	1.55%	4.14%	4.78%	36.77%	36.77%	-	1.48%	-11.90%	12.03%	115
SIM Industrial Fund-R	1.20%	1.62%	1.14%	3.99%	4.54%	30.18%	35.62%	-	1.95%	-8.59%	8.61%	47
Active UT Avg.	1.53%	1.43%	1.34%	4.16%	4.97%	36.88%	28.70%	R 6 109.23	1.52%	-13.72%	10.19%	126

Table 5.30: Statistics for the mean difference in net returns for an average ETF and an average active unit trust

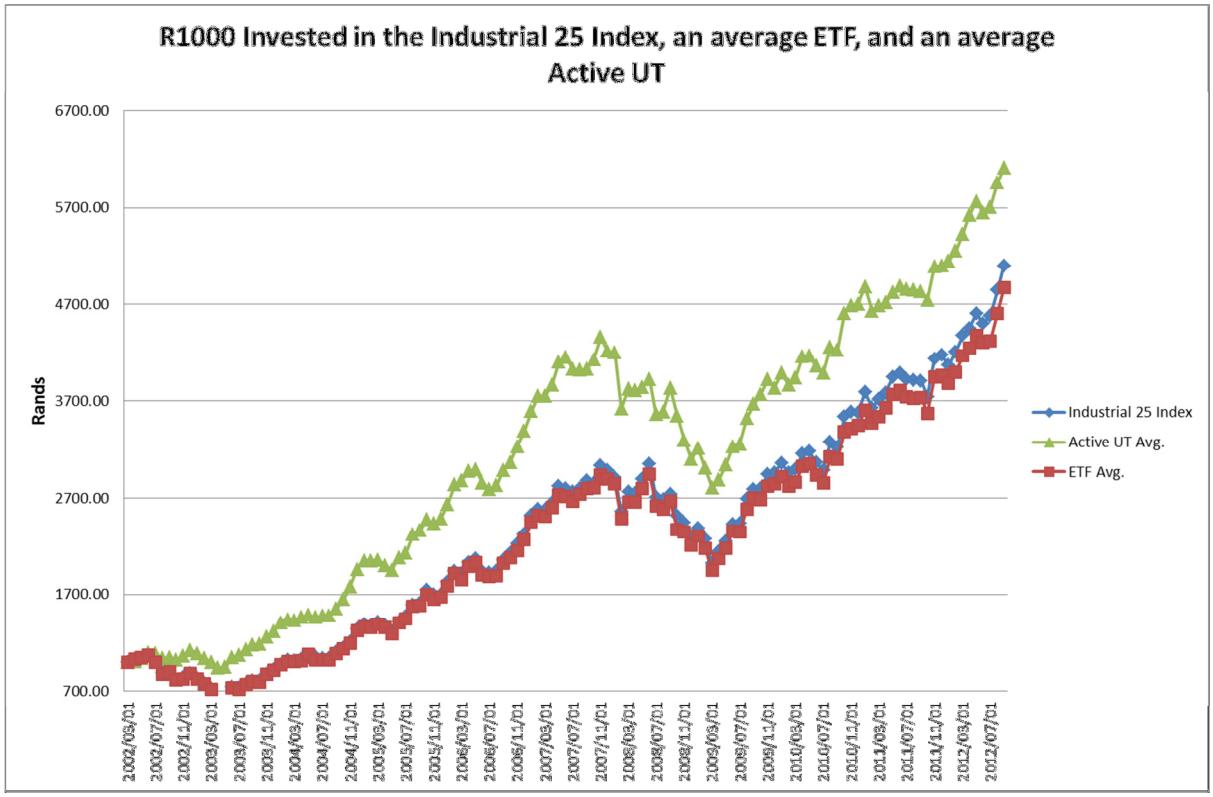
Conf. Intervals (Paired-Sample)	Avg. ETF Net Return - Avg. Active UT Net Return
Sample Size	126
Sample Mean	-0.001341526
Sample Std Dev	0.023540172
Confidence Level	95.0%
Degrees of Freedom	125
Lower Limit	-0.005491997
Upper Limit	0.002808945
Paired-Sample T-Test	Avg. ETF Net Return - Avg. Active UT Net Return
Sample Size	126
Sample Mean	-0.001341526
Sample Std Dev	0.023540172
Hypothesized Mean	0
Alternative Hypothesis	<> 0
Standard Error of Mean	0.002097125
Degrees of Freedom	125
t-Test Statistic	-0.6397
p-Value	0.5235
Null Hypoth. at 10% Significance	Don't Reject
Null Hypoth. at 5% Significance	Don't Reject
Null Hypoth. at 1% Significance	Don't Reject

5.5.4. Summary of results for the Industrial 25 Index, ETFs and active unit trusts

Figure 5.4 shows a plot of one thousand rand invested in the FTSE/JSE Industrial 25 Index, an average ETF and an average AUT for a period from April 2002 to September 2012.

At a 10%, 5% and 1% significance level, the null hypothesis was not rejected for all three tests as the *p*-values all exceeded 0.1. All three 95% confidence intervals of the mean difference in net returns, extended from negative values to positive values.

Figure 5.4: Plot of R1000 invested in the Industrial 25 Index, an average ETF and an average active UT



5.6. Performance of the Resource 10 Index, ETFs and active unit trusts

5.6.1. Performance of ETFs on average versus the Resource 10 Index

H0: ETFs on average, that track the FTSE/JSE Resource 10 Index, do not significantly outperform the index after expenses.

HA: ETFs on average, that track the FTSE/JSE Resource 10 Index, do significantly outperform the index after expenses.

Table 5.31: Descriptive Statistics, TERs and R1000 Invested for the Resource 10 Index and ETFs (Period 2006-2012)

Resource 10 Index											
Name	**Mean Return**		**TER**	**Std. Dev.**		**Sharpe Ratio**		**R1000 Invested**	**Mdn.**	**Min.**	**Max.**	**Obs.**
Resource 10 Index	0.52%		n/a	7.21%		7.25%		R 1 218.57	-0.01%	-22.59%	17.48%	76
Exchange traded Funds											
Name	**Mean Net Return**		**TER**	**Std. Dev.**		**Sharpe Ratio**		**R1000 Invested**	**Mdn.**	**Min.**	**Max.**	**Obs.**
	ETF	**Index**		**ETF**	**Index**	**ETF**	**Index**					
Satrix RESI	0.49%	0.52%	0.46%	7.14%	7.21%	6.84%	7.25%	-	-0.77%	-24.37%	17.15%	76
ETF Average	0.49%	0.52%	0.46%	7.14%	7.21%	6.84%	7.25%	R 1 189.19	-0.77%	-24.37%	17.15%	76

Table 5.32: Statistics for the mean difference in net returns for the Resource 10 Index and an average ETF

Conf. Intervals (Paired-Sample)	Resources 10 Index - Avg. ETF Net Return
Sample Size	76
Sample Mean	0.000340816
Sample Std Dev	0.010469319
Confidence Level	95.0%
Degrees of Freedom	75
Lower Limit	-0.002051526
Upper Limit	0.002733158
Paired-Sample T-Test	Resources 10 Index - Avg. ETF Net Return
Sample Size	76
Sample Mean	0.000340816
Sample Std Dev	0.010469319
Hypothesized Mean	0
Alternative Hypothesis	<> 0
Standard Error of Mean	0.001200913
Degrees of Freedom	75
t-Test Statistic	0.2838
p-Value	0.7773
Null Hypoth. at 10% Significance	Don't Reject
Null Hypoth. at 5% Significance	Don't Reject
Null Hypoth. at 1% Significance	Don't Reject

5.6.2. Performance of active unit trusts on average versus the Resource 10 Index

H0: Active unit trusts on average, that use the FTSE/JSE Resource 10 Index as a benchmark, do not significantly outperform the index after expenses.

HA: Active unit trusts on average, that use the FTSE/JSE Resource 10 Index as a benchmark, do significantly outperform the index after expenses.

Table 5.33: Descriptive Statistics, TERs and R1000 Invested for the Resource 10 Index and active unit trusts (Period 2006-2012)

Resource 10 Index											
Name	Mean Return		TER	Std. Dev.		Sharpe Ratio		R1000 Invested	Mdn.	Min.	Max.	Obs.
Resource 10 Index	0.52%		n/a	7.21%		7.25%		R 1 218.57	-0.01%	-22.59%	17.48%	76
Active Unit Trusts												
Name	Mean Net Return		TER	Std. Dev.		Sharpe Ratio		R1000 Invested	Mdn.	Min.	Max.	Obs.
	AUT	Index		AUT	Index	AUT	Index					
Coronation Resources Fund	1.49%	1.18%	1.20%	6.79%	7.80%	21.88%	15.10%	-	0.48%	-19.36%	19.19%	130
Stanlib Resources Fund-A	0.64%	0.95%	1.70%	6.69%	7.41%	9.63%	12.82%	-	-0.33%	-22.27%	17.26%	119
Stanlib Resources Fund-R	0.69%	0.95%	1.13%	6.69%	7.41%	10.31%	12.82%	-	-0.24%	-22.14%	17.35%	119
Momentum Resources Fund	0.72%	0.67%	1.88%	6.60%	6.48%	10.99%	10.39%	-	0.23%	-16.06%	14.83%	43
Active UT Avg.	0.47%	0.52%	1.48%	6.78%	7.21%	6.90%	7.25%	R 1 193.26	0.44%	-21.16%	15.94%	76

Table 5.34: Statistics for the mean difference in net returns for the Resource 10 Index and an average active unit trust

Conf. Intervals (Paired-Sample)	Resources 10 Index - Avg. Active UT Net Return
Sample Size	76
Sample Mean	0.000555869
Sample Std Dev	0.024527853
Confidence Level	95.0%
Degrees of Freedom	75
Lower Limit	-0.005048985
Upper Limit	0.006160724
Paired-Sample T-Test	Resources 10 Index - Avg. Active UT Net Return
Sample Size	76
Sample Mean	0.000555869
Sample Std Dev	0.024527853
Hypothesized Mean	0
Alternative Hypothesis	<> 0
Standard Error of Mean	0.002813538
Degrees of Freedom	75
t-Test Statistic	0.1976
p-Value	0.8439
Null Hypoth. at 10% Significance	Don't Reject
Null Hypoth. at 5% Significance	Don't Reject
Null Hypoth. at 1% Significance	Don't Reject

5.6.3. Performance of the average ETF versus the average active unit trust

H0: ETFs on average, that track the FTSE/JSE Resource 10 Index, do not significantly outperform the average active unit trust counterpart after expenses.

HA: ETFs on average, that track the FTSE/JSE Resource 10 Index, do significantly outperform the average active unit trust counterpart after expenses.

Table 5.35: Descriptive Statistics, TERs and R1000 Invested for ETFs and active unit trusts (Period 2006-2012)

Exchange traded Funds												
Name	Mean Net Return		TER	Std. Dev.		Sharpe Ratio		R1000 Invested	Mdn.	Min.	Max.	Obs.
	ETF	Index		ETF	Index	ETF	Index					
Satrix RESI	0.49%	0.52%	0.46%	7.14%	7.21%	6.84%	7.25%	-	-0.77%	-24.37%	17.15%	76
ETF Average	0.49%	0.52%	0.46%	7.14%	7.21%	6.84%	7.25%	R 1 189.19	-0.77%	-24.37%	17.15%	76
Active Unit Trusts												
Name	Mean Net Return		TER	Std. Dev.		Sharpe Ratio		R1000 Invested	Mdn.	Min.	Max.	Obs.
	AUT	Index		AUT	Index	AUT	Index					
Coronation Resources Fund	1.49%	1.18%	1.20%	6.79%	7.80%	21.88%	15.10%	-	0.48%	-19.36%	19.19%	130
Stanlib Resources Fund-A	0.64%	0.95%	1.70%	6.69%	7.41%	9.63%	12.82%	-	-0.33%	-22.27%	17.26%	119
Stanlib Resources Fund-R	0.69%	0.95%	1.13%	6.69%	7.41%	10.31%	12.82%	-	-0.24%	-22.14%	17.35%	119
Momentum Resources Fund	0.72%	0.67%	1.88%	6.60%	6.48%	10.99%	10.39%	-	0.23%	-16.06%	14.83%	43
Active UT Avg.	0.47%	0.52%	1.48%	6.78%	7.21%	6.90%	7.25%	R 1 193.26	0.44%	-21.16%	15.94%	76

Table 5.36: Statistics for the mean difference in net returns for an average ETF and an average active unit trust

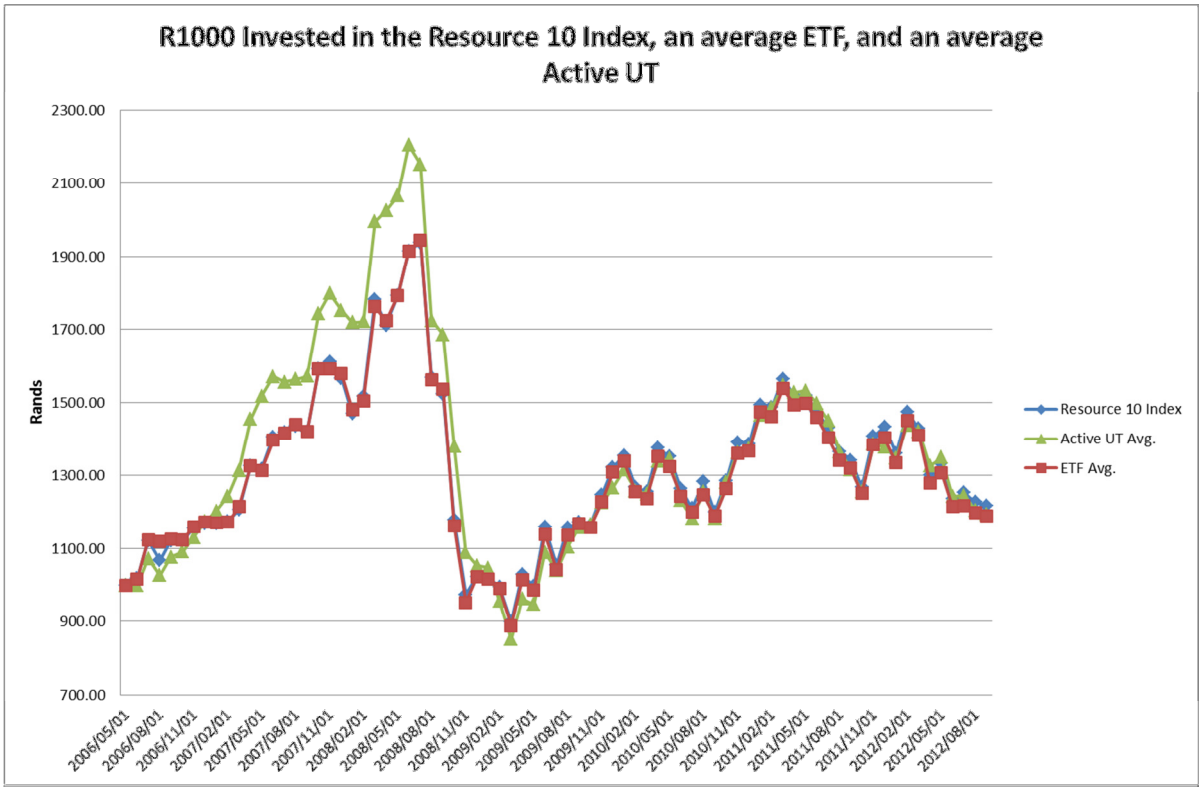
Conf. Intervals (Paired-Sample)	ETF Avg. Net Return - Avg. Active UT Net Return
Sample Size	76
Sample Mean	0.000215053
Sample Std Dev	0.026086362
Confidence Level	95.0%
Degrees of Freedom	75
Lower Limit	-0.005745936
Upper Limit	0.006176042
Paired-Sample T-Test	ETF Avg. Net Return - Avg. Active UT Net Return
Sample Size	76
Sample Mean	0.000215053
Sample Std Dev	0.026086362
Hypothesized Mean	0
Alternative Hypothesis	<> 0
Standard Error of Mean	0.002992311
Degrees of Freedom	75
t-Test Statistic	0.0719
p-Value	0.9429
Null Hypoth. at 10% Significance	Don't Reject
Null Hypoth. at 5% Significance	Don't Reject
Null Hypoth. at 1% Significance	Don't Reject

5.6.4. Summary of results for the Resources 10 Index, ETFs and active unit trusts

Figure 5.5 shows a plot of one thousand rand invested in the FTSE/JSE Resources Index, an average ETF and an average AUT for a period from June 2006 to September 2012.

At a 10%, 5% and 1% significance level, the null hypothesis was not rejected for all three tests as the *p*-values all exceeded 0.1. All three 95% confidence intervals of the mean difference in net returns, extended from negative values to positive values.

Figure 5.5: Plot of R1000 invested in the Resource 10 Index, an average ETF and an average active UT



5.7. Performance of the SA Listed Property Index, ETFs and active unit trusts

5.7.1. Performance of ETFs on average versus the SA Listed Property Index

H0: ETFs on average, that track the FTSE/JSE SA Listed Property Index, do not significantly outperform the index after expenses.

HA: ETFs on average, that track the FTSE/JSE SA Listed Property Index, do significantly outperform the index after expenses.

Table 5.37: Descriptive Statistics, TERs and R1000 Invested for the SA Listed Property Index and ETFs (Period 2007-2012)

SA Listed Property Index												
Name	Mean Return		TER	Std. Dev.		Sharpe Ratio		R1000 Invested	Mdn.	Min.	Max.	Obs.
SA Listed Property Index	0.71%		n/a	4.85%		14.55%		R 1 416.71	1.24%	-11.19%	18.19%	59
Exchange traded Funds												
Name	Mean Net Return		TER	Std. Dev.		Sharpe Ratio		R1000 Invested	Mdn.	Min.	Max.	Obs.
	ETF	Index		ETF	Index	ETF	Index					
Property Index Tracker	0.62%	0.71%	1.07%	5.02%	4.85%	12.29%	14.55%	-	0.94%	-12.03%	16.17%	59
ETF Average	0.62%	0.71%	1.07%	5.02%	4.85%	12.29%	14.55%	R 1 337.98	0.94%	-12.03%	16.17%	59

Table 5.38: Statistics for the mean difference in net returns for the SA Property Listed Index and an average ETF

Conf. Intervals (Paired-Sample)	SA Listed Property Index - Avg. ETF Net Return
Sample Size	59
Sample Mean	0.000888209
Sample Std Dev	0.014528961
Confidence Level	95.0%
Degrees of Freedom	58
Lower Limit	-0.002898059
Upper Limit	0.004674477
Paired-Sample T-Test	SA Listed Property Index - Avg. ETF Net Return
Sample Size	59
Sample Mean	0.000888209
Sample Std Dev	0.014528961
Hypothesized Mean	0
Alternative Hypothesis	<> 0
Standard Error of Mean	0.00189151
Degrees of Freedom	58
t-Test Statistic	0.4696
p-Value	0.6404
Null Hypoth. at 10% Significance	Don't Reject
Null Hypoth. at 5% Significance	Don't Reject
Null Hypoth. at 1% Significance	Don't Reject

5.7.2. Performance of active unit trusts on average versus the SA Listed Property Index

H0: Active unit trusts on average, that use the FTSE/JSE SA Listed Property Index as a benchmark, do not significantly outperform the index after expenses.

HA: Active unit trusts on average, that use the FTSE/JSE SA Listed Property Index as a benchmark, do significantly outperform the index after expenses.

Table 5.39: Descriptive Statistics, TERs and R1000 Invested for the SA Listed Property Index and active unit trusts (Period 2007-2012)

SA Listed Property Index											
Name	Mean Return		TER	Std. Dev.		Sharpe Ratio		R1000 Invested	Mdn.	Min.	Max.	Obs.
SA Listed Property Index	0.71%		n/a	4.85%		14.55%		R 1 416.71	1.24%	-11.19%	18.19%	59
Active Unit Trusts												
Name	Mean Net Return		TER	Std. Dev.		Sharpe Ratio		R1000 Invested	Mdn.	Min.	Max.	Obs.
	AUT	Index		AUT	Index	AUT	Index					
Momentum Property Fund	0.49%	0.71%	1.43%	4.64%	4.85%	10.54%	14.55%	-	0.59%	-12.65%	17.09%	59
Active UT Avg.	0.49%	0.71%	1.43%	4.64%	4.85%	10.54%	14.55%	R 1 253.42	0.59%	-12.65%	17.09%	59

Table 5.40: Statistics for the mean difference in net returns for the SA Property Listed Index and an average active unit trust

Conf. Intervals (Paired-Sample)	SA Listed Property Index - Avg. Active UT Net Return
Sample Size	59
Sample Mean	0.002168041
Sample Std Dev	0.015648147
Confidence Level	95.0%
Degrees of Freedom	58
Lower Limit	-0.001909888
Upper Limit	0.00624597
Hypothesis Test (Paired-Sample)	SA Listed Property Index - Avg. Active UT Net Return
Sample Size	59
Sample Mean	0.002168041
Sample Std Dev	0.015648147
Hypothesized Mean	0
Alternative Hypothesis	<> 0
Standard Error of Mean	0.002037215
Degrees of Freedom	58
t-Test Statistic	1.0642
p-Value	0.2916
Null Hypoth. at 10% Significance	Don't Reject
Null Hypoth. at 5% Significance	Don't Reject
Null Hypoth. at 1% Significance	Don't Reject

5.7.3. Performance of the average ETF versus the average active unit trust

H0: ETFs on average, that track the FTSE/JSE SA Listed Property Index, do not significantly outperform the average active unit trust counterpart after expenses.

HA: ETFs on average, that track the FTSE/JSE SA Listed Property Index, do significantly outperform the average active unit trust counterpart after expenses.

Table 5.41: Descriptive Statistics, TERs and R1000 Invested for ETFs and passive unit trusts (Period 2007-2012)

Exchange traded Funds												
Name	Mean Net Return		TER	Std. Dev.		Sharpe Ratio		R1000 Invested	Mdn.	Min.	Max.	Obs.
	ETF	Index		ETF	Index	ETF	Index					
Property Index Tracker	0.62%	0.71%	1.07%	5.02%	4.85%	12.29%	14.55%	-	0.94%	-12.03%	16.17%	59
ETF Average	0.62%	0.71%	1.07%	5.02%	4.85%	12.29%	14.55%	R 1 337.98	0.94%	-12.03%	16.17%	59
Active Unit Trusts												
Name	Mean Net Return		TER	Std. Dev.		Sharpe Ratio		R1000 Invested	Mdn.	Min.	Max.	Obs.
	AUT	Index		AUT	Index	AUT	Index					
Momentum Property Fund	0.49%	0.71%	1.43%	4.64%	4.85%	10.54%	14.55%	-	0.59%	-12.65%	17.09%	59
Active UT Avg.	0.49%	0.71%	1.43%	4.64%	4.85%	10.54%	14.55%	R 1 253.42	0.59%	-12.65%	17.09%	59

Table 5.42: Statistics for the mean difference in net returns for an average ETF and an average active unit trust

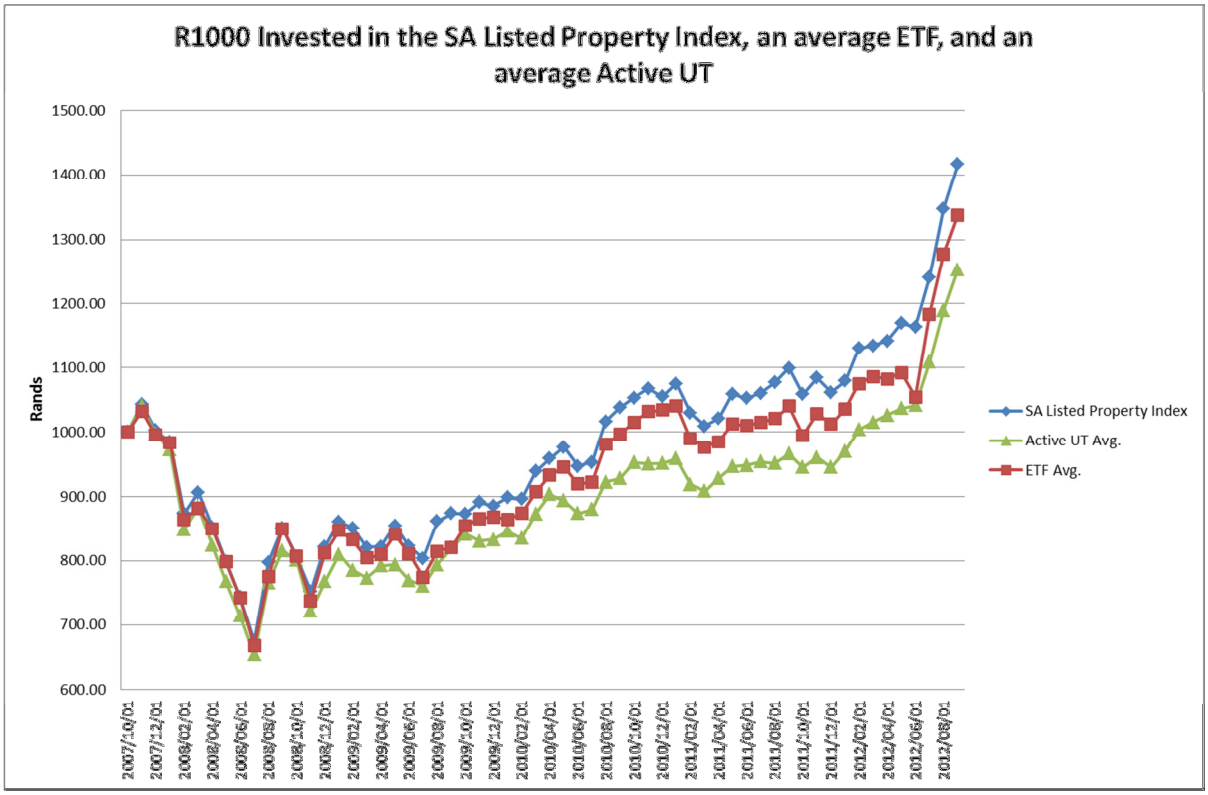
Conf. Intervals (Paired-Sample)	Avg. ETF Net Return - Avg. Active UT Net Return
Sample Size	59
Sample Mean	0.001279832
Sample Std Dev	0.01850789
Confidence Level	95.0%
Degrees of Freedom	58
Lower Limit	-0.00354335
Upper Limit	0.006103014
Paired-Sample T-Test	Avg. ETF Net Return - Avg. Active UT Net Return
Sample Size	59
Sample Mean	0.001279832
Sample Std Dev	0.01850789
Hypothesized Mean	0
Alternative Hypothesis	<> 0
Standard Error of Mean	0.002409522
Degrees of Freedom	58
t-Test Statistic	0.5312
p-Value	0.5973
Null Hypoth. at 10% Significance	Don't Reject
Null Hypoth. at 5% Significance	Don't Reject
Null Hypoth. at 1% Significance	Don't Reject

5.7.4. Summary of results for the SA Listed Property Index, ETFs and active unit trusts

Figure 5.6 shows a plot of one thousand rand invested in the FTSE/JSE SA Listed Property Index, an average ETF and an average AUT for a period from November 2007 to September 2012.

At a 10%, 5% and 1% significance level, the null hypothesis was not rejected for all three tests as the *p*-values all exceeded 0.1. All three 95% confidence intervals of the mean difference in net returns, extended from negative values to positive values.

Figure 5.6: Plot of R1000 invested in the SA Listed Property Index, an average ETF and an average active UT



5.8. Performance of the Dividend Plus Index and ETFs

5.8.1. Performance of ETFs on average versus the Dividend Plus Index

H0: ETFs on average, that track the FTSE/JSE Dividend Plus Index, do not significantly outperform the index after expenses.

HA: ETFs on average, that track the FTSE/JSE Dividend Plus Index, do significantly outperform the index after expenses.

Table 5.43: Descriptive Statistics, TERs and R1000 Invested for the Dividend Plus Index and ETFs (Period 2007-2012)

Dividened Plus Index												
Name	Mean Return		TER	Std. Dev.		Sharpe Ratio		R1000 Invested	Mdn.	Min.	Max.	Obs.
Dividend Plus Index	0.77%		n/a	4.97%		15.47%		R 1 473.39	0.58%	-11.18%	10.42%	60
Exchange traded Funds												
Name	Mean Net Return		TER	Std. Dev.		Sharpe Ratio		R1000 Invested	Mdn.	Min.	Max.	Obs.
	ETF	Index		ETF	Index	ETF	Index					
Satrix Divedend Plus	0.73%	0.77%	0.46%	4.93%	4.97%	14.88%	15.47%	-	0.58%	-11.18%	10.42%	60
ETF Average	0.73%	0.77%	0.46%	4.93%	4.97%	14.88%	15.47%	R 1 444.09	0.58%	-11.18%	10.42%	60

Table 5.44: Statistics for the mean difference in net returns for the Dividend Index and an average ETF

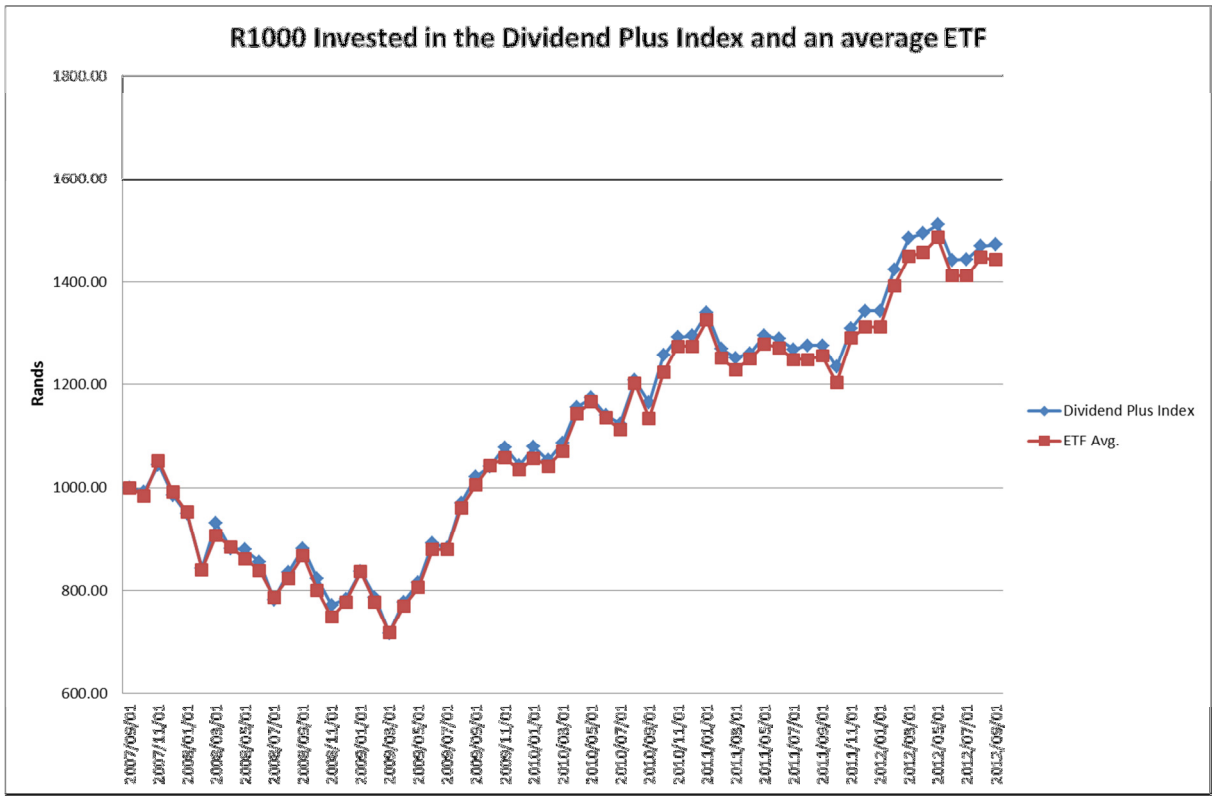
Conf. Intervals (Paired-Sample)	Dividend Plus Index Return - Avg. ETF Net Return
Sample Size	60
Sample Mean	0.000352487
Sample Std Dev	0.011123035
Confidence Level	95.0%
Degrees of Freedom	59
Lower Limit	-0.002520897
Upper Limit	0.003225872
Paired-Sample T-Test	Dividend Plus Index Return - Avg. ETF Net Return
Sample Size	60
Sample Mean	0.000352487
Sample Std Dev	0.011123035
Hypothesized Mean	0
Alternative Hypothesis	<> 0
Standard Error of Mean	0.001435978
Degrees of Freedom	59
t-Test Statistic	0.2455
p-Value	0.8069
Null Hypoth. at 10% Significance	Don't Reject
Null Hypoth. at 5% Significance	Don't Reject
Null Hypoth. at 1% Significance	Don't Reject

5.8.2. Summary of results for the Dividend Plus Index and ETFs

Figure 5.7 shows a plot of one thousand rand invested in the FTSE/JSE Dividend Plus Index and an average ETF for a period from October 2007 to September 2012.

At a 10%, 5% and 1% significance level, the null hypothesis was not rejected as the *p*-value exceeded 0.1. The 95% confidence intervals of the mean difference in net returns, extended from negative values to positive values.

Figure 5.7: Plot of R1000 invested in the Dividend Plus Index and an average ETF



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5.9. Performance of the RAFI 40 TR Index and ETFs

5.9.1. Performance of ETFs on average versus the RAFI 40 TR Index

H0: ETFs on average, that track the FTSE/JSE RAFI 40 TR Index, do not significantly outperform the index after expenses.

HA: ETFs on average, that track the FTSE/JSE RAFI 40 TR Index, do significantly outperform the index after expenses.

Table 5.45: Descriptive Statistics, TERs and R1000 Invested for the RAFI 40 TR Index and ETFs (Period 2009-2012)

RAFI 40 TR Index											
Name	Mean Return		TER	Std. Dev.		Sharpe Ratio		R1000 Invested	Mdn.	Min.	Max.	Obs.
RAFI 40 Index	1.22%		n/a	3.99%		30.61%		R 1 524.69	1.33%	-5.65%	9.20%	37
Exchange traded Funds												
Name	Mean Net Return		TER	Std. Dev.		Sharpe Ratio		R1000 Invested	Mdn.	Min.	Max.	Obs.
	ETF	Index		ETF	Index	ETF	Index					
Satrix RAFI TR Index	1.17%	1.22%	0.46%	4.12%	3.99%	28.50%	30.61%	-	0.50%	-6.01%	10.04%	37
ETF Average	1.17%	1.22%	0.46%	4.12%	3.99%	28.50%	30.61%	R 1 495.51	0.50%	-6.01%	10.04%	37

Table 5.46: Statistics for the mean difference in net returns for the RAFI 40 TR Index and an average ETF

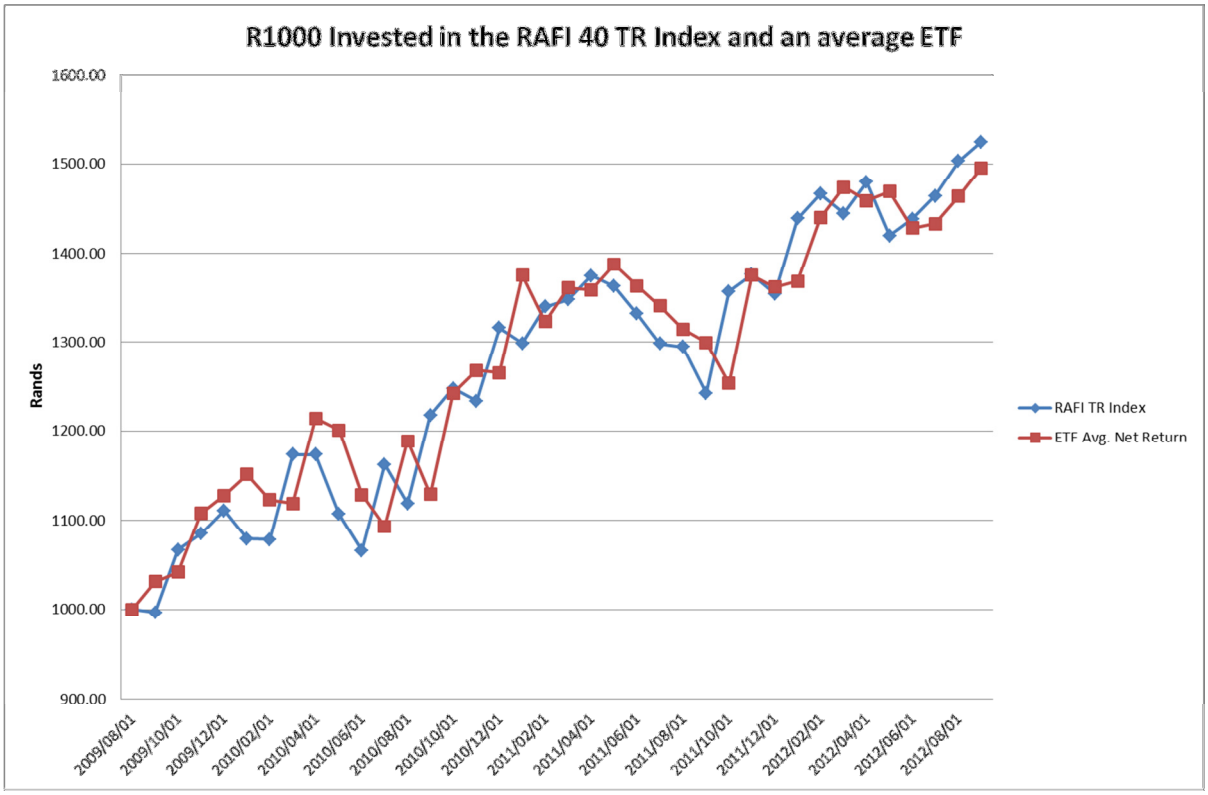
Conf. Intervals (Paired-Sample)	RAFI 40 TR Index Return - Avg. ETF Net Return
Sample Size	37
Sample Mean	0.000481582
Sample Std Dev	0.062627836
Confidence Level	95.0%
Degrees of Freedom	36
Lower Limit	-0.020399579
Upper Limit	0.021362742
Paired-Sample T-Test	RAFI 40 TR Index Return - Avg. ETF Net Return
Sample Size	37
Sample Mean	0.000481582
Sample Std Dev	0.062627836
Hypothesized Mean	0
Alternative Hypothesis	<> 0
Standard Error of Mean	0.010295953
Degrees of Freedom	36
t-Test Statistic	0.0468
p-Value	0.9630
Null Hypoth. at 10% Significance	Don't Reject
Null Hypoth. at 5% Significance	Don't Reject
Null Hypoth. at 1% Significance	Don't Reject

5.9.2. Summary of results for the RAFI 40 TR Index and ETFs

Figure 5.8 shows a plot of one thousand rand invested in the FTSE/JSE RAFI 40 TR Index and an average ETF for a period from September 2009 to September 2012.

At a 10%, 5% and 1% significance level, the null hypothesis was not rejected as the *p*-value exceeded 0.1. The 95% confidence intervals of the mean difference in net returns, extended from negative values to positive values.

Figure 5.8: Plot of R1000 invested in the RAFI 40 TR Index and an average ETF



5.10. Performance of the Equally Weighted Top 40 Index and ETFs

5.10.1. Performance of ETFs on average versus the Equally Weighted Top 40 Index

H0: ETFs on average, that track the FTSE/JSE Equally Weighted Top 40 Index, do not significantly outperform the index after expenses.

HA: ETFs on average, that track the FTSE/JSE RAFI Equally Weighted Top 40 Index, do significantly outperform the index after expenses.

Table 5.47: Descriptive Statistics, TERs and R1000 Invested for the Equally Weighted Top 40 Index and ETFs (Period 2010-2012)

Equally Weighted Top 40 Index											
Name	Mean Return		TER	Std. Dev.		Sharpe Ratio		R1000 Invested	Mdn.	Min.	Max.	Obs.
Equally Weighted Top 40 Index	1.06%		n/a	3.47%		30.66%		R 1 284.78	1.40%	-4.15%	8.26%	25
Exchange traded Funds												
Name	Mean Net Return		TER	Std. Dev.		Sharpe Ratio		R1000 Invested	Mdn.	Min.	Max.	Obs.
	ETF	Index		ETF	Index	ETF	Index					
Bettabeta Equally Weighted Top 40	1.04%	1.06%	0.40%	3.18%	3.47%	32.83%	30.66%	-	0.27%	-3.08%	9.08%	25
ETF Average	1.04%	1.06%	0.40%	3.18%	3.47%	32.83%	30.66%	R 1 281.33	0.27%	-3.08%	9.08%	25

Table 5.48: Statistics for the mean difference in net returns for the Equally Weighted Top 40 Index and an average ETF

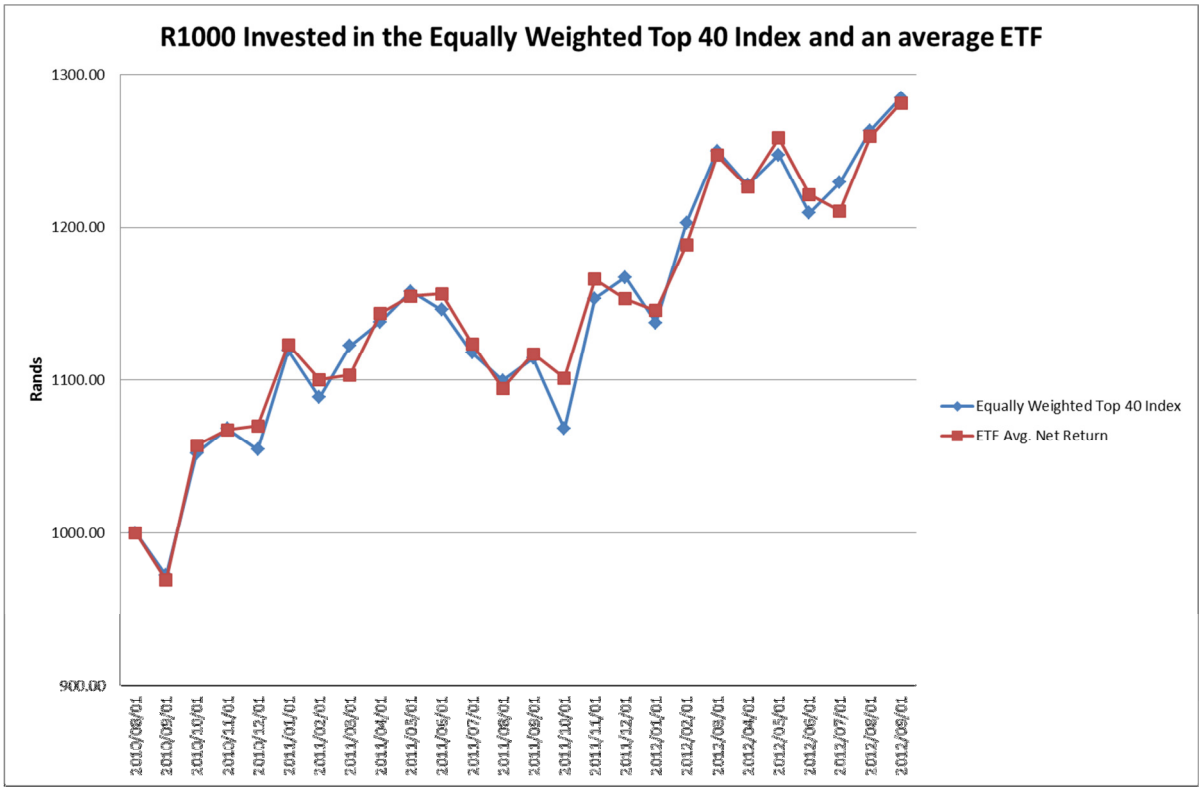
Conf. Intervals (Paired-Sample)	Equally Weighted Top 40 Index Return - Avg. ETF Net Return
Sample Size	25
Sample Mean	0.000200406
Sample Std Dev	0.015350534
Confidence Level	95.0%
Degrees of Freedom	24
Lower Limit	-0.006135983
Upper Limit	0.006536795
Paired-Sample T-Test	Equally Weighted Top 40 Index Return - Avg. ETF Net Return
Sample Size	25
Sample Mean	0.000200406
Sample Std Dev	0.015350534
Hypothesized Mean	0
Alternative Hypothesis	<> 0
Standard Error of Mean	0.003070107
Degrees of Freedom	24
t-Test Statistic	0.0653
p-Value	0.9485
Null Hypoth. at 10% Significance	Don't Reject
Null Hypoth. at 5% Significance	Don't Reject
Null Hypoth. at 1% Significance	Don't Reject

5.10.2. Summary of results for the Equally Weighted Top 40 Index and ETFs

Figure 5.9 shows a plot of one thousand rand invested in the FTSE/JSE Equally Weighted Top 40 Index and an average ETF for a period from September 2010 to September 2012.

At a 10%, 5% and 1% significance level, the null hypothesis was not rejected as the *p*-value exceeded 0.1. The 95% confidence intervals of the mean difference in net returns, extended from negative values to positive values.

Figure 5.9: Plot of R1000 invested in the Equally Weighted Top 40 Index and an average ETF



6. Discussion of Results

6.1. Introduction

This chapter provides a discussion of the results reported in the previous chapter. The discussion will follow a similar structure as chapter five. Firstly, there will be a discussion of the sample used and a few observations on the sample. The summarised results obtained for the various hypotheses will then be discussed. Where appropriate, these results have been compared with results obtained by other researchers.

6.2. Performance of the Top 40 Index, ETFs, passive and active unit trusts

6.2.1. Performance of ETFs on average versus the Top 40 Index

Table 5.3 presents the descriptive statistics for the FTSE/JSE Top 40 Index and ETFs that track the index. Results indicate that the average net return of ETFs is 1.16%, whereas the index return is 1.18%. The average Sharpe ratio of ETFs is 19.96%, whereas the index Sharpe ratio is 20.85%. One thousand rand invested in the average ETF and Index, for a period from January 2001 to September 2012, would have a return on investment of R4 011.67 and R4 206.54 respectively.

The *t*-test applied on the difference between the index and ETF average net returns is equal to 0.464, indicating that the deviation in returns is statistically insignificant, as shown in Table 5.4. A 95% confidence interval of the mean difference in returns extends from a negative value to a positive value. This is consistent with the fact that the two-tailed *p*-value is greater than 0.05.

6.2.2. Performance of passive unit trusts on average versus the Top 40 Index

Table 5.5 presents the descriptive statistics for the FTSE/JSE Top 40 Index and PUTs that track the index. Results indicate that the average net return of PUTs is 1.04%, whereas the index return is 1.18%. The average Sharpe ratio of PUTs is 18.92%, whereas the index Sharpe ratio is 20.85%. One thousand rand invested in the average PUT and Index, for a period from January 2001 to

September 2012, would have a return on investment of R3 487.78 and R4 206.54 respectively.

The *t*-test applied on the difference between the index and PUT average net returns is equal to 2.2499, indicating that the deviation in returns is statistically significant at the 5% level, as shown in Table 5.6. It can be inferred that PUTs, that track the Top 40 Index, slightly underperform this benchmark. A 95% confidence interval of the mean difference in returns does not include the hypothesized mean. This is consistent with the fact that the two-tailed *p*-value is less than 0.05.

6.2.3. Performance of active unit trusts on average versus the Top 40 Index

Table 5.7 presents the descriptive statistics for the FTSE/JSE Top 40 Index and AUTs that use the index as a benchmark. Results indicate that the average net return of AUTs is 1.32%, whereas the index return is 1.18%. The average Sharpe ratio of AUTs is 26.01%, whereas the index Sharpe ratio is 20.85%. One thousand rand invested in the average AUT and Index, for a period from January 2001 to September 2012, would have a return on investment of R6 755.84 and R4 206.54 respectively.

The *t*-test applied on the difference between the index and AUT average net returns is equal to -1.2778, indicating that the deviation in returns is statistically insignificant, as shown in Table 5.8. A 95% confidence interval of the mean difference in returns extends from a negative value to a positive value. This is consistent with the fact that the two-tailed *p*-value is greater than 0.05.

6.2.4. Performance of an average ETF versus an average passive unit trust

Table 5.9 presents the descriptive statistics for ETFs and PUTs that track the FTSE/JSE Top 40 Index. Results indicate that the average net return of ETFs is 12 basis points (b.p.) higher than the average net return of PUTs. The average Sharpe ratio of ETFs is 104 b.p. higher than average Sharpe ratio of PUTs. One thousand rand invested in the average ETF, for a period from January 2001 to September 2012, would have a return on investment of

R523.89 more than the same investment in an average PUT. The average total expense ratio of ETFs is 0.34%, in comparison to the 0.82% average for PUTs.

The *t*-test applied on the difference between ETF and PUT average net returns is equal to 1.5579, indicating that the deviation in net returns is statistically insignificant, as shown in Table 5.10. A 95% confidence interval of the mean difference in net returns extends from a negative value to a positive value. This is consistent with the fact that the two-tailed *p*-value is greater than 0.05.

6.2.5. Performance of an average ETF versus an average active unit trust

Table 5.11 presents the descriptive statistics for ETFs and AUTs that track the FTSE/JSE Top 40 Index. Results indicate that the average net return of ETFs is 16 b.p. lower than the average net return of AUTs. The average Sharpe ratio of ETFs is 605 b.p. lower than the average Sharpe ratio of AUTs. One thousand rand invested in the average ETF, for a period from January 2001 to September 2012, would have a return on investment of R2 744.17 less than the same investment in an average AUT. The average total expense ratio of ETFs is 0.34%, in comparison to the 1.99% average for AUTs.

The *t*-test applied on the difference between ETF and AUT average net returns is equal to -1.3491, indicating that the deviation in net returns is statistically insignificant, as shown in Table 5.12. A 95% confidence interval of the mean difference in net returns extends from a negative value to a positive value. This is consistent with the fact that the two-tailed *p*-value is greater than 0.05.

6.3. Performance of the SWIX Top 40 Index, ETFs and active unit trusts

6.3.1. Performance of ETFs on average versus the SWIX Top 40 Index

Table 5.13 presents the descriptive statistics for the FTSE/JSE SWIX Top 40 Index and an ETF that tracks the index. Results indicate that the average net return of the ETF is 0.75%, whereas the index return is 0.80%. The average Sharpe ratio of the ETF is 14.98%, whereas the index Sharpe ratio is 16.12%. One thousand rand invested in the ETF and Index, for a period from June 2006 to September 2012, would have a return on investment of R1 626.06 and R1 668.85 respectively.

The *t*-test applied on the difference between the index and ETF average net returns is equal to 0.3872, indicating that the deviation in returns is statistically insignificant, as shown in Table 5.14. A 95% confidence interval of the mean difference in returns extends from a negative value to a positive value. This is consistent with the fact that the two-tailed *p*-value is greater than 0.05.

6.3.2. Performance of active unit trusts on average versus the SWIX Top 40 Index

Table 5.15 presents the descriptive statistics for the FTSE/JSE SWIX Top 40 Index and AUTs that use the index as a benchmark. Results indicate that the average net return of AUTs is 0.59%, whereas the index return is 0.80%. The average Sharpe ratio of AUTs is 12.94%, whereas the index Sharpe ratio is 16.12%. One thousand rand invested in an average AUT and the Index, for a period from June 2006 to September 2012, would have a return on investment of R1 443.51 and R1 668.85 respectively.

The *t*-test applied on the difference between the index and AUT average net returns is equal to 1.2163, indicating that the deviation in returns is statistically insignificant, as shown in Table 5.16. A 95% confidence interval of the mean difference in returns extends from a negative value to a positive value. This is consistent with the fact that the two-tailed *p*-value is greater than 0.05.

6.3.3. Performance of an average ETF versus an average active unit trust

Table 5.17 presents the descriptive statistics for ETFs and AUTs that track the FTSE/JSE SWIX Top 40 Index. Results indicate that the average net return of an ETF is 16 b.p. higher than the average net return of AUTs. The average Sharpe ratio of the ETF is 204 b.p. higher than the average Sharpe ratio of AUTs. One thousand rand invested in the ETF, for a period from June 2006 to September 2012, would have a return on investment of R182.55 more than the same investment in an average AUT. The average total expense ratio of the ETF is 0.46%, in comparison to the 1.21% average for AUTs.

The *t*-test applied on the difference between ETF and AUT average net returns is equal to 0.8236, indicating that the deviation in net returns is statistically insignificant, as shown in Table 5.18. A 95% confidence interval of the mean

difference in net returns extends from a negative value to a positive value. This is consistent with the fact that the two-tailed *p*-value is greater than 0.05.

6.4. Performance of the Financial 15 Index, ETFs and active unit trusts

6.4.1. Performance of ETFs on average versus the Financial 15 Index

Table 5.19 presents the descriptive statistics for the FTSE/JSE Financial 15 Index and an ETF that tracks the index. Results indicate that the average net return of the ETF is 0.97%, whereas the index return is 1.00%. The average Sharpe ratio of the ETF is 17.16%, whereas the index Sharpe ratio is 18.67%. A thousand rand invested in the ETF and Index, for a period from April 2002 to September 2012, would have a return on investment of R2 781.24 and R2 934.37 respectively.

The *t*-test applied on the difference between the index and ETF average net returns is equal to 0.1542, indicating that the deviation in returns is statistically insignificant, as shown in Table 5.20. A 95% confidence interval of the mean difference in returns extends from a negative value to a positive value. This is consistent with the fact that the two-tailed *p*-value is greater than 0.05.

6.4.2. Performance of active unit trusts on average versus the Financial 15 Index

Table 5.21 presents the descriptive statistics for the FTSE/JSE Financial 15 Index and AUTs that use the index as a benchmark. Results indicate that the average net return of AUTs is 1.10%, whereas the index return is 1.00%. The average Sharpe ratio of AUTs is 24.53%, whereas the index Sharpe ratio is 18.67%. One thousand rand invested in an average AUT and the Index, for a period from April 2002 to September 2012, would have a return on investment of R3 502.93 and R2 934.37 respectively.

The *t*-test applied on the difference between the index and AUT average net returns is equal to -0.4800, indicating that the deviation in returns is statistically insignificant, as shown in Table 5.22. A 95% confidence interval of the mean difference in returns extends from a negative value to a positive value. This is consistent with the fact that the two-tailed *p*-value is greater than 0.05.

6.4.3. Performance of the average ETF versus the average active unit trust

Table 5.23 presents the descriptive statistics for an ETF and AUTs that track the FTSE/JSE Financial 15 Index. Results indicate that the average net return of an ETF is 13 b.p. lower than the average net return of AUTs. The average Sharpe ratio of the ETF is 745 b.p. lower than the average Sharpe ratio of AUTs. One thousand rand invested in the ETF, for a period from April 2002 to September 2012, would have a return on investment of R 721.69 less than the same investment in an average AUT. The average total expense ratio of the ETF is 0.46%, in comparison to the 1.90% average for AUTs.

The *t*-test applied on the difference between ETF and AUT average net returns is equal to -0.5005, indicating that the deviation in net returns is statistically insignificant, as shown in Table 5.24. A 95% confidence interval of the mean difference in net returns extends from a negative value to a positive value. This is consistent with the fact that the two-tailed *p*-value is greater than 0.05.

6.5. Performance of the Industrial 25 Index, ETFs and active unit trusts

6.5.1. Performance of ETFs on average versus the Industrial Index

Table 5.25 presents the descriptive statistics for the FTSE/JSE Industrial 25 Index and an ETF that tracks the index. Results indicate that the average net return of the ETF is 1.40%, whereas the index return is 1.43%. The average Sharpe ratio of the ETF is 27.02%, whereas the index Sharpe ratio is 28.70%. One thousand rand invested in the ETF and Index, for a period from April 2002 to September 2012, would have a return on investment of R4 871.93 and R5 105.23 respectively.

The *t*-test applied on the difference between the index and ETF average net returns is equal to 0.2865, indicating that the deviation in returns is statistically insignificant, as shown in Table 5.26. A 95% confidence interval of the mean difference in returns extends from a negative value to a positive value. This is consistent with the fact that the two-tailed *p*-value is greater than 0.05.

6.5.2. Performance of active unit trusts on average versus the Industrial 25 Index

Table 5.27 presents the descriptive statistics for the FTSE/JSE Industrial 25 Index and AUTs that use the index as a benchmark. Results indicate that the average net return of AUTs is 1.53%, whereas the index return is 1.43%. The average Sharpe ratio of AUTs is 36.88%, whereas the index Sharpe ratio is 28.70%. One thousand rand invested in an average AUT and the Index, for a period from April 2002 to September 2012, would have a return on investment of R6 109.23 and R5 105.23 respectively.

The *t*-test applied on the difference between the index and AUT average net returns is equal to -0.5484, indicating that the deviation in returns is statistically insignificant, as shown in Table 5.28. A 95% confidence interval of the mean difference in returns extends from a negative value to a positive value. This is consistent with the fact that the two-tailed *p*-value is greater than 0.05.

6.5.3. Performance of the average ETF versus the average active unit trust

Table 5.29 presents the descriptive statistics for an ETF and AUTs that track the FTSE/JSE Industrial 25 Index. Results indicate that the average net return of an ETF is 13 b.p. lower than the average net return of AUTs. The average Sharpe ratio of the ETF is 988 b.p. lower than the average Sharpe ratio of AUTs. One thousand rand invested in the ETF, for a period from April 2002 to September 2012, would have a return on investment of R1 237.30 less than the same investment in an average AUT. The average total expense ratio of the ETF is 0.46%, in comparison to the 1.34% average for AUTs.

The *t*-test applied on the difference between ETF and AUT average net returns is equal to -0.6397, indicating that the deviation in net returns is statistically insignificant, as shown in Table 5.30. A 95% confidence interval of the mean difference in net returns extends from a negative value to a positive value. This is consistent with the fact that the two-tailed *p*-value is greater than 0.05.

6.6. Performance of the Resource 10 Index, ETFs and active unit trusts

6.6.1. Performance of ETFs on average versus the Resource 10 Index

Table 5.31 presents the descriptive statistics for the FTSE/JSE Resource 10 Index and an ETF that tracks the index. Results indicate that the average net return of the ETF is 0.49%, whereas the index return is 0.52%. The average Sharpe ratio of the ETF is 6.84%, whereas the index Sharpe ratio is 7.25%. One thousand rand invested in the ETF and the Index, for a period from June 2006 to September 2012, would have a return on investment of R1 189.19 and R1 218.57 respectively.

The *t*-test applied on the difference between the index and ETF average net returns is equal to 0.2838, indicating that the deviation in returns is statistically insignificant, as shown in Table 5.32. A 95% confidence interval of the mean difference in returns extends from a negative value to a positive value. This is consistent with the fact that the two-tailed *p*-value is greater than 0.05.

6.6.2. Performance of active unit trusts on average versus the Resource 10 Index

Table 5.33 presents the descriptive statistics for the FTSE/JSE Resource 10 Index and AUTs that use the index as a benchmark. Results indicate that the average net return of AUTs is 0.47%, whereas the index return is 0.52%. The average Sharpe ratio of AUTs is 6.90%, whereas the index Sharpe ratio is 7.25%. One thousand rand invested in an average AUT and the Index, for a period from June 2006 to September 2012, would have a return on investment of R1 193.26 and R1 218.57 respectively.

The *t*-test applied on the difference between the index and AUT average net returns is equal to -0.1976, indicating that the deviation in returns is statistically insignificant, as shown in Table 5.34. A 95% confidence interval of the mean difference in returns extends from a negative value to a positive value. This is consistent with the fact that the two-tailed *p*-value is greater than 0.05.

6.6.3. Performance of the average ETF versus the average active unit trust

Table 5.35 presents the descriptive statistics for an ETF and AUTs that track the FTSE/JSE Resource 10 Index. Results indicate that the average net return

of an ETF is 2 b.p. higher than the average net return of AUTs. However, the average Sharpe ratio of the ETF is 6 b.p. lower than the average Sharpe ratio of AUTs since the standard deviation of the ETF is higher than the average AUT. One thousand rand invested in the ETF, for a period from June 2006 to September 2012, would have a return on investment of R4.07 less than the same investment in an average AUT. The average total expense ratio of the ETF is 0.46%, in comparison to the 1.48% average for AUTs.

The *t*-test applied on the difference between ETF and AUT average net returns is equal to 0.0719, indicating that the deviation in net returns is statistically insignificant, as shown in Table 5.36. A 95% confidence interval of the mean difference in net returns extends from a negative value to a positive value. This is consistent with the fact that the two-tailed *p*-value is greater than 0.05.

6.7. Performance of the SA Listed Property Index, ETFs and active unit trusts

6.7.1. Performance of ETFs on average versus the SA Listed Property Index

Table 5.37 presents the descriptive statistics for the FTSE/JSE SA Listed Property Index and an ETF that tracks the index. Results indicate that the average net return of the ETF is 0.62%, whereas the index return is 0.71%. The average Sharpe ratio of the ETF is 12.29%, whereas the index Sharpe ratio is 14.55%. One thousand rand invested in the ETF and the Index, for a period from November 2007 to September 2012, would have a return on investment of R1 337.98 and R1 416.71 respectively.

The *t*-test applied on the difference between the index and ETF average net returns is equal to 0.4696, indicating that the deviation in returns is statistically insignificant, as shown in Table 5.38. A 95% confidence interval of the mean difference in returns extends from a negative value to a positive value. This is consistent with the fact that the two-tailed *p*-value is greater than 0.05.

6.7.2. Performance of active unit trusts on average versus the SA Listed Property Index

Table 5.39 presents the descriptive statistics for the FTSE/JSE SA Listed Property Index and AUTs that use the index as a benchmark. Results indicate

that the average net return of AUTs is 0.49%, whereas the index return is 0.71%. The average Sharpe ratio of AUTs is 10.54%, whereas the index Sharpe ratio is 14.55%. One thousand rand invested in an average AUT and the Index, for a period from November 2007 to September 2012, would have a return on investment of R1 253.42 and R1 416.71 respectively.

The *t*-test applied on the difference between the index and AUT average net returns is equal to 1.0642, indicating that the deviation in returns is statistically insignificant, as shown in Table 5.40. A 95% confidence interval of the mean difference in returns extends from a negative value to a positive value. This is consistent with the fact that the two-tailed *p*-value is greater than 0.05.

6.7.3. Performance of the average ETF versus the average active unit trust

Table 5.41 presents the descriptive statistics for an ETF and AUT that tracks the FTSE/JSE SA Listed Property Index. Results indicate that the average net return of an ETF is 13 b.p. higher than the average net return of an AUT. The average Sharpe ratio of the ETF is 175 b.p. higher than the average Sharpe ratio of the AUT. One thousand rand invested in the ETF, for a period from November 2007 to September 2012, would have a return on investment of R84.58 more than the same investment in the AUT. The average total expense ratio of the ETF is 1.07%, in comparison to 1.43% for the AUT.

The *t*-test applied on the difference between ETF and AUT average net returns is equal to 0.5312, indicating that the deviation in net returns is statistically insignificant, as shown in Table 5.42. A 95% confidence interval of the mean difference in net returns extends from a negative value to a positive value. This is consistent with the fact that the two-tailed *p*-value is greater than 0.05.

6.8. Performance of the Dividend Plus Index and ETFs

6.8.1. Performance of ETFs on average versus the Dividend Plus Index

Table 5.43 presents the descriptive statistics for the FTSE/JSE Dividend Plus Index and an ETF that tracks the index. Results indicate that the average net return of the ETF is 0.73%, whereas the index return is 0.77%. The average Sharpe ratio of the ETF is 14.88%, whereas the index Sharpe ratio is 15.47%. One thousand rand invested in the ETF and the Index, for a period from

October 2007 to September 2012, would have a return on investment of R1 444.09 and R1 473.39 respectively.

The *t*-test applied on the difference between the index and ETF average net returns is equal to 0.2455, indicating that the deviation in returns is statistically insignificant, as shown in Table 5.44. A 95% confidence interval of the mean difference in returns extends from a negative value to a positive value. This is consistent with the fact that the two-tailed *p*-value is greater than 0.05.

6.9. Performance of the RAFI 40 TR Index and ETFs

6.9.1. Performance of ETFs on average versus the RAFI 40 TR Index

Table 5.45 presents the descriptive statistics for the FTSE/JSE RAFI 40 Total Return (TR) Index and an ETF that tracks the index. Results indicate that the average net return of the ETF is 1.17%, whereas the index return is 1.22%. The average Sharpe ratio of the ETF is 28.50%, whereas the index Sharpe ratio is 30.61%. One thousand rand invested in the ETF and the Index, for a period from September 2009 to September 2012, would have a return on investment of R1 495.51 and R1 524.69 respectively.

The *t*-test applied on the difference between the index and ETF average net returns is equal to 0.0468, indicating that the deviation in returns is statistically insignificant, as shown in Table 5.46. A 95% confidence interval of the mean difference in returns extends from a negative value to a positive value. This is consistent with the fact that the two-tailed *p*-value is greater than 0.05.

6.10. Performance of the Equally Weighted Top 40 Index and ETFs

6.10.1. Performance of ETFs on average versus the Equally Weighted Top 40 Index

Table 5.47 presents the descriptive statistics for the FTSE/JSE Equally Weighted Top 40 Total Return Index and an ETF that tracks the index. Results indicate that the average net return of the ETF is 1.04%, whereas the index return is 1.06%. The average Sharpe ratio of the ETF is 32.83%, whereas the index Sharpe ratio is 30.66%. One thousand rand invested in the ETF and the Index, for a period from September 2010 to September 2012, would have a return on investment of R1 281.33 and R1 284.78.69 respectively.

The *t*-test applied on the difference between the index and ETF net returns is equal to 0.0653, indicating that the deviation in returns is statistically insignificant, as shown in Table 5.48. A 95% confidence interval of the mean difference in returns extends from a negative value to a positive value. This is consistent with the fact that the two-tailed *p*-value is greater than 0.05.

6.11. Summary of the results and its Implications

The results from Table 6.1 indicate that, for the various periods under observation, ETFs do not statistically significantly outperform their respective benchmark indices or counterpart PUTs and AUTs.

6.11.1. ETF and passive unit trust performance versus the benchmark index

The hypothesis tests reveal that ETFs, in all nine categories, did not significantly outperform their respective benchmark indices, inferring that ETFs have a low tracking error. PUTs also do not statistically significantly outperform or underperform their respective benchmark indices in the Top 40 category at a 1% significance level. However, at a 5% level of significance, PUTs do statistically significantly underperform the Top 40 Index. This infers that PUTs have a slightly higher tracking error than ETFs. These results add support to the research conducted by Gallagher and Segara (2005) which concluded that ETFs present lower tracking errors records relative to comparable index funds (i.e. passive unit trusts).

Table 6.1: Summary of Hypothesis Test Results

Top 40 Category	
Null Hypothesis	**Result**
H0: ETFs on average, that track the FTSE/JSE Top 40 Index, do not significantly outperform the index after expenses.	Fail to reject null hypothesis at all levels of significance.
H0: PUTs on average, that track the FTSE/JSE Top 40 Index, do not significantly outperform the index after expenses.	Fail to reject null hypothesis at 1% level of significance. Reject at the 5% and 10% level of significance.
H0: AUTs on average, that use the FTSE/JSE Top 40 Index as a benchmark, do not significantly outperform the index after expenses.	Fail to reject null hypothesis at all levels of significance.
H0: ETFs on average, that track the FTSE/JSE Top 40 Index, do not significantly outperform the average PUT counterpart after expenses.	Fail to reject null hypothesis at all levels of significance.
H0: ETFs on average, that track the FTSE/JSE Top 40 Index, do not significantly outperform the average AUT counterpart after expenses.	Fail to reject null hypothesis at all levels of significance.
SWIX Top 40 Category	
Null Hypothesis	**Result**
H0: ETFs on average, that track the FTSE/JSE SWIX Top 40 Index, do not significantly outperform the index after expenses.	Fail to reject null hypothesis at all levels of significance.
H0: AUTs on average, that use the FTSE/JSE SWIX Top 40 Index as a benchmark, do not significantly outperform the index after expenses.	Fail to reject null hypothesis at all levels of significance.
H0: ETFs on average, that track the FTSE/JSE SWIX Top 40 Index, do not significantly outperform the average AUT counterpart after expenses.	Fail to reject null hypothesis at all levels of significance.
Financial 15 Category	
Null Hypothesis	**Result**
H0: ETFs on average, that track the FTSE/JSE Financial 15 Index, do not significantly outperform the index after expenses.	Fail to reject null hypothesis at all levels of significance.
H0: Active unit trusts on average, that use the FTSE/JSE Financial 15 Index as a benchmark, do not significantly outperform the index after expenses.	Fail to reject null hypothesis at all levels of significance.
H0: ETFs on average, that track the FTSE/JSE Financial 15 Index, do not significantly outperform the average active unit trust counterpart after expenses.	Fail to reject null hypothesis at all levels of significance.
Industrial 25 Category	
Null Hypothesis	**Result**
H0: ETFs on average, that track the FTSE/JSE Industrial 25 Index, do not significantly outperform the index after expenses.	Fail to reject null hypothesis at all levels of significance.
H0: AUTs on average, that use the FTSE/JSE Industrial 25 Index as a benchmark, do not significantly outperform the index after expenses.	Fail to reject null hypothesis at all levels of significance.
H0: ETFs on average, that track the FTSE/JSE Industrial 25 Index, do not significantly outperform the average AUT counterpart after expenses.	Fail to reject null hypothesis at all levels of significance.
Resource 10 Category	
Null Hypothesis	**Result**
H0: ETFs on average, that track the FTSE/JSE Resource 10 Index, do not significantly outperform the index after expenses.	Fail to reject null hypothesis at all levels of significance.
H0: Active unit trusts on average, that use the FTSE/JSE Resource 10 Index as a benchmark, do not significantly outperform the index after expenses.	Fail to reject null hypothesis at all levels of significance.
SA Listed Property Category	
Null Hypothesis	**Result**
H0: ETFs on average, that track the FTSE/JSE SA Listed Property Index, do not significantly outperform the index after expenses.	Fail to reject null hypothesis at all levels of significance.
H0: AUTs on average, that use the FTSE/JSE SA Listed Property Index as a benchmark, do not significantly outperform the index after expenses	Fail to reject null hypothesis at all levels of significance.
H0: ETFs on average, that track the FTSE/JSE SA Listed Property Index, do not significantly outperform the average AUT counterpart after expenses.	Fail to reject null hypothesis at all levels of significance.
Dividend Plus Category	
Null Hypothesis	**Result**
H0: ETFs on average, that track the FTSE/JSE Dividend Plus Index, do not significantly outperform the index after expenses.	Fail to reject null hypothesis at all levels of significance.
RAFI 40 TR Category	
Null Hypothesis	**Result**
H0: ETFs on average, that track the FTSE/JSE RAFI 40 TR Index, do not significantly outperform the index after expenses.	Fail to reject null hypothesis at all levels of significance.
Equally Weighted Top 40 Category	
Null Hypothesis	**Result**
H0: ETFs on average, that track the FTSE/JSE Equally Weighted Top 40 Index, do not significantly outperform the index after expenses.	Fail to reject null hypothesis at all levels of significance.

From these results it can also be inferred that ETFs and PUTs do not produce any excess returns relative to the benchmark index returns. This, as noted by Rompotis (2008a) in his research, is an expected finding since both ETFs and PUTs are passively managed and merely try to replicate the return of the index being tracked. Furthermore, after deducting the TER from the returns of ETFs and PUTs the resultant net return will be less than the index return.

The results also indicate that the Satrix RAFI 40 ETF does not statistically significantly outperform or underperform that the FSTE/JSE RAFI 40 Total Return (TR) Index. Funds or indices that use the TR method for return calculations include the reinvestment of dividends in the returns. This result infers that ETF managers are efficient at re-investing dividends. Re-investment is done through the purchase of securities on the FTSE/JSE RAFI 40 Index in accordance with the calculation methodology of the TR version of the index, thereby increasing the NAV of each Satrix RAFI 40 security. If dividends were re-invested inefficiently then there would have been a deviation in the net returns of the Satrix RAFI 40 ETF and the FTSE/JSE RAFI 40 TR Index.

6.11.2. ETF performance versus passive unit trusts

The hypothesis tests show that ETFs, in the Top 40 category, do not statistically significantly outperform PUTs. Therefore, these results are comparable to work done by Rompotis (2008a) as well as Poterba and Shoven (2002) who concluded that ETFs and index funds (i.e. passive unit trusts) achieve similar performance records. These results contradict work done by Elton *et al*. (2002) who find that the SPDRs ETF underperforms both the S&P 500 Index and their index fund (i.e. passive unit trust) counterparts. These results also contradict work done by Gastineau (2004), who suggests that ETFs generally display inferior performance in comparison to index mutual funds (i.e. passive unit trusts).

The average TER of ETFs, used in this study for the Top 40 category, is lower than for PUTs. This result corresponds with the research conducted by Rongala (2009) who concluded that ETFs on average are a cheaper investment tool than index mutual funds (i.e. passive unit trusts). TER however, as noted by Kostovetsky (2003), does not take into account shareholder accounting and

this is the main reason for ETFs being able to offer lower expense ratios. Shareholder transaction costs for ETFs include commission to the brokerage house and fees to market makers in the form of bid-ask spreads. These costs result in higher management fees than the TER suggests, however inclusion of shareholder accounting costs was beyond the scope of this research project.

6.11.3. ETF performance versus active unit trusts

The hypothesis tests reveal that ETFs, in all six categories tested, do not statistically significantly outperform or underperform AUTs, after costs for the various periods under observation. No research could be found where ETF performance was compared to AUTs, after costs. It can be inferred from the results that actively managed funds on average do not provide a statistically significant difference in performance to ETFs, after costs.

The hypothesis tests reveal that AUTs, in all six categories tested, do not statistically significantly outperform or underperform their respective benchmark indices, after costs. It can be inferred from the results that actively managed funds on average do not provide a statistically significant difference in performance to the benchmark index, after costs. Work conducted by Wermers (2000), Gruber (1996) and Carhart (1997) concluded that the average active mutual fund underperforms market indices. Other researchers such as Bogle (1998) as well as Fortin and Michelson (1999) concluded that passively managed mutual funds (i.e. passive unit trusts) and benchmark indices exceed the returns of actively managed mutual funds in all categories, except small-cap growth funds. These results contradict work conducted by Fortin and Michelson (2005) as well as Prondzinski (2010), who, concluded that internationally actively managed mutual funds (i.e. funds outside the US) outperform their benchmark indices. Therefore previous literature has mixed results about the performance of active funds relative to passive indices, and that this study records that the average AUT performance is in-line with index performance after costs.

7. Conclusions and Recommendations

7.1. Summary

This study investigated the performance of ETFs relative to their respective tracking indices as well as comparable PUTs and AUTs. The literature reviewed provided a background on the performance of ETFs relative to their tracking indices and PUTs. The literature reviewed showed that most of the studies were based on ETFs and index mutual funds (i.e. passive unit trusts) in the US with more recent studies taking place in other parts of the world, such as Australia.

Literature on the performance of active and passive mutual funds provided a background on the performance these different types of investment strategies. Early work conducted by Wermers (2000), Gruber (1996) and Carhart (1997), indicates that actively managed mutual funds on average underperform passive index funds, after costs. Research by Bogle (1998), Larsen and Resnick (1998) as well as Fortin and Michelson (1999) indicates that in certain categories, such as small-cap growth funds, actively managed funds outperform passive index funds. Latest research on passive versus active investing, by Fortin and Michelson (2005) as well as Prondzinski (2010), suggests that actively managed mutual funds outside the US outperform passive mutual funds and benchmark indices. This leads back to Kjetsaa's (2004) study of active and passive fund performance, where he suggests that excellent portfolios can be constructed by owning shares in index funds as well as actively managed funds.

As far as ascertained, no research has been conducted on the performance of ETFs relative to AUTs. This study will hopefully be the start of building-up a sizeable record of the performance of ETFs relative to AUTs in South Africa and internationally.

7.2. ETF and passive unit trust performance versus the benchmark index

It can be concluded that ETFs, in all nine categories, do not statistically significantly outperform or underperform their respective benchmark indices, after costs. PUTs also do not statistically significantly outperform or

underperform their respective benchmark indices in the Top 40 category at a 1% significance level. However, at a 5% level of significance, PUTs do statistically significantly underperform the Top 40 Index. It can therefore be concluded that on average ETFs have a slightly lower tracking error than PUTs. This conclusion is in agreement with research conducted by Gallagher and Segara (2005).

The performance of ETFs and PUTs, in this study, relative to their respective benchmark indices is as expected, since these investment tools merely try to replicate the return of the tracking index. Furthermore, resultant net returns will be lower than the index return because of administrative costs.

7.3. ETF performance versus passive unit trusts

It can be concluded that ETFs, in the Top 40 category, do not statistically significantly outperform or underperform PUTs. This conclusion is in agreement with research conducted by Rompotis (2008a), as well as by Poterba and Shoven (2002).

Furthermore, it can be concluded that the average TER of ETFs, used in this study for the Top 40 category, is lower than for PUTs. This conclusion is in agreement with the research conducted by Rongala (2009).

7.4. ETF performance versus active unit trusts

It can be concluded that ETFs and indices, in all six categories tested, do not statistically significantly outperform or underperform AUTs, after costs for the various periods under observation. This proves that, for the periods under observation, active fund managers on average were unable to statistically significantly beat the index or ETFs by stock picking and timing.

7.5. Significance of findings

This study has proven that ETFs have a lower tracking error than PUTs. One of the reasons for this is that the average TER of ETFs is 48 b.p. lower than the average PUT. This means that an investor looking for a long-term passive investment strategy should invest in ETFs rather than PUTs for higher returns.

The significance of this finding for PUT providers is that for these funds to stay competitive they must look at ways of reducing the TER.

Caution should be exercised in concluding that the average AUT does not statistically significantly outperform its benchmark index or the average ETF. An investor does not invest in averages, but a particular fund and certain actively managed funds in this study have outperformed the benchmark index. Therefore a combined investment portfolio of ETFs and AUTs should be considered to yield a higher reward-to-variability ratio. However, the level of index investing to implement in a portfolio as well as which active managers to select, is beyond the scope of this study.

7.6. Recommendations for future research

- The performance of the Stanlib Top 40 ETF, which tracks the FSTE/JSE Top 40 TR Index, should be researched to further investigate the efficiency of fund managers in re-investing dividends. The Stanlib Top 40 EFT was formed in October 2010 and therefore was removed from the data set due to insufficient data.
- This study should be revisited in a few years, when more data becomes available, so that yearly, rather than monthly, returns can be used. The purpose of the study would be to investigate if yearly returns would provide a wider deviation between the net returns of funds and the index as yearly TERs, rather than monthly TERs, will be used.
- Survivorship bias has not been taken into account in this study due to the lack of time. Future research should include funds that have been terminated so that a more accurate performance of ETFs, PUTs and AUTs can be recorded.
- Dividends tax has been implemented in South Africa from the 1st of April 2012. Future research should be conducted on the effect this will have on the performance of ETFs, PUTs and AUTs.
- A study should be conducted, using historical data, to find the optimal balance of index and active investing. The study would record the optimal mix of active and passive investing using ETFs, PUTs and AUTs so that reward-to-variability can be optimised.

8. Reference List

Agapova, A. (2011). Conventional mutual index funds versus exchange traded funds. *Journal of Financial Markets, 14*(2), 323-343. doi:10.1016/j.finmar.2010.10.005

Albright, S. C., Winston, W. L., & Zappe, C. J. (2009). *Data analysis and decision making.* Mason, OH: Cengage Learning.

Auret, C., & Cline, R. (2011). Do the value, size and January effects exist on the JSE? *Investment Analysts Journal, 74*, 29-37.

Auret, C., & Sinclaire, R. (2006). Book-to-market ratio and returns on the JSE. *Investment Analysts Journal, 63*, 31-38.

Baiden, J. (2011). *Exchange traded funds - Advantages, disadvantages and laws.* Retrieved June 14, 2012, from SSRN: http://ssrn.com/abstract=1874409

Bailey, G., & Gilbert, E. (2007). The impact of liquidity on mean reversion of share returns on the JSE. *Investment Analysts Journal, 66*, 19-29.

Basiewicz, C., & Auret, C. (2009). Feasibility of the Fama and French three factor model explaining returns on the JSE. *Investment Analysts Journal, 71*, 13-25.

Bernstein, P. J. (2002). A primer on exchange-traded funds. *Journal of Accountancy, 193*(1), 38-41.

Bhattacharya, U., & Galpin, N. (2005). Is Stock Picking declining around the World? *AFA 2007 Chicago Meetings Paper.* Chicago. Retrieved April 21, 2012, from http://ssrn.com/abstract=849627

BlackRock. (2012). ETP Landscape Industrial Highlights. New York, NY, USA. Retrieved March 2, 2012, from http://www.blackrockinternational.com/content/groups/internationalsite/documents/literature/etfl_industryhilight_q112.pdf

Bodie, Z., Kane, A., & Marcus, A. J. (2011). *Investments and portfolio management* (9th ed.). New York, NY: McGraw-Hill/Irwin.

Bogle, J. C. (1998). The implications of style analysts for mutual fund performance. *Journal of Portfolio Management, 24*(4), 34-41. doi:10.3905/jpm.2001.319804

Bogle, J. C. (2007). *The Wall Street Journal*. Retrieved August 8, 2012, from WSJ: http://online.wsj.com

Brink, M. E. (2004). *The performance of South African unit trusts for the period 1984 to 2003.* Retrieved October 8, 2012, from Sun Scholar Reasearch Repository: http://hdl.handle.net/10019.1/16477

Brinson, G. P., Hood, L., & Beebower, G. L. (1986). Determinants of portfolio performance. *Financial Analysts Journal, 42*(4), 39-44.

Carhart, M. (1997). On persistence in mutual fund performance. *Journal of Finance, 52*(1), 57-82.

CFA Institute. (2010). *Ethical and professional standards and quantitative methods.* New York, NY: Pearson.

CFA Institute. (2012a). *Alternative investments, risk management and the application of derivatives.* New York, NY: Pearson.

CFA Institute. (2012b). *Behavioral finance, individual investors and institutional investors.* New York, NY: Pearson.

CFA Institute. (2012c). *Fixed income and equity portfolio management.* New York, NY: Pearson.

Chen, G., & Strother, T. S. (2008). *On the contribution of index exchange traded funds to price discovery in the presence of price limits without short selling*. Retrieved June 14, 2012, from SSRN: http://ssrn.com/abstract=1094485

Cremers, M., & Petajisto, A. (2009). How active is your fund manager? A new measure that predicts performance. *AFA 2007 Chicago Meetings Paper.* Retrieved March 21, 2012, from http://ssrn.com/abstract=891719

Cubbin, E., Eidne, M., Firer, C., & Gilbert, E. (2006). Mean reversion on the JSE. *Investment Analysts Journal, 63*, 39-48.

Dellva, W. (2001). Exchange-traded funds not for everyone. *Journal of Financial Planning, 14*(4), 110-124.

Elton, E. J., Gruber, M. J., Comer, G., & Li, K. (2002). Spiders: Where are the bugs? *Journal of Business, 75*(3), 453-472.

ETF SA. (2012a). *ETF Fact sheet*. Retrieved September 22, 2012, from ETF SA Home of exchange traded funds: http://www.etfsa.co.za/ETF_factsheet.htm

ETF SA. (2012b). *ETF Quick sheets*. Retrieved April 24, 2012, from ETF SA Home of exchange traded funds: http://www.etfsa.co.za/ETF_quicksheet.htm

Fama, E. F. (1970). Efficient Capital Markets: A Review of Theory and Empirical Work. *Journal of Finance, 25*(2), 383-417.

Fama, E. F., & French, K. R. (1992). The cross-section of expected stock returns. *Journal of Finance, 47*(2), 427-465.

Fama, E. F., & French, K. R. (1993). Common risk factors in the return of bonds and stocks. *Journal of Financial Economics, 33*, 3-56.

Fortin, R., & Michelson, S. (1999). Fund indexing vs. active management. *Journal of Financial Planning, 12*(2), 74-81.

Fortin, R., & Michelson, S. (2005). Active international mutual fund management: Can managers beat the index? *Managerial Finance, 15*(9), 82-94.

Gallagher, R. D., & Segara, R. (2005). The performance and trading characteristics of exchange-traded funds. *The University of New South Wales*. Retrieved September 25, 2012, from http://wwwdocs.fce.unsw.edu.au/banking/workpap/wp%2011%202004.pdf

Garland, R. (2006). The true costs of ETFs. *Financial Planning, 36*(2), 112.

Gastineau, G. L. (2001). Exchange-traded funds: An introduction. *Journal of Portfolio Management, 27*(3), 88-96. doi:10.3905/jpm.2001.319804

Gastineau, G. L. (2004). The benchmark index ETF performance problem. *Journal of Portfolio Managment, 30*(2), 96-103.

Gastineau, G. L. (2010). *The exchange traded funds manual* (2nd ed.). Hoboken, New Jersey: John Wiley & Sons.

Grinblatt, M., & Titman, S. (1993). Performance measurement without benchmarks: An examination of mutual fund returns. *Journal of Business, 66*(1), 47-68.

Grinblatt, M., Titman, S., & Wermers, R. (1995). Momentum investment strategies, portfolio performance and herding: A study of mutual fund behaviour. *American Economic Review, 85*(5), 1088-1105.

Grossman, S. J., & Stiglitz, J. E. (1980). On the impossibility of informationally efficient markets. *American Economic Review, 70*(3), 393-408.

Gruber, M. J. (1996). Another puzzle: The growth in actively managed mutual funds. *The Journal of Finance, 51*(3), 783-810.

Investment Company Institute. (2012). 2012 Investment Company fact book. Retrieved July 23, 2012, from http://www.icifactbook.org

Jensen, M. (1968). The performance of mutual funds in the period 1945-1964. *Journal of Finance, 23*(2), 389-416.

Kjetsaa, R. (2004). Actively managed equity mutual fund performance relative to benchmarks. *American Business Review, 22*(1), 102-112.

Kostovetsky, L. (2003). Index mutual funds and exchange-traded funds. *Journal of Portfolio Management*, 80-92.

Kruger, J., & Lantermans, S. (2010). *Risk, book to market and size effects in the South African stock market*. Retrieved August 8, 2012, from SSRN: http://ssrn.com/abstract=1934720

Larsen, J. A., & Resnick, B. G. (1998). Empirical insights on indexing. *Journal of Portfolio Managment, 25*(1), 51-60.

Malkiel, B. (1995). Returns from investing in equity mutual funds 1971-1995. *Journal of Finance, 50*(2), 549-572.

Markowitz, H. M. (1952). Portfolio selection. *Journal of finance, 7*(1), 77-91.

Meade, N., & Salkin, G. R. (1989). Index funds: Construction and performance measurements. *The Journal of the Operational Research Society, 40*(10), 871-879. doi:10.1057/jors.1989.155

Minor, D. (2003). Transcending the active/passive debate. *Journal of Investing, 12*(4), 74-82.

Muller, C., & Ward, M. (2011). Active share on the JSE. *Investment Analysts Journal*(74), 17-26.

Muller, C., & Ward, M. (2012). *Style-based effects on the Johannesburg Stock Exchange: A graphical time series approach*. Retrieved August 8, 2012, from SSRN: http://ssrn.com/abstract=2018203

Mutooni, R., & Muller, C. (2007). Equity style timing. *Investment Analysts Journal, 65*, 15-24.

Nedbank. (2012). *BGreen ETF*. Retrieved April 24, 2012, from Nedbank: http://www.nedbank.co.za/website/content/Capital-BgreenETF/

Piotroski, J. D. (2000). Value investing: The use of historical financial statement information to separate winners from losers. *Journal of Accounting Research, 38*, 1-41.

Poterba, J. M., & Shoven, J. B. (2002). Exchange-traded funds: A new investment option for taxable investors. *American Economic Review, 92*(2), 422-427.

Prondzinski, D. A. (2010). *Passive versus active managment of mutual funds: Evidence from the 1995-2008 period*. Retrieved September 23, 2012, from ProQuest: http://proquest.umi.com/pqdlink?did=2064846621&Fmt=7&clientId=79356&RQT=309&VName=PQD

Rompotis, G. G. (2006). *The performance of Swiss exchange traded funds.* Retrieved June 14, 2012, from SSRN: http://ssrn.com/abstract=929460

Rompotis, G. G. (2008a). An empirical comparing investigation of exchange traded funds and index funds performance. *European Journal of Economics, Finance and Administration*(13), 7-17. Retrieved October 25, 2012, from http://www.eurojournals.com/ejefas_13_01.pdf

Rompotis, G. G. (2008b). Interfamily competition on index tracking: The case of the vanguard ETFs and index funds. *Journal of Asset Management, 10*(4), 263-278. doi:10.1057/jam.2009.11

Rompotis, G. G. (2009). *Active versus passive management : New evidence from exchange traded funds*. Retrieved June 14, 2012, from SSRN: Available at SSRN: http://ssrn.com/abstract=1337708

Rongala, S. (2009). *Exchange-traded funds: Challenging the dominance of mutual funds?* New York: Deloitte Development LLC. Retrieved July 22, 2012, from http://www.deloitte.com/assets/Dcom-UnitedStates/Local%20Assets/Documents/us_fsi_IM_ExchangeTradedFunds_061009(1).pdf

Saunders, M., & Lewis, P. (2012). *Doing Research in Business and Management.* Essex, England: Pearson.

Sharpe, W. F. (1964). Capital asset prices: A theory of market equilibrium under conditions of risk. *Journal of Finance, 19*(3), 425-442.

Sharpe, W. F. (1966). Mutual Fund Performance. *Journal of Business, 39*(1), 119-138.

Sharpe, W. F. (1991). The arithmetic of active management. *Financial Analysts Journal, 47*(1), 7-9.

Strugnell, D., Gilbert, E., & Kruger, R. (2011). Beta, size and value effects on the JSE. *Investment Analysts Journal, 74*, 1-17.

Svetina, M. (2010). Exchange traded funds: Performance and competition. *Journal of Applied Finance, 20*(2), 130-145.

Swinkels, L., & Tjong-A-Tjoe, L. (2007). Can mutual funds time investment styles? *Journal of Asset Management, 8*(2), 123-132. doi:10.1057/palgrave.jam.2250066

Swinkels, L., & Tjong-A-Tjoe, L. (2008). Can exchange traded funds be used to exploit industry momentum? Retrieved June 14, 2012, from SSRN: http://ssrn.com/abstract=1150972

Tobin, J. (1958). Liquidity preference as behaviour towards risk. *Review of Economic Studies, 25*(2), 65-86.

Treynor, J. (1965). How to rate management of mutual funds. *Harvard Business, 43*(1), 63-75.

United States Securities and Exchange Commission. (2012). *Exchange traded funds*. Retrieved October 6, 2012, from http://www.sec.gov/answers/etf.htm

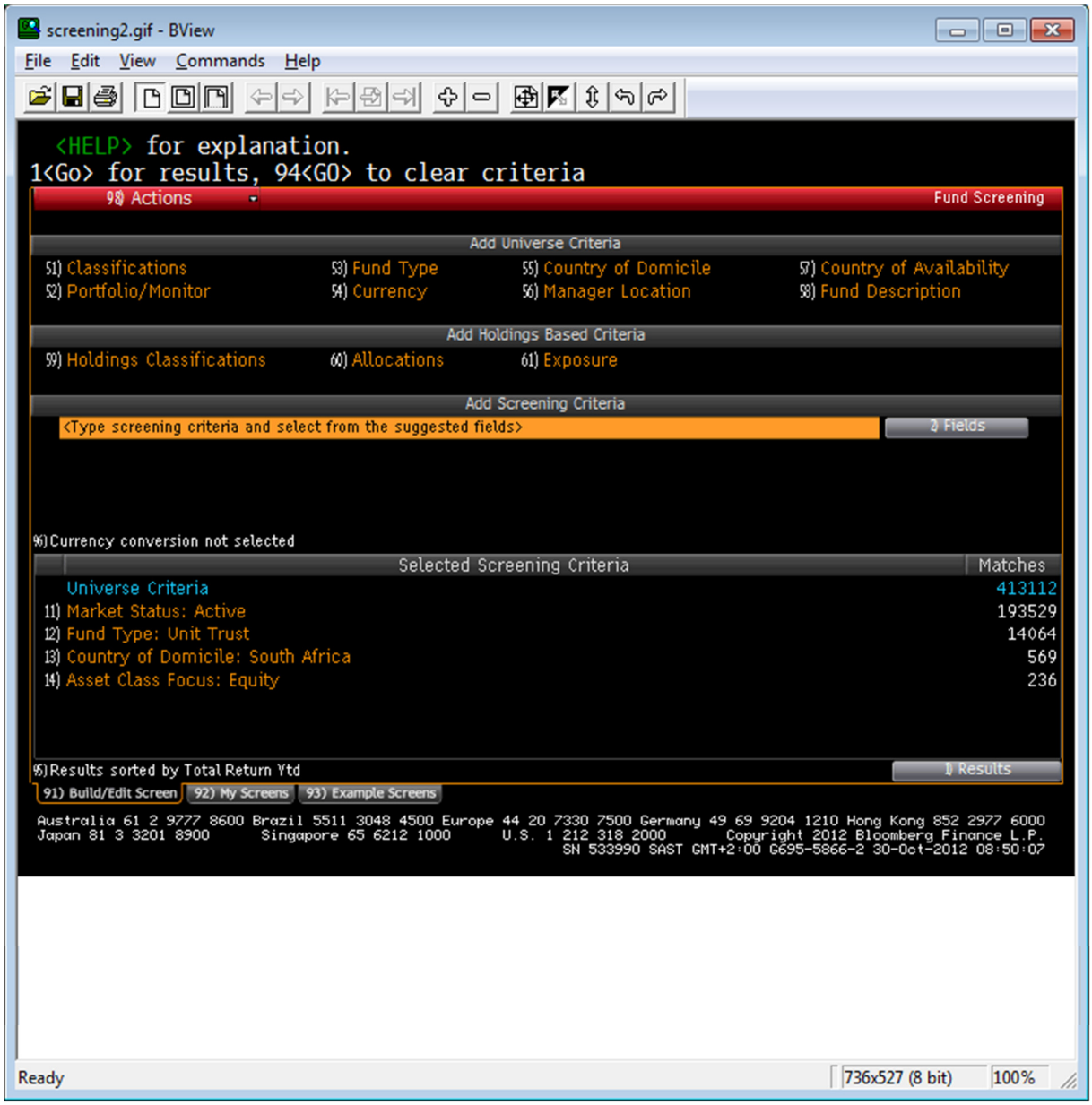
Van Rensburg, P. (2001). A decomposition of style-based risk on the JSE. *Investment Analysts Journal, 54*, 45-60.

Van Rensburg, P., & Robertson, M. (2003). Size, PE, beta and JSE returns. *Investment Analysts Journal, 58*, 1-11.

Wermers, R. (1997). Momentum investment strategies of mutual funds, performance persistence and survivorship bias. Retrieved June 14, 2012, from http://www.rhsmith.umd.edu/faculty/rwermers/

Wermers, R. (2000). Mutual fund performance: An empirical decomposition into stock picking talent, style, transaction costs and expenses. *Journal of Finance, 55*(4), 1666-1695.

Appendix A: Domestic equity unit trusts listed on Bloomberg



Appendix B: Raw monthly share closing price data for indices

TOP40 Index		FINI15 Index		INDI25 Index	
Date	PX_CLOSE_1D	Date	PX_CLOSE_1D	Date	PX_CLOSE_1D
	7806.19		3919.83		8431.3
2000/02/29	7601.22	2000/02/29	3960.83	2000/02/29	8411.02
2000/03/31	7127.3	2000/03/31	3764.02	2000/03/31	8595.55
2000/04/28	7226.15	2000/04/28	3858.85	2000/04/28	8438.68
2000/05/31	6761.45	2000/05/31	3772.38	2000/05/31	7824.13
2000/06/30	6769.46	2000/06/30	3615.96	2000/06/30	7562.48
2000/07/31	7144.04	2000/07/31	3636.71	2000/07/31	8086.81
2000/08/31	7220.13	2000/08/31	3682.4	2000/08/31	8180.54
2000/09/29	7966.83	2000/09/29	3995.78	2000/09/29	8709.78
2000/10/31	7783.22	2000/10/31	3798.49	2000/10/31	8570.03
2000/11/30	7757.53	2000/11/30	3615.02	2000/11/30	8182.76
2000/12/29	7410.55	2000/12/29	3650.02	2000/12/29	7420.3
2001/01/31	7862.61	2001/01/31	4169.86	2001/01/31	7691.21
2001/02/28	8626.84	2001/02/28	4357.93	2001/02/28	8213.86
2001/03/30	8633.88	2001/03/30	4077.02	2001/03/30	7566.28
2001/04/30	7790.36	2001/04/30	3758.41	2001/04/30	6493.22
2001/05/31	8610.82	2001/05/31	4003.8	2001/05/31	7098.26
2001/06/29	8984.63	2001/06/29	4167.29	2001/06/29	7269.77
2001/07/31	8746.98	2001/07/31	4327.81	2001/07/31	7240.24
2001/08/31	8076.82	2001/08/31	4178.03	2001/08/31	6563.49
2001/09/28	8492.13	2001/09/28	4130.74	2001/09/28	6708.75
2001/10/31	7571.97	2001/10/31	3671.66	2001/10/31	5808.5
2001/11/30	8078.83	2001/11/30	3650.11	2001/11/30	6193.11
2001/12/31	9010.86	2001/12/31	3609.44	2001/12/31	6725.92
2002/01/31	10110.17	2002/01/31	3669.12	2002/01/31	7001.38
2002/02/28	10025.45	2002/02/28	3437.42	2002/02/28	6912.01
2002/03/29	10632.71	2002/03/29	3446.38	2002/03/29	7071.05
2002/04/30	10766.34	2002/04/30	3414.52	2002/04/30	7295.4
2002/05/31	10660.26	2002/05/31	3854.95	2002/05/31	7308.67
2002/06/28	10798.01	2002/06/28	3774.21	2002/06/28	7535.9
2002/07/31	10233.44	2002/07/31	3609.87	2002/07/31	7178.15
2002/08/30	8768.15	2002/08/30	3300.52	2002/08/30	6281.73
2002/09/30	9225.96	2002/09/30	3342.23	2002/09/30	6415.96
2002/10/31	8991.75	2002/10/31	3182.94	2002/10/31	5825.34
2002/11/29	8850.29	2002/11/29	3271.42	2002/11/29	5977.62
2002/12/31	8991.88	2002/12/31	3532.43	2002/12/31	6254.5
2003/01/31	8682.03	2003/01/31	3245.36	2003/01/31	5910.45
2003/02/28	8183.21	2003/02/28	3143.08	2003/02/28	5540.53
2003/03/31	7796.61	2003/03/31	2998.68	2003/03/31	5169.89
2003/04/30	7095.78	2003/04/30	2744.05	2003/04/30	4619.48
2003/05/30	6924.49	2003/05/30	2897.42	2003/05/30	4733.15
2003/06/30	7940.13	2003/06/30	3157.26	2003/06/30	5244.31
2003/07/31	7680.74	2003/07/31	3190.77	2003/07/31	5204.6
2003/08/29	8088.21	2003/08/29	3287.19	2003/08/29	5519.56
2003/09/30	8470.33	2003/09/30	3167.32	2003/09/30	5719.77
2003/10/31	8167	2003/10/31	3063.75	2003/10/31	5696.26
2003/11/28	8966.62	2003/11/28	3322.34	2003/11/28	6210.57

Appendix C: Sample spread sheet

TOP 40 CATEGORY - COMPARING RETURNS, RETURNS AFTER COST (RAC) AND R1000 INVESTED FOR THE INDEX, ETF, PASSIVE UT AND ACTIVE UT																												
	INDEX			ETFS									PASSIVE UNIT TRUSTS								ACTIVE UNIT TRUSTS							
TER (Annually)					0.46%			0.21%						0.69%			1.14%					2.92%			1.66%			
TER (Monthly)					0.04%			0.02%						0.06%			0.09%					0.24%			0.14%			
Code	TOP40 Index			STX40 SJ Equity			RMBT40 SJ Equity						CORALSI SJ Equity			SIMINDE SJ Equity					CORTOPB SJ Equity			CORTP20 SJ Equity				
Date	Share Price	Index Return	R1k Invested	Share Price	Return	Net Return	Share Price	Return	Net Return	ETF Avg.	R1k Invested	Share Price	Return	Net Return	Share Price	Return	Net Return	Passive UT Avg.	R1k invested	Share Price	Return	Net Return	Share Price	Return	Net Return	Active UT Avg.	R1k Invested
2010/03/31	23995	-0.19%	3237.90	2391	-0.38%	-0.41%	2401	0.167%	0.15%	**-0.13%**	**3095.98**	3237	-0.23%	-0.28%	6489	-0.28%	-0.37%	**-0.28%**	**2743.37**	6200	1.38%	1.14%	6279	0.82%	0.69%	**1.08%**	**5182.15**
2010/04/30	25833	7.66%	3486.04	2589	8.28%	8.24%	2581	7.497%	7.48%	**7.86%**	**3339.36**	3496	7.99%	7.93%	7007	7.97%	7.88%	**7.82%**	**2957.80**	6603	6.50%	6.26%	6696	6.65%	6.51%	**6.44%**	**5516.14**
2010/05/31	25630	-0.79%	3458.57	2575	-0.54%	-0.58%	2567	-0.542%	-0.56%	**-0.57%**	**3320.34**	3463	-0.92%	-0.98%	6970	-0.52%	-0.62%	**-0.70%**	**2937.10**	6566	-0.56%	-0.80%	6650	-0.69%	-0.82%	**-0.84%**	**5469.70**
2010/06/30	24158	-5.74%	3259.95	2420	-6.02%	-6.06%	2420	-5.727%	-5.74%	**-5.90%**	**3124.41**	3265	-5.71%	-5.77%	6567	-5.78%	-5.87%	**-5.73%**	**2768.82**	6296	-4.12%	-4.36%	6385	-3.99%	-4.13%	**-4.19%**	**5240.70**
2010/07/30	23295	-3.57%	3143.47	2344	-3.14%	-3.18%	2330	-3.719%	-3.74%	**-3.46%**	**3016.38**	3150	-3.54%	-3.60%	6330	-3.62%	-3.71%	**-3.64%**	**2668.04**	6033	-4.16%	-4.40%	6127	-4.04%	-4.18%	**-4.24%**	**5018.67**
2010/08/31	25225	8.28%	3403.88	2528	7.85%	7.81%	2523	8.283%	8.27%	**8.04%**	**3258.86**	3407	8.16%	8.11%	6820	7.75%	7.66%	**7.56%**	**2869.81**	6592	9.26%	9.02%	6703	9.41%	9.27%	**9.20%**	**5480.57**
2010/09/30	24127	-4.35%	3255.77	2400	-5.06%	-5.10%	2420	-4.082%	-4.10%	**-4.60%**	**3108.93**	3268	-4.06%	-4.12%	6539	-4.13%	-4.22%	**-4.27%**	**2747.37**	6353	-3.62%	-3.86%	6470	-3.49%	-3.63%	**-3.69%**	**5278.34**
2010/10/29	26154	8.40%	3529.33	2618	9.08%	9.05%	2615	8.058%	8.04%	**8.54%**	**3374.52**	3563	9.03%	8.97%	7124	8.95%	8.86%	**9.22%**	**3000.57**	6873	8.17%	7.93%	7007	8.31%	8.17%	**8.11%**	**5706.38**
2010/11/30	27054	3.44%	3650.70	2700	3.13%	3.09%	2711	3.671%	3.65%	**3.37%**	**3488.37**	3657	2.62%	2.56%	7380	3.59%	3.50%	**2.77%**	**3083.65**	7084	3.08%	2.84%	7179	2.45%	2.31%	**2.46%**	**5846.51**
2010/12/31	26845	-0.77%	3622.47	2694	-0.22%	-0.26%	2690	-0.775%	-0.79%	**-0.53%**	**3470.01**	3629	-0.75%	-0.81%	7321	-0.79%	-0.89%	**-0.43%**	**3070.33**	6920	-2.32%	-2.56%	7022	-2.19%	-2.33%	**-2.39%**	**5706.88**
2011/01/31	28639	6.69%	3864.68	2855	5.98%	5.94%	2862	6.394%	6.38%	**6.16%**	**3683.67**	3870	6.64%	6.58%	7806	6.62%	6.52%	**6.35%**	**3265.40**	7406	7.03%	6.79%	7525	7.17%	7.03%	**6.97%**	**6104.48**
2011/02/28	28145	-1.73%	3798.01	2808	-1.65%	-1.68%	2813	-1.712%	-1.73%	**-1.71%**	**3620.78**	3785	-2.20%	-2.26%	7616	-2.44%	-2.53%	**-2.24%**	**3192.12**	7184	-3.00%	-3.24%	7309	-2.88%	-3.01%	**-3.08%**	**5916.77**
2011/03/31	29078	3.31%	3923.84	2890	2.92%	2.88%	2905	3.271%	3.25%	**3.07%**	**3731.85**	3907	3.22%	3.17%	7857	3.17%	3.07%	**3.07%**	**3289.99**	7453	3.76%	3.52%	7592	3.88%	3.74%	**3.68%**	**6134.58**
2011/04/29	29037	-0.14%	3918.40	2908	0.62%	0.58%	2906	0.034%	0.02%	**0.30%**	**3743.08**	3927	0.53%	0.47%	7896	0.50%	0.41%	**0.49%**	**3305.97**	7540	1.17%	0.93%	7691	1.30%	1.16%	**1.10%**	**6202.12**
2011/05/31	29564	1.81%	3989.49	2964	1.93%	1.89%	2968	2.134%	2.12%	**2.00%**	**3818.00**	4008	2.06%	2.00%	8057	2.03%	1.94%	**1.62%**	**3359.65**	7683	1.89%	1.65%	7756	0.85%	0.71%	**0.99%**	**6263.70**
2011/06/30	29274	-0.98%	3950.32	2947	-0.57%	-0.61%	2940	-0.943%	-0.96%	**-0.79%**	**3787.98**	3967	-1.03%	-1.08%	7971	-1.07%	-1.16%	**-0.94%**	**3328.15**	7680	-0.03%	-0.28%	7762	0.08%	-0.06%	**-0.12%**	**6256.47**
2011/07/29	28552	-2.47%	3852.86	2850	-3.29%	-3.33%	2853	-2.959%	-2.98%	**-3.15%**	**3668.54**	3870	-2.45%	-2.51%	7774	-2.47%	-2.56%	**-2.56%**	**3243.08**	7532	-1.93%	-2.17%	7620	-1.83%	-1.97%	**-2.02%**	**6130.22**
2011/08/31	27858	-2.43%	3759.22	2790	-2.11%	-2.14%	2786	-2.348%	-2.37%	**-2.25%**	**3585.82**	3743	-3.28%	-3.34%	7534	-3.09%	-3.18%	**-3.10%**	**3142.52**	7404	-1.70%	-1.94%	7498	-1.60%	-1.74%	**-1.79%**	**6020.35**
2011/09/30	27682	-0.63%	3735.52	2778	-0.43%	-0.47%	2777	-0.323%	-0.34%	**-0.40%**	**3571.32**	3496	-6.60%	-6.66%	7503	-0.41%	-0.50%	**-1.99%**	**3079.91**	7368	-0.48%	-0.72%	7471	-0.37%	-0.51%	**-0.56%**	**5986.57**
2011/10/31	26376	-4.72%	3559.23	2640	-4.97%	-5.01%	2634	-5.149%	-5.17%	**-5.09%**	**3389.67**	3582	2.47%	2.41%	7195	-4.10%	-4.20%	**-2.61%**	**2999.58**	7150	-2.96%	-3.20%	7257	-2.86%	-3.00%	**-3.05%**	**5803.95**
2011/11/30	29019	10.02%	3915.91	2912	10.30%	10.26%	2909	10.440%	10.42%	**10.34%**	**3740.29**	3950	10.28%	10.22%	7931	10.22%	10.13%	**9.93%**	**3297.57**	7700	7.69%	7.45%	7770	7.07%	6.93%	**7.07%**	**6214.20**
2011/12/30	29430	1.42%	3971.35	2903	-0.31%	-0.35%	2953	1.513%	1.50%	**0.57%**	**3761.76**	4008	1.48%	1.42%	8046	1.45%	1.36%	**0.64%**	**3318.63**	7754	0.70%	0.46%	7833	0.81%	0.67%	**0.62%**	**6252.59**
2012/01/31	28470	-3.26%	3841.79	2851	-1.79%	-1.83%	2847	-3.590%	-3.61%	**-2.72%**	**3659.50**	3875	-3.32%	-3.38%	7778	-3.33%	-3.42%	**-2.75%**	**3227.41**	7611	-1.85%	-2.09%	7696	-1.75%	-1.89%	**-1.94%**	**6131.37**
2012/02/29	30176	5.99%	4072.06	3001	5.26%	5.22%	3018	6.006%	5.99%	**5.61%**	**3864.65**	4054	4.60%	4.55%	8161	4.92%	4.83%	**5.12%**	**3392.56**	8002	5.14%	4.90%	8100	5.25%	5.12%	**5.06%**	**6441.68**
2012/03/30	30547	1.23%	4122.05	3050	1.63%	1.59%	3061	1.425%	1.41%	**1.50%**	**3922.66**	4109	1.36%	1.31%	8272	1.36%	1.27%	**1.28%**	**3435.98**	8190	2.35%	2.11%	8299	2.45%	2.31%	**2.26%**	**6587.26**
2012/04/30	29603	-3.09%	3994.77	2971	-2.59%	-2.63%	2967	-3.071%	-3.09%	**-2.86%**	**3810.53**	4013	-2.33%	-2.38%	8076	-2.38%	-2.47%	**-2.32%**	**3356.20**	8130	-0.73%	-0.97%	8246	-0.63%	-0.77%	**-0.82%**	**6533.11**
2012/05/31	30365	2.57%	4097.48	3051	2.69%	2.65%	3053	2.899%	2.88%	**2.77%**	**3916.00**	4127	2.84%	2.78%	8303	2.81%	2.72%	**2.18%**	**3429.50**	8278	1.82%	1.58%	8355	1.32%	1.18%	**1.28%**	**6616.91**
2012/06/29	29202	-3.83%	3940.58	2945	-3.47%	-3.51%	2937	-3.800%	-3.82%	**-3.66%**	**3772.48**	3968	-3.85%	-3.91%	7980	-3.89%	-3.98%	**-3.82%**	**3298.47**	7880	-4.80%	-5.04%	7962	-4.70%	-4.84%	**-4.89%**	**6293.26**
2012/07/31	29638	1.49%	3999.43	2955	0.34%	0.30%	2965	0.953%	0.94%	**0.62%**	**3795.82**	4027	1.49%	1.43%	8097	1.47%	1.37%	**1.23%**	**3338.97**	8058	2.26%	2.02%	8150	2.36%	2.22%	**2.17%**	**6429.78**
2012/08/31	30387	2.53%	4100.45	3043	2.96%	2.92%	3040	2.530%	2.51%	**2.72%**	**3898.97**	4061	0.85%	0.79%	8216	1.47%	1.38%	**1.70%**	**3395.77**	8206	1.84%	1.60%	8309	1.95%	1.82%	**1.76%**	**6542.94**
2012/09/28	31173	2.59%	4206.54	3127	2.78%	2.74%	3133	3.059%	3.04%	**2.89%**	**4011.67**	4187	3.09%	3.03%	8463	3.00%	2.90%	**2.71%**	**3487.78**	8480	3.34%	3.10%	8595	3.45%	3.31%	**3.25%**	**6755.84**
Descriptive Statistics																												
Mean Return		1.18%			1.19%	1.15%		1.22%	1.20%	**1.16%**			1.12%	1.06%		0.83%	0.73%	**1.04%**			1.24%	1.00%		1.63%	1.49%	**1.49%**	
StdDev		5.68%			5.79%	5.79%		5.17%	5.17%	**5.80%**			5.61%	5.61%		5.21%	5.21%	**5.50%**			6.77%	6.77%		5.15%	5.15%	**5.09%**	
Median		1.26%			1.15%	1.12%		0.58%	0.56%	**1.12%**			1.36%	1.31%		0.50%	0.41%	**1.15%**			1.17%	0.93%		1.32%	1.18%	**1.28%**	
Min		-14.91%			-16.25%	-16.29%		-12.06%	-12.08%	**-16.29%**			-14.19%	-14.25%		-11.91%	-12.01%	**-15.48%**			-21.67%	-21.91%		-13.34%	-13.48%	**-13.48%**	
Max		14.67%			16.16%	16.12%		13.41%	13.40%	**16.12%**			14.43%	14.37%		12.23%	12.14%	**14.41%**			30.74%	30.50%		15.77%	15.64%	**15.64%**	
Range		29.57%			32.41%	32.41%		25.48%	25.48%	**32.41%**			28.63%	28.63%		24.14%	24.14%	**29.88%**			52.40%	52.40%		29.12%	29.12%	**29.12%**	
No. of observations		141			141	141		46	46	**141**			141	141		47	47	**141**			73	73		141	141	**141**	