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Copy cat unit trust investment strategies in high cost structure environments.

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ABSTRACT

Copy cat investment strategies exist in the US, where copy cat funds profitably replicate the investing behaviour of larger more renowned funds, leveraging off research completed by the initial fund, without incurring the same level of expenses.

Funds, or unit trusts as they are known in South Africa, are mandated to disclose portfolio holdings quarterly, with the intention of enabling investors to track whether funds are meeting their stated objectives, through more frequent access to portfolio holdings. More frequent disclosure has led to significant controversy internationally, with some researchers providing evidence that more frequent disclosure has led to copy cat investing strategies.

In contrast to the research completed in the US, copy cat funds in South Africa are able to generate similar returns, before costs, but once costs are included t-tests provided evidence that the copy cat fund was not able to generate significantly higher returns than the actual fund, particularly in the long run.

These tests hold true when considering the whole general equity market, but interestingly do not hold statistically valid for every fund when considering them in isolation. Certain funds within the general equity classification offer potential for copy cat investing and have successfully proven outperformance in the last decade. Copy cat investors would need to seek out these funds based on the predicted outperformance of each fund, by considering the historical behaviour and then lastly by considering their own, already questionable, risk appetite.

KEYWORDS

Copy cat Investing

Mutual Fund Disclosure

Unit Trust Investing

DECLARATION

I declare that this research project is my own work. It is submitted in partial fulfilment 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 other 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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9 November 2011

Name

Signature

Date

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1. INTRODUCTION TO RESEARCH PROBLEM

1.1. OVERVIEW

Fund managers are hired to trade in accordance with the fund's investment objective, in such a way that the returns generated are in excess of the market, for the investor. This requires in depth knowledge of the industry, investment targets, regulations as well as research in order to derive the best result (ICI, 2010). Predatory trading practices influence the market and may have further dire consequences for the future ability of these funds to differentiate (Verbeek and Wang, 2010)

Legislation and regulation does however directly impact on the fund and the fund manager's ability to have flexibility, autonomy and freedom of choice regarding their trading strategies (Verbeek and Wang, 2010). As confirmed by the Financial Services Board (FSB), in the last few years many regulatory bodies have shifted to more frequent disclosure intervals.

Although frequent portfolio disclosure increases transparency and allows investors the ability to validate funds against investment objectives, the frequent disclosure is said to also encourage predatory trading practices in the market, also referred to as copy cat investing (Verbeek and Wang, 2010).

Wermers (2001), Frank, Poterba, Shackelford and Shoven (2004) and Coval, Joshua and Stafford (2007) highlight some of the negative aspects associated with quarterly disclosure, including the likely increase in new costs for mutual funds and the ability for external funds to benefit from the fund research performed by these funds without undertaking it themselves or incurring the actual cost of owning the fund shares.

Verbeek and Wang (2010) found a substantial cross sectional dispersion in the relative performance of copy cat funds and stated that free riding on the portfolios disclosed by past winning funds and

the funds that disclose representative holdings generate significantly better performance net of trading costs and expenses (Verbeek and Wang, 2010).

So why do this research?

The FSB require quarterly disclosure for funds within South Africa, in an industry that is believed to have high cost structures. Verbeek and Wang (2010) provide evidence to support their theory that free riding on disclosed portfolios by past winning funds generates significantly better performance net of trading costs and expenses. Myers, Poterba, Shackelford and Shoven (2001) suggest that this is due to the fact that copy cat funds do not incur research and management expenses associated with the funds they are attempting to mimic. This inference can be further extended to suggest that the higher the cost structure, the higher the savings for the copy cat fund, thus the higher return. Annual management fees, including VAT, equate to as much as 3.42% in South Africa, which gives firms quite a substantial margin to work with (Profile Media, 2011).

It is suggested that South African unit trust funds have high cost structures and with quarterly disclosures is the perfect environment for copy cat investing. This research will quantify actual cost structures within South Africa, and calculate actual returns assuming the copy cat investment fund replicates published holdings a period thereafter. Data will then be used to perform a portfolio replication study to simulate copy cat investment portfolios, using actual holdings, actual timings and actual fee structures by simulating behaviour with a one month delay.

Are Verbeek and Wang (2010) right to suggest that free riding on disclosed fund holdings is an attractive strategy?

1.2. FUND MANAGEMENT

Investment management is the management of securities and assets by a professional with the aim of meeting defined investment goals of the investor (ICI, 2010). This would include shares, bonds and other securities. Investors range from insurance companies, pension funds and corporations to private investors through direct investment contracts, but more often through collective investment schemes such as mutual funds or exchange-traded funds (ICI, 2010). Investment management services include financial statement analysis, asset selection, stock selection and ongoing monitoring of investments (ICI, 2010).

The term “asset management” is often used to refer to the investment management of collective investments (ICI, 2010). “Fund management” is usually the term used when referring to institutional investment as well as investment management for private investors. Wealth management or portfolio management is often used to describe investment managers who specialise in advisory and discretionary management on behalf of wealthy private investors (ICI, 2010). These managers are also referred to as private bankers.

Fund managers, also known as investment advisers in the United States, include both the firm that provides investment management services and the individual who directs fund management decisions (ICI, 2010).

1.3. MUTUAL FUNDS AND UNIT TRUSTS

A mutual fund is a professionally managed type of collective investment scheme that pools money from many investors to buy securities (SEC, 2011). In the United States there are nearly 8,000 mutual funds available to investors, and no two are identical. Mutual funds vary in terms of size, investment objective, and the services they provide to shareholders, and, consequently, in the fees and expenses that they charge (ICI, 2010).

As fund managers transact for, and on behalf of, various funds it is their responsibility to transact or enter into contractual agreements or arrangements for and on behalf of underlying funds. They are responsible for managing the underlying fund assets to ensure that their obligations and investment objectives are met, by simultaneously complying with fund mandates, legislation and regulation (SEC, 2011).

In South Africa mutual funds are usually referred to as unit trusts. A unit trust is considered a medium to long term investment allowing investors to access markets that are otherwise difficult to access. An investors money is pooled with that of other investors to create a spread of fund investment into bond, equity and money markets (Fundamental Investments, 2011).

Most unit trusts are open ended trusts where there is no limit to investors participating in the fund, and the number of units fluctuate only upon the supply and demand requirements of investors (Fundamental Investments, 2011). The unit trust investor purchases units representing the overall share in the fund. The price of these units change over time as they are valued by the underlying investments in the market (Fundamental Investments, 2011).

Unit trusts are classified into different fund types. These include:

- Domestic Funds: These are unit trusts that invest at least 70% of their assets in South African investment markets at all times.
- Worldwide Funds: These are unit trusts that invest in both South African and foreign markets. A minimum of 30% of the assets should be held in South African markets, and a minimum of 30% of the assets should be held offshore, at all times. The 15% minimum requirement applies to all the sub-categories with the exception of the Worldwide - Asset Allocation Funds category.

- Foreign Funds: These are unit trusts that invest at least 85% of their assets outside South Africa at all times.
- Regional Funds: These are unit trusts that invest at least 85% of their assets in a single country or region, excluding South Africa, at all times.

Each of these categories is sub-categorised into the second tier of classification, namely:

- i) Equity funds,
- ii) Asset Allocation funds, and
- iii) Fixed Interest funds.

For the purposes of this report we will be considering Domestic Equity Funds.

Domestic portfolios are collective investment portfolios that invest at least 70% of their assets in South African investment markets at all times (ASISA, 2011). Equity portfolios are collective investment portfolios that invest predominantly in shares listed on the Johannesburg Stock Exchange (JSE). These funds invest a minimum of 75% of the market value of the portfolios in equities at all times and generally seek maximum capital appreciation as their primary goal. All equity and derivative investments must conform 100% to the defined investment requirement of each category (ASISA, 2011). Equity Funds include:

- Equity - General portfolios - These portfolios invest in selected shares across all economic groups and industry sectors of the JSE Securities Exchange South Africa as well as across the range of large, mid and smaller cap shares. These portfolios do not subscribe to a particular theme or investment style. The portfolios in this category offer medium to long-term capital growth as their primary investment objective (ASISA, 2011).

- Equity – Growth portfolios - These portfolios seek maximum capital appreciation as their primary objective through investment in growth companies. Growth companies can be defined as those whose earnings are on or are anticipated to enter a strong and sustainable upward trend and typically trade on high price to earnings ratios (PE ratios). These portfolios are invested in growth companies across all Economic Groups of the JSE Securities Exchange South Africa (ASISA, 2011).
- Equity - Value portfolios - These are portfolios that seek medium to long-term capital appreciation as their primary investment objective. The funds seek out "value" situations by typically investing in shares with low relative PE ratios as well as shares that are trading at a discount to their net asset value. These portfolios frequently offer a higher than FTSE/JSE All Share Index average level of income. These portfolios are invested in selected "value" shares across all Economic Groups of the JSE Securities Exchange South Africa (ASISA, 2011).
- Equity - Large cap portfolios - These portfolios seek long-term growth as their primary objective through investment in large market capitalisation shares which fall within the top 40 JSE Securities Exchange South Africa listed shares ranked by market capitalisation., i.e. included in the FTSE/JSE Top 40 Index (ASISA, 2011).
- Equity - Smaller companies portfolios - These portfolios invest in established smaller companies as well as in emerging companies that are in the initial phase of their life. New investment by the funds are restricted to fledgling, small and mid-cap shares only and at least 75% of the fund will be invested in fledgling, small and mid-cap shares at all times. Due to both the nature and focus of these portfolios, they may be more volatile than funds that are diversified across the broader market (ASISA, 2011).
- Equity - Resources and basic industries portfolios - These portfolios invest in companies whose principal business operations involve the exploration, mining, distribution and

processing of metals, minerals, energy, chemicals, forestry and other agricultural and natural resources or where at least 50% of their earnings are derived from such business activities and excludes service providers to these companies. These portfolios invest primarily in securities listed in the FTSE/JSE Resources and Basic Industries economic groups and may be more volatile than funds that are diversified across a wider range of FTSE/JSE economic groups (ASISA, 2011).

- Equity - Financial portfolios - These portfolios invest in selected financial services companies including banks, insurance companies, brokerage firms and other companies whose principal business operations involve the provision of various financial service or where at least 50% of their earnings are derived from the provision of such financial services. The portfolios invest primarily in companies listed in the FTSE/JSE Financials Economic Group. These portfolios may be more volatile than portfolios that are diversified across a wider range of FTSE/JSE economic groups (ASISA, 2011).
- Equity – Industrial portfolios – These portfolios invest in selected industrial companies listed on the JSE Securities Exchange South Africa but excludes all companies listed in the FTSE/JSE Resources and Financial Economic Groups (ASISA, 2011).
- Equity - Varied specialist portfolios - These portfolios invest in a single Economic Group or Industrial Sector or in companies that share a common theme or activity as defined in their respective mandates. However due to the unique nature of their mandates they cannot be categorised into any of the afore-listed categories. The performance of these portfolios cannot be compared to others in this category. Due to both the nature and focus of these portfolios , they may be more volatile than funds that are diversified across the broader market (ASISA, 2011).

1.4. LEGISLATION AND REGULATION

The US Securities and Exchange Commission, also referred to as the SEC, is a US federal agency that is responsible for enforcing the federal securities laws and regulating the securities industry, the nation's stock and options exchanges, and other electronic securities markets in the United States (SEC, 2011). In addition to the 1934 Act that created it, the SEC enforces the Securities Act of 1933, the Trust Indenture Act of 1939, the Investment Company Act of 1940, the Investment Advisers Act of 1940, the Sarbanes-Oxley Act of 2002 and other statutes. The SEC was created by section 4 of the Securities Exchange Act of 1934 (SEC, 2011).

In the United States, a mutual fund is registered with the SEC and is overseen by a board of directors or trustees. The board is charged with ensuring that the fund is managed in the best interests of the fund's investors and with hiring the fund manager and other service providers to the fund. Under Internal Revenue Service (IRS) rules, a US mutual fund must distribute effectively all of its net income and net realized gains from the sale of securities at least annually (SEC, 2011).

Since passing the Investment Company Act of 1940, three types of investment companies exist in the US, namely mutual funds, unit investment trusts and closed-end funds. Recently, exchange-traded funds have gained in popularity (ICI, 2010). Hedge funds are not considered a type of mutual fund, but rather another type of combined investment scheme that is not governed by the Investment Company Act of 1940 and that is not required to register with the Securities and Exchange Commission (ICI, 2010).

In the rest of the world, mutual fund is used as a generic term for various types of collective investment vehicles, such as unit trusts, open-ended investment companies, unitized insurance funds and UCITS (Undertakings for Collective Investment in Transferable Securities, pronounced "YOU-sits") (ICI, 2010).

Within South Africa, ASISA represents the majority of South Africa's asset managers, collective investment scheme management companies, linked investment service providers, multi-managers, and life insurance companies (ASISA, 2011).

United by one representative body for the first time, the members of ASISA have mandated this new association to pro-actively engage with the policymaker and regulator, as well as intermediaries and consumers on regulatory and other important issues of common concern. (ASISA, 2011) All unit trust funds are mandated to disclose their portfolio holdings quarterly allowing for enhanced transparency to investors (ASISA, 2011).

The Financial Services Board is a unique independent institution established by statute to oversee the South African Non-Banking Financial Services Industry in the public interest, including insurance companies, securities firms, participation bond schemes, portfolio management, pension funds, and mutual funds. The Insurance Division of the FSB supervises and regulates the insurance industry in South Africa (Estandardsforum, 2009). The FSB is committed to promote and maintain a sound financial investment environment in South Africa (FSB, 2011).

The list of acts administered by the Financial Services Board (FSB), thus impacting South African funds include:

- Collective Investment Schemes Control Act (Act 45 of 2002)
- Financial Services Board Act (Act 97 of 1990)
- Financial Advisory and Intermediaries Services Act 37 of 2002 (FAIS Act)
- Financial Institutions (Protection of Funds) Act (Act 28 of 2001)
- Financial Supervision of the Road Accident Fund Act (Act 8 of 1993)
- Friendly Societies Act (Act 25 of 1956)

- Inspection of Financial Institutions Act (Act 80 of 1998)
- Long-term Insurance Act (Act 52 of 1998)
- Pension Funds Act, 24 (Act 24 of 1956)
- Short-term Insurance Act (Act 53 of 1998)
- Supervision of the Financial Institutions Rationalisation Act (Act 32 of 1996)
- The Securities Services Act (Act 36 of 2004)

According to the IMF's 2008 Financial System Stability Assessment, the Minister of Finance has discretion to promulgate FSB regulations, as well as terminate the duties of senior FSB staff and members of the FSB Board (Estandardsforum, 2009). The IMF goes on to note that the financial system in South Africa is dominated by a few large conglomerates with interlocking ownership and operations covering a broad range of activities, including insurance, banking, brokerage, and asset management. In particular, four of the five largest insurance groups have ownership links to major banks (Estandardsforum, 2009).

1.5. COST STRUCTURES

Mutual fund fees and expenses include shareholder transaction costs, investment advisory fees, and marketing and distribution expenses. Funds pass these costs on to investors (ICI, 2010). Some funds charge shareholder fees directly to investors whenever they buy or sell shares. In addition, every fund incurs operating expenses. Funds typically pay their operating expenses out of fund assets, passing the costs on indirectly to the investor. Although these fees may not seem significant they can substantially reduce an investor's earnings (ICI, 2010).

Total Expense Ratios (TER) are used as a measure of costs associated with unit trusts. TERs are a measure of the fund's assets that have been used as payment for services rendered in the

management of the fund, expressed as a percentage of the daily average value of the portfolio, calculated over a period, usually a financial year (Fundamental Investments, 2011).

The Collective Investment Scheme (CIS) industry supports a principle of disclosure and transparency to its investors. TERs have been implemented in the interest of investors, as these should assist investors and their advisors to understand the disclosure better (Fundamental Investments, 2011).

TERs enable investors to evaluate their portfolios by quantifying the cost incurred in the management of the fund in a single number so that the impact of these costs on returns is clear. There is international precedent for using TERs to measure expenses elsewhere in the world (Fundamental Investments, 2011).

Currently TERs include the following expenses:

- Cost incurred in the prudent operation of a fund are included. The costs are deducted from the fund's assets
- Management fees (including performance fees)
- Fixed operating costs:
 - Custody and trustee fees
 - Audit fees
 - Bank charges, other than those charged by an investor's bank
 - Value Added Taxes
- Liquidity costs:
 - Net negative interest charges (this is applicable in the unlikely event of a fund owing interest to a bank as a result of temporary liquidity pressure)
- For investments in other funds:
 - Weighted portion of the underlying portfolio's TER (for funds of funds)
 - Upfront fees

- Exit fees or reduction of redemption
- Where income is earned by the providers of scrip lending services and if this income is not passed back to the portfolio, such an amount that is retained by the provider must be included.

Investor expenses not included in a TER:

- Costs that are incurred directly by the investor and not the fund itself are not included, such as:
 - Costs of entry to an investment (initial fees)
 - Initial and ongoing cost for financial advice – if applicable.
 - Other costs incurred directly by the investor, because of the investment (e.g. bank charges)
- Exit costs
- Costs that are related to specific products, where these products invest in collective investment schemes, such as some life and LISP products. An example of this would be the cost of a Retirement Annuity which invests in collective investment schemes.

In order to align the Association of Collective Investment's (ACI) TER to other expense ratios used elsewhere in the world brokerage and expenses relating to the settlement of transactions and taxes incurred on these items (i.e. Vat on brokerage, UST and stamp duty) do not need to be included in the TER calculation. This will allow for more accurate comparisons of TERs of local funds to TERs of international funds. Transaction costs will be incurred regardless of the capacity in which such a purchase is made, e.g. purchasing an equity in a private capacity or for an underlying asset in a portfolio (Fundamental Investments, 2011).

2. LITERATURE REVIEW

2.1. FUND MANAGEMENT

Baks, Busse and Clifton Green (2006) document a positive relation between mutual fund performance and managers willingness to take big bets in a relatively small number of stocks. Their results hold for mimicking portfolios based on fund holdings as well as when returns are net of expenses.

Chen, Jegadeesh and Wermers (2000) found that stocks bought by mutual fund managers outperform the stocks that they sell.

Baker, Lubomir, Litov, Wachter and Wurgler (2010) study the nature of this stock-picking ability. They measured trading skill by whether stocks were held or traded by fund managers and how these performed at subsequent corporate earnings announcements.

They believe their approach increased the power to detect skilled trading and shed light on its source. Their findings were similar to that of Chen *et al* (2000). They also found that mutual fund trades also forecast earnings surprises and concluded that mutual fund managers were able to trade profitably in part because they were able to forecast earnings-related fundamentals.

2.2. FUND RETURNS AND TRADING EXPENSES

“It is pretty much impossible for shareholders to figure out how much all this trading is costing them, because todays expense ratios do not include money lost to brokerage commissions, market makers and other trading costs” (Haslem 2003, quoting Johathan Clements, Wall Street Journal, Oct 29 2003, p.52)

Chalmers, Edelen and Kadlec (2001) refer to previous studies such as Elton, Gruber, Das and Hlavka (1993) and Carhart (1997) where they find that turnover is negatively related to fund returns while Wermers (2000) finds that turnover is not associated to fund returns, Chen *et al* (2000) find that turnover is positively associated with fund returns.

Chalmers *et al* (2001) claim that the relation between mutual fund returns and trading expenses provides a powerful test of the value of active trading. There is however inconsistent evidence, which they believe was due to the use of turnover as a proxy for trading expenses. In turn they estimate trading expenses directly using portfolio holdings and transaction data and found that fund managers fail to recover the cost of transacting. However, Wermers (2000) concluded that active management adds value. He examines trading expenses for funds sorted by style and turnover, using a different approach to that suggested by Chalmers *et al* (2001).

Khorana, Servaes and Tufano (2006) study fees charged by 46,799 mutual funds offered for sale in 18 countries, which together account for about 86% of the world fund industry. They examined management fees, total expense ratios and estimated total shareholding costs (which include load charges) and found that fees vary substantially from country to country. They found that larger funds and fund complexes charge lower fees, as do funds selling cross-nationally, while fees are higher for funds distributed in more countries and funds domiciled in so-called offshore locations.

Gil-Bazo and Ruiz-Verd (2008) uncover another puzzling fact about the market for equity mutual funds: funds with worse before-fee performance charge higher fees. This negative relationship between fees and performance is robust and can be explained as the outcome of strategic fee-setting by mutual funds in the presence of investors with different degrees of sensitivity to performance (Gil-Bazo and Ruiz-Verd, 2008).

Verbeek and Wang (2010) stated that the relatively high expense ratios of active funds facilitate the potential free riders relative success by making the most of their cost advantage.

2.3. LEGISLATION AND REGULATION

In the United States the SEC increased the frequency of disclosure requirements in 2004. They felt that this would be beneficial as it would increase transparency allowing for more frequent disclosure of portfolio holdings as well as to streamline the shareholder portfolio schedules. It would also allow

investors to monitor their portfolio diversification and improve asset allocation decisions. Investors were able to monitor investment objectives and create more transparency around portfolio manipulation such as ‘window dressing and portfolio pumping’ (Verbeek and Wang, 2010).

In South Africa, ASISA is responsible for monitoring quarterly disclosure in conjunction with the FSB, providing aggregated portfolio information to the public after each disclosure period (ASISA, 2011).

Copy cat funds do not incur expenses as do the funds that they are mimicking but they miss the opportunity to invest in assets that managers identify as good return opportunities between disclosure periods (Mysers, Poterba, Shackelford and Shoven, 2001).

Brown and Swartz (2011) found that hedge funds benefit largely from disclosure, even though many argue disclosure of equity holdings could harm investment funds. They noted that not only investors received the benefit of mandatory portfolio disclosure, but hedge funds themselves also profit through price pressure on their portfolios as well as possibly through front running their own positions (Brown and Swartz, 2011).

2.4. DISCLOSURE

In 2004 the SEC enhanced regulations to more frequently disclose portfolio holdings for all mutual funds, from semi-annually as previously required to quarterly. This has subsequently led to a heated policy debate on the optimal level and frequency of fund disclosure.

In South Africa Unit Trusts are governed by the Collective Investment Schemes Control Act, No 45 of 2002 and regulated by the Financial Services Board (FSB). Independent trustees oversee the unit trust scheme and the assets of the unit trust funds are held in safe custody at a major financial institution for the benefit of the investors in the fund. Unit Trusts are also required to act in accordance with certain guidelines laid out by the Association for Savings and Investment SA. South African tax legislation requires that all South African unit trust funds distribute the net income in the

fund (interest and dividends, less expenses) periodically. Income is distributed annually, semi-annually, quarterly or monthly, depending on the type of unit trust fund (Element Investment Managers, 2011).

The Collective Investment Scheme Act no 45 of 2002 states that a fund manager is required to disclose information about the investment objectives of the collective investment scheme, the calculation of the net asset value and dealing prices, charges, risk factors and the distribution of income accruals. It also states that information that is necessary to enable the investor to make an informed decision must also be provided to the investor timeously and in a comprehensible manner (CIS, 2002).

Myers et al (2001) stated that one of the costs of more frequent disclosure is a potential reduction in the private benefits from research on asset values. They believe that disclosure provides the public with detail on which funds the fund manager thinks are undervalued, providing copy cat funds with the ability to free ride. As stated above, these copy cat funds do however miss the ability to invest in assets that the fund manager may identify as a positive return opportunity between disclosure dates.

Wermers (2001) notes that there are two potential costs to an investor in a fund when the fund is required to more frequently disclose its holdings. Firstly, it becomes easier for other investors to use the information on fund inflows to “front run” the trades, in so doing bidding up the prices of the securities that the fund manager wishes to buy. The more frequent the disclosure, the higher the cost thereof. Secondly, the reduced disclosure period reduces the time that the fund investor is able to benefit from their research and investments. The managers who direct investments in actively managed open end funds perform research about various securities to identify underpriced assets that will generate above average returns.

Myers et al (2001) state that these two costs must be balanced against the potential benefits of disclosure both from the individual investors standpoint as well as from the regulator's perspective of trying to design an optimal policy.

Verbeek and Wang (2010) attempted to address the question to what extent more frequent disclosure provided valuable information for outsiders. They considered whether outsiders were able to capitalise on fund research at little or no cost to themselves and also sought to address to what extent the enhanced SEC regulations had increased the potential for, what they referred to as, free riding strategies (Verbeek and Wang, 2010).

Wermers had in 2001 examined the potentially harmful consequences of more frequent fund disclosure and concluded that abusive activities such as free riding increased and adversely affected fund performance as it prevented a fund from relasing its full potential based on internal research.

Brown and Schwarz (2011), detect abnormal trading volume in the days leading up to a disclosure date and also find significant positive abnormal returns immediately after the disclosure date, suggesting the presence of copy cat trading. They showed a large spike in excess returns of disclosed securities immediately after the disclosure date, which was highly correlated to the excess volume results, in their opinion providing further evidence of buying pressure. They did however find no evidence that disclosed holdings offer long term investors access to profitable information.

Elton et al (2009) claim that the longer the period between disclosure the more round trip trades (purchase and sale or sale and repurchase) that take place in the period are missed. They claim that missing intra period trades significantly influence their hypotheses. They used the following formula to examine the amount of missed trades and use turnover as a metric.

They allocate turnover as the lesser of purchases or sales divided by the average monthly net asset value as follows:

$$C_t^+ = \sum_i (N_{it} - N_{it-1}) \bar{P}_{it} \text{ for all } i \text{ where } (N_{it} - N_{it-1}) \geq 0 \quad (1)$$

$$C_t^- = \sum_i (N_{it-1} - N_{it}) \bar{P}_{it} \text{ for all } i \text{ where } (N_{it} - N_{it-1}) < 0 \quad (2)$$

where

1. N_{it} = the number of shares of stock i held at the end of month t ;
2. \bar{P}_{it} = the average of the prices of stock i at the beginning and end of month t .

For any year

$$C^+ = \sum_{t=1}^{12} C_t^+ \quad (3)$$

$$C^- = \sum_{t=1}^{12} C_t^- \quad (4)$$

Equations 1 to 4 are estimated over the appropriate intervals. They state that, as expected, the larger the interval between observations of holdings the lower the estimate of turnover. They used monthly holdings data which lead to estimates of turnover very close to those reported by the mutual funds themselves. They claim that using quarterly data missed 18,5% of the trades estimated using monthly data (Elton *et al*, 2009).

2.5. COPY CAT INVESTING

Verbeek and Wang (2010) constructed copy cat funds of US domestic funds by “duplicating the active fund’s disclosed portfolios and rebalancing whenever new holdings were reported” in order to address the aforementioned issues (Verbeek and Wang, 2010, p.2). They measured the relative success of free riding by comparing the performance between copy cat funds and the target active fund.

Their results indicated that outside investors could in general earn net returns comparable to active mutual funds by simply replicating the periodically disclosed fund portfolios (Verbeek and Wang,

2010). They also noted that the active trading in interim periods did not generate sufficient value to beat the hidden costs. These findings were previously stated by Berk and Green (2004) and Kacperczyk, Sialm and Zheng (2008), confirmed by the analysis performed by Verbeek and Wang in 2010.

Verbeek and Wang (2010) stated that the average relative performance of copy cat funds significantly increased after the SEC changed disclosure requirements in 2004. They claim that this was due to the increase in the representativeness of the fund disclosure. They state that more frequent disclosure provided more evidence of the targeted funds actual investment style and expanded the opportunity for free riders to successfully track or even beat their actively managed counterparts.

Verbeek and Wang (2010) defined the gross monthly period return for a copy cat targeting mutual fund j as :

$$GR_t^j = \sum_{i=1}^N \tilde{w}_{i,t-1}^j R_{i,t}, \quad (1)$$

where $R_{i,t}$ denotes the return on asset i , and the value weights are given by

$$\tilde{w}_{i,t-1}^j = \frac{N_{i,t-\tau}^j P_{i,t-1}}{\sum_{i=1}^N N_{i,t-\tau}^j P_{i,t-1}}, \quad (2)$$

where $N_{i,t-\tau}^j$ denotes the number of shares of stock i held by mutual fund j at the most recent disclosure date at time $t-\tau$, and $P_{i,t-1}$ is the stock price at the end of the previous month.

And followed Kacperczyk, Sialm and Zheng (2008) to compute the execution costs for each trade using

$$C_{i,t}^B = 1.098 + 0.336 D_{i,t}^{Nasdaq} + 0.092 Trsize_{i,t} - 0.084 \text{Log}(mcap_{i,t}) + 13.807 \left(\frac{1}{P_{i,t}} \right), \quad (3)$$

$$C_{i,t}^S = 0.979 + 0.058D_{i,t}^{Nasdaq} + 0.214Trsize_{i,t} - 0.059Log(mcap_{i,t}) + 6.537\left(\frac{1}{P_{i,t}}\right), \quad (4)$$

Their method assumes the copy cat fund spends nothing on research and in order to minimise any possible survival bias they include each mutual fund that exists during a given month, regardless of whether the fund survives the year.

Wermers (2006) highlighted that in practice copy cat fund managers are not able to exactly replicate the gross performance computed from closing prices due to the reality of liquidity deficiency and price impacts.

Frank et al (2004) compare the net returns before trading costs for copy cat funds and the reported returns for the mutual fund, ignoring possible trading costs. They found the net return indistinguishable from zero. Verbeek and Wang (2010) comment that given the insignificant gross return difference and the considerably lower expense ratios for copy cat funds, the outperformance by copy cat funds in terms of net returns before trading costs is not surprising. The relatively high expenses eliminate almost all of the expected gains from the active investments. Verbeek and Wang (2010) find that periodic portfolio disclosure provides outsiders with free riding opportunities to generate the net performance that is comparable to active funds. Outsiders are thus able to gain the benefits of research without ever undertaking the research themselves and without incurring the same level of expenses (Verbeek and Wang, 2010).

Myers *et al* (2001) designed copy cat funds to evaluate one of the costs of disclosure. They categorised the fund that carries out the research as the primitive fund, where the return on that fund is

$R_{\text{primitive, pre-expense}}$ the fund expenses equal to e

The net of expense pretax return to the investor in this fund is:

$$R_{\text{primitive, net}} = R_{\text{primitive, pre-expense}} - e.$$

They consider λ as a fraction of expenses associated with research and other costs of actively managed funds, such as brokerage fees, allowing the copy cat fund to generate an after expense return of:

$$R_{\text{copycat, net}} = R_{\text{copycat, pre-expense}} - (1-\lambda)e.$$

They computed the differential return of the primitive and copy cat funds on a pre expense and post expense basis and tested these for statistical significance:

$$\Delta_{\text{pre-expense}} = R_{\text{primitive, pre-expense}} - R_{\text{copycat, pre-expense}}$$

$$\Delta_{\text{net}} = R_{\text{primitive, net}} - R_{\text{copycat, net}}.$$

Myers *et al* (2001) found the results from the high expense ratio sample indicated that the copy cat fund could track the primitive fund closely for up to six months after disclosure. They noted that their return differences were statistically insignificant regardless of whether they deducted expenses or not.

Brown and Schwarz (2010) examined the use of hedge fund filings by market participants found that mandatory disclosure by hedge fund portfolios provides little long term benefit to investors who seek to free ride.

2.6. WINDOW DRESSING AND HERDING

As far back as 1991, Lakonishok, Shleifer, Thaler and Vishny referred to window dressing stating that “portfolio managers are reluctant to produce annual reports that show share holdings that have sharply declined in value. You throw out the duds because you do not want to have to apologise for or defend a stock’s presence to clients even though your investment judgement may be to hold.” (Lakonishok *et al*, 1991, p.2)

Musto (1999) provides analysis that funds allocating between government issues and private issues hold more government issues around disclosure, consistent, in their opinion, with the theory that intermediaries prefer to disclose safer portfolios.

Wermers (1999) found that stocks, that ‘herds’ buy, outperform stocks that they sell, and is consistent with mutual fund herding speeding up the price adjustment process.

Grinblatt *et al*. (1995) examine the issue of whether mutual funds tend to buy stocks that went up in the past and sell stocks that went down in the past. This is related to the more general issue of herding also investigated by Lakonishok *et al* in 1992, namely, do institutional investors tend to trade in the same stocks at the same time, or herd as it is sometimes referred to? If institutions herd, a concern is that there will be a price impact, leading to a much more volatile stock market (Elton, Gryber, Blake, Krasny and Ozelge, 2010). If institutions herd by buying what other funds bought in prior periods, then the purchases will be spread over time and the price impact is likely to be relatively small. However, if they all follow the same mechanical trading rules, they are likely to purchase or sell at the same time and the potential impact will be large. The mechanical rule suggested, and the one that researchers have argued produces excess returns, is momentum (Elton *et al*, 2010).

Elton *et al* (2010) did however conclude that the presence of momentum trading is uncovered while using quarterly data, but this disappears when considering monthly changes in holdings instead.

Their investigation also showed that monthly data and contemporaneous returns showed that 31% of funds appear to trade against momentum, while with lagged return 41% of funds appear to trade against momentum. Thus, Elton *et al* (2010) claim a large percentage of fund managers seem to be contrarians (trading against short-term momentum) rather than momentum traders.

Elton *et al* (2010) also found little evidence of semi-annual, or quarterly, window dressing. They viewed this as confirmation of the belief that investors pay more attention to annual reports than to interim disclosures.

3. RESEARCH QUESTION

This research will set out to determine whether copy cat funds are able to generate returns on par or greater than those by the unit trust investor, after expenses, in the high cost South African context.

Unit Trust funds making the initial investment will do so based on market research and will apply management fees to their actively traded portfolios, so, excluding costs, one would expect their return to be superior to that of a fund merely copying their disclosed holdings. Myers *et al* (2001) suggested that firms apply techniques such as herding and window dressing to alter the perception of their holdings for stakeholders on disclosure and as such contribute to the policy debate on the optimal level and frequency of fund disclosure. By only keeping record of the 'good' holdings copy cat funds may reap even more benefit from mimicking the published holdings.

The research question:

- Are copy cat funds in South Africa able to generate returns greater than the initial unit trust investment?

3.1. HYPOTHESES

Hypothesis 1: The null hypothesis states that the average return experienced by initial investors is the same as the average return of copy cat funds, excluding fees. The alternate hypothesis states that the average return is not the same.

$$H_{1_0}: \mu_i = \mu_c$$

$$H_{1_1}: \mu_i \neq \mu_c$$

Hypothesis 2: The null hypothesis states that the average return experienced by initial investors, after deducting fees, is more than or equal to the average return of copy cat funds. The alternate hypothesis states that the average copy cat return is larger than the average return of the initial investor, after deducting fees.

$$H_{2_0}: \mu_i \geq \mu_c$$

$$H_{2_1}: \mu_i < \mu_c$$

4. RESEARCH METHODOLOGY

4.1. RESEARCH DESIGN

Portfolio disclosures in South Africa take place quarterly, which would allow a copy cat fund to invest in those holdings in the period thereafter, updating their holdings every three months with newly disclosed information – applying a buy and hold strategy for three months. A portfolio replication study will be applied to consider actual timing, actual holdings and actual fee structures to determine what returns would have been generated by a copy cat fund applying this strategy.

A pilot study will be completed on Allan Gray's General Equity Fund to identify any immediate concerns that should be considered for the research and to determine whether our hypothesis holds true for this particular high cost fund.

The research approach that will be applied makes use of actual quarterly exposures. Elton *et al* (2010) suggest monthly exposures and state that conclusions change when monthly holdings data are used, believing that there are two reasons for this. The first is that the timing of events can be more precisely measured using more frequent data. The second is that using quarterly or semi-annual holdings data misses a significant proportion of trades – the very trades that might well be initiated by the phenomenon under investigation (Elton *et al*, 2010). Furthermore, they state that the estimate of turnover based on monthly holdings data is so close to the reported return proving that few trades are missed with monthly data (Elton *et al*, 2010). Although Elton *et al* (2010) suggest rather using monthly exposures, these are unfortunately not available in the South African market.

As stated by Dembo and Rosen, more than a decade ago in 2000, portfolio replication studies had proven their applicability to problems such as static hedging in complete and incomplete markets, strategic asset and capital allocation, benchmark tracking, design of synthetic products and portfolio compression. They stated that the scenario approach allows for general non-normal, discrete and subjective distributions, as well as for the accurate modelling of the full range of nonlinear

instruments. They also claimed that it provides an intuitive, operational framework for explaining basic financial theory.

This portfolio replication approach is slightly different to approaches used by researchers in the United States. Verbeek and Wang (2010) estimate the trading costs for Copy cat funds based on the studies by Keim and Madhavan (1997), Wermers (2000) and Kacperczyk, Sialm and Zheng (2008). Keim and Madhavan (1997) provide fitted regressions to estimate the total institutional (explicit and implicit) execution costs for a sample of mutual funds during the period 1991-1993. Wermers (2000) re-computes the coefficients in this regression, excluding trader dummies, since trader types for fund transactions are hard to collect.

Verbeek and Wang (2010) calculate the number of trading orders (both buy and sell) for each stock by comparing the fund's holdings at two consecutive disclosure dates, assuming that the Copy cat fund is managing the same amount of assets as its primitive fund. They then follow Kacperczyk *et al* (2008) and compute the execution costs using a regression equation with the independent variables a combination of trade size (dollar value of the stock trade divided by market capitalization of the stock), the natural logarithm of the market capitalization of the stock, the stock price and a dummy variable that equals one if the trade occurs on Nasdaq (as opposed to NYSE or AMEX). They assume copy cat funds do not spend anything on research. Accordingly, copy cat funds can operate with relatively low levels of expenses. Following Frank *et al*. (2004), Verbeek and Wang (2010) assume that their copy cat fund incur expenses equal to those of the Vanguard Total Stock Market Index fund in 2002, 20 basis points.

Elton *et al* (2010) also apply different mathematical approaches to each of the scenarios under question in their review. For tax motivated trading they too make use of regression equations, while for momentum and fund return measures they applied Grinblatt *et al*'s (1995) methodology. Here momentum is a function of the relationship between the number of shares held at the time, the

average price at the beginning of the disclosed period as well as at the end, the number of individual assets held as well as asset returns.

Once the pilot analysis is completed, further insight will be sought into the returns generated by different funds, with different cost structures.

An in depth qualitative interviewing analysis is not required as the problem is clearly defined and understood, no further probing is required from financial investors. There are differing schools of thought with regards to disclosure requirements as highlighted by Verbeek and Wang (2010), with only some confident that disclosure has an impact on profitability. A technique is required that will objectively provide evidence for, or against the hypothesis.

Given that a quantitative research design will be applied there are additional advantages for the researcher, including the absence of researcher bias, non response bias will not be a problem and response bias will not have any impact on research results as surveys and questionnaires will not be used.

4.2. DESIGN DESCRIPTORS

Blumberg, Cooper and Shindler (2010) recommend considering a number of other descriptors in research design including data collection, the time dimension and the research environment. In this case data collection will be public fund data that is published by funds and stored by some organisations over time to enable accurate tracking and predictability.

The level of control required in this type of approach is significant. Actual investment data available in the market will be used rather than allowing room for interpretation. The assessment will need to remain objective.

Various descriptive statistics will be generated along with frequency diagrams and hypothesis testing will be used to test the stated hypotheses.

4.3. LEVEL OF ANALYSIS

This analysis will focus on all South African general equity funds, and will consider their holdings from 2000. Equity price series have been sourced and will be used to calculate the return of both the actual fund, assuming no intra period trading, as well as the copy cat fund, assuming a buy and hold strategy is applied.

4.4. CONSISTENCY MATRIX

Refer to Appendix 1.

4.5. POPULATION AND SAMPLING

The universe for this research will include all South African unit trust funds, in the domestic equity and flexible asset allocation categories. South African regulatory conditions apply and disclosure for South African firms will be taken into account. All funds with disclosures will be considered.

The following guidelines will be considered to ensure that there are no externalities that may impact on the outcome of this research.

- Legal and regulatory limitations
 - One regulatory body will be considered to ensure that the impact on all fund managers in the sample is the same.
 - Legalities apply and change across national boundaries and as such this review will be limited to one – South Africa.
 - Regulation in general is enforced through governing bodies located in that jurisdiction. For South Africa specifically the following will be impacted (FSB, 2011):
 - FAIS

- FICA
 - Collective Investment Schemes Control Act
 - Securities Services Act
 - Pension Fund Act
 - Medical Schemes Act
 - Long Term Insurance Act
- Credit Rating
 - It is possible that fund managers with higher credit ratings are less likely to consider copy cat investing strategies, but this has not been stated or proven in the research found thus far so will be ignored.
 - Given the research questions it is also necessary to consider fee structures and fund turnover. Below is the sampling frame of all South African fund managers, with their funds under management (in R'000), as at the end of 2010.

Table 4-1: Funds under management – South Africa 2010

Fund Manager	Funds under Management (R'000)
Public Investment Corporation	739,700,000
Old Mutual Investment Group SA	397,559,790
Sanlam Investment Management	267,676,180
Stanlib Asset Management	253,013,000
Alan Gray	231,960,000
Investec Asset Management	221,731,722
Coronation Asset Management	144,798,651
RMB Asset Management	137,236,275
Investment Solutions	135,179,588
ABSA Asset Management	91,458,000
Prudential Portfolio Managers (SA)	82,417,718

Futuregrowth Asset Management	81,825,068
Precient Investment Management	60,788,413
Metropolitan Asset Management	55,440,153
Cadiz Specialised Asset Management	50,911,600
Dibanisa	37,930,668
Taquanta Asset Managers	36,233,263
Advantage Asset Management	33,847,584
Symmetry Multi Manager	32,699,042
Oasis	26,060,870
Foord Asset Management	23,913,100
Element	15,142,000
Kagiso Asset Management	12,983,730
RECM	9,018,667
Peregrine Quant	8,869,040
Marriott Asset Management	8,000,000
Argon	5,954,256
Afena Capital	5,845,803
PSG Absolute	3,925,000
Catalyst	3,638,545
Mergence	3,158,500
Tri Linear	3,042,984
Atlantic	2,846,000
Pan-Africa Asset Management	2,707,600
Cannon	2,273,000
Jim Busha	2,078,960
Gryphon Asset Management	2,036,000
Orthogonal	1,817,234
Prodigy-Coris Asset Management	Unknown
Alliance Capital Management	Unknown
Bluealpha Investment Management	Unknown
Hermes	805,321
AFC	561,951
Osborne	484,018
Trident	478,798

Source: RMB Fund Data, 2010

4.6. SAMPLING TECHNIQUE

Given the intention to apply a portfolio replication study a sample will not be extracted. All South African general equity funds with published disclosures will be considered.

4.7. UNIT OF ANALYSIS

For the analysis of actual fund returns, quarterly disclosures will be considered. Disclosures include portfolio holdings as well as changes from fund movements between disclosure periods. Portfolio holdings are published quarterly - this duration will hereafter be referred to as a “period”. The unit of analysis will be return per period per fund.

As trading occurs intra month it is not completely accurate to assume static portfolio holdings for the copy cat fund. It would be better to consider intra period trading, and as such actual returns have been used when considering the actual fund. For the copy cat fund however it is not possible to include any intra period trading strategies as these are not publically available or disclosed. A buy and hold strategy has thus been assumed for the derivation of copy cat holdings.

4.8. POPULATION EXCLUSIONS

Fund holdings are derived largely as a result of mandates. These mandates differ significantly across funds, some allowing for overdrafts and derivatives for example. Although this influences hedging capabilities, for the purposes of this analysis copy cat funds have standard mandates with no derivative trading, overdraft facilities (negative cash on call) and do not function as a fund of funds.

All South African mutual/unit trust funds will be replicated in the copy cat fund, but all negative holdings will be ignored.

- Derivatives resulting in negative holdings month on month have been excluded. As a result hedging is indirectly ignored.

- Negative cash on call (overdraft) has been ignored. It is assumed that the copy cat funds are unable to utilise overdrafts and that their mandates require cash before investments can take place.
- All categorised holdings have been linked to the Satrix 40 index.

5. RESULTS

5.1. DATA AND ASSUMPTIONS

Data sourced for this analysis includes portfolio holding information for all South African funds, equity and index prices as well as detail about each fund. Refer to Appendix 2 for additional detail and column definitions, below a summary of each data type:

Fund Details – Each fund provides information on themselves with their portfolio holding disclosure. This includes information such as the fund’s start date and fund categorisations.

Fund Holdings – Fund disclosures include the listing of all investments made by each fund for each disclosure period, in South Africa for each quarter. These fund holdings have been collected manually by Chris Muller for the period 1992 to 2007. From 2007 Moneyweb published the portfolio holdings, and made this information electronically available to all its members. Fund information was unfortunately incomplete over 2008 and 2009, these holdings were sourced from a researcher at UBS who had stored the required information. Other missing periods were sourced individually through quarterly disclosure reports by fund. In each of these disclosures equity details, and in some cases tickers (allowing a link to Bloomberg’s equity prices), are provided allowing us to link this information to the equity prices on the portfolio disclosure dates.

Market Data – Equity and index prices published daily. Equity prices are not recorded for non trade days. If the disclosure date was on a Sunday for example the next day’s published price will be used.

Buy outs/Mergers – A list of all known mergers and acquisitions was provided by Chris Muller. These were recorded over time to keep track of all company name changes, consolidations, mergers and acquisitions. When company changes occur it is necessary to know the new company ticker so that it is possible to derive the correct equity prices for the published holding. Given that these changes were recorded manually it is possible that some have accidentally been missed. In the event that

these are not known, and prices are not available for the date in question, it will be assumed that the company ceased trading on the day the equity price series stopped.

Total Expense Ratios (TER) – Total expense ratios have been used for each general equity fund as an indication of costs. In the unlikely event that the TER for a general equity fund was not explicitly stated the rate for the balanced or general fund for that organisation was assigned. Refer to Appendix 6 for the TERs used.

Data cleansing was required as numerous data sources were used. Fund names were standardised, market data was linked manually and categorisations were consistently applied. Equity tickers were allocated for each portfolio disclosure.

Historically, due to different regulations and legislation, fund disclosure requirements differed over time. In some cases the full holding was disclosed, in others only the top ten equity investments, and in others similar investments were aggregated together. This created complexities in the analysis as categorised holdings could not be linked to a specific equity price. In these cases appropriate indices were used instead.

In cases where rates were available for the beginning of the period, but the equity price was not available at the end of the holding period (no longer published, but not due to a name change or merger), zero growth in that particular equity holding has been assumed.

All aggregated holdings have been linked to the Satrix 40 Index. Industry indices have not been used. Refer to Appendix 4 and 5 to view all the holdings linked to the Satrix 40 Index. In some cases funds invested in other funds. As returns for all funds in the market were not known it was decided to link those holdings to the Satrix 40 to include some form of fund movement, rather than ignoring them altogether. Refer to Appendix 5 for a detailed list of funds invested in. This is an estimation of return and will not be accurate, but will add desired volatility to the overall holding.

5.2. DATA COLLECTION PROCESS

The following sources of information were supplied by Chris Muller:

- Historical holdings as published by each fund from 1992 to 2007 stored manually
- Total Expense Ratios
- Equity name changes and mergers

The following information was sourced:

- Moneyweb listings were used for fund information from 2007
- Moneyweb fund holdings from 2007 to present
- Moneyweb classifications
- Actual fund returns, after the deduction of costs, sourced from Profile Media
- Missing actual returns sourced through quarterly disclosure reports
- RMB market rates, used for equity and index prices
- UBS provided missing portfolio holdings for 2008 and 2009

5.3. CONSTRUCTING RETURNS

In order to determine whether copy cat investing in South Africa will provide superior return for the copying fund, actual returns generated by funds will need to be compared to a derived copy cat fund. Data published by each fund will be used to replicate portfolio holdings for the copy cat fund, but as there is a delay in publishing the copy cat fund will generate returns lagged by a period.

Given that the initial investing firms spend large amounts of time and money on research and that various fees are charged for investments, large costs are associated with these investing practices.

For the copying fund this is not the case. They merely replicate the holdings, albeit 60 working days later than the initial investor and leverage, in theory, off the same subsequent returns.

The following three categories of returns have been considered for this report:

- Actual fund returns, after deducting costs
 - Actual fund returns are published quarterly. These published returns are quoted after the deduction of costs (TERs) and will be used as such for this analysis.
- Actual fund returns, before costs
 - Actual fund returns before costs were derived. TERs are provided and were used to “add back” costs to each fund. These TERs were provided as an annual rate and were adjusted to allow for quarterly analysis.
- Copy cat returns
 - Assuming that the copy cat fund was only able to invest in their holdings a quarter later than the actual fund, they would only be able to replicate the holding once the actual fund had provided full disclosures. For the analysis a buy and hold strategy was assumed, with updates after the next quarterly disclosure.

In order to compare these results against one another, cumulative returns were calculated and plotted as will be seen in the sections to follow. The process followed for each of these categorisations is described below:

ACTUAL FUND RETURNS

Actual fund returns, after deducting costs are published and were used as provided. Total Expense Ratios (TERs) are known for each fund and were used to derive actual fund returns before the deduction of costs as follows:

$$\text{Actual Fund Return, before costs} = \text{Actual Fund Return, after deducting costs} - (\text{Annual_TER}/4)$$

COPY CAT FUNDS

For the copy cat fund a normalised fund value of R 1,000,000 was used. This R 1,000,000 was allocated into the investments in the same proportion as the funds original investment, however the start date of this investment was allocated to be a quarter after the holding date published by the fund in question. Assuming the fund held that position flat for a further quarter, actual equity prices were then used to determine what the portfolio value would have been at the end of that period.

Returns were then calculated as follows:

$$\text{Fund Total Value}_{\text{Beg}+1} = 1,000,000 \quad (1)$$

Where $\text{Beg}+1$ denotes one quarter after the beginning of the actual investment period (aligning with the date of disclosure) and $\text{End}+1$ denotes one quarter later than the end of the investment quarter.

Using the standardised portfolio, the number of shares invested is derived:

$$\text{Number of Shares}_{\text{E Beg}+1} = 1,000,000 * P_{\text{E}} / MR_{\text{E Beg}+1} \quad (2)$$

where P denotes the proportional investment of the Equity E, using the Market Rate MR at the beginning of the period.

Now assuming a buy and hold strategy:

$$\text{Number of Shares}_{\text{E Beg}+1} = \text{Number of Shares}_{\text{E End}+1} \quad (3)$$

$$\text{Total Value}_{\text{E End}+1} = \text{Number of Shares}_{\text{E End}+1} * MR_{\text{E End}+1} \quad (4)$$

$$\text{Fund Total Value}_{\text{End}+1} = \sum \text{Total Value}_{\text{E End}+1} \quad (5)$$

Thereafter deriving the copy cat fund returns per period:

$$(\text{Fund Total Value}_{\text{E End}+1} - \text{Fund Total Value}_{\text{Beg}+1}) / \text{Fund Total Value}_{\text{Beg}+1} \quad (6)$$

5.4. STATISTICS

A full portfolio replication study was used for this analysis along with hypothesis testing to provide statistical evidence for, or against, the research questions. Before commencing the full analysis some high level results were generated to get a view of the information under consideration.

As all general equity funds in South Africa were considered and information was gathered until March 2011, it was decided to extract summary statistics from the last quarter of published holdings, March 2011. Below an indication of the funds considered, with the statistics highlighting the largest and smallest funds by total investment.

Table 5-1 First Quarter 2011 – Summary statistics

Total number of general equity funds	80
Total invested across all funds (Q1 2011)	R 91 billion
Largest fund, by value invested	Allan Gray Equity Fund
Largest value invested (Q1 2011)	R 25.8 billion (28% of total investment)
Smallest fund, by value invested	Tri Linear Equity Fund
Smallest value invested (Q1 2011)	R 74 122
Range	R 25.8 billion
Top 5 Funds, by value invested	Allan Gray Equity Fund Nedgroup Investments Rainmaker Old Mutual Investors Investec Equity Fund Coronation Equity Fund
Mean value invested (including all equity funds)	R 1.1 billion

Standard deviation of value invested	R 3.2 billion
Median value invested	R 244 million
Kurtosis	43
Skewness	6

It is interesting to note that there are only a few prominent players in this industry. The top three general equity funds make up half of the total investment for the first quarter of 2011. There is significant skewness in the data, when considering fund investments. Most of the funds in the bottom half make up 1% to 2% of the overall holding.

Figure 5-1 Percentage of total general equity fund investment in Q1 2011

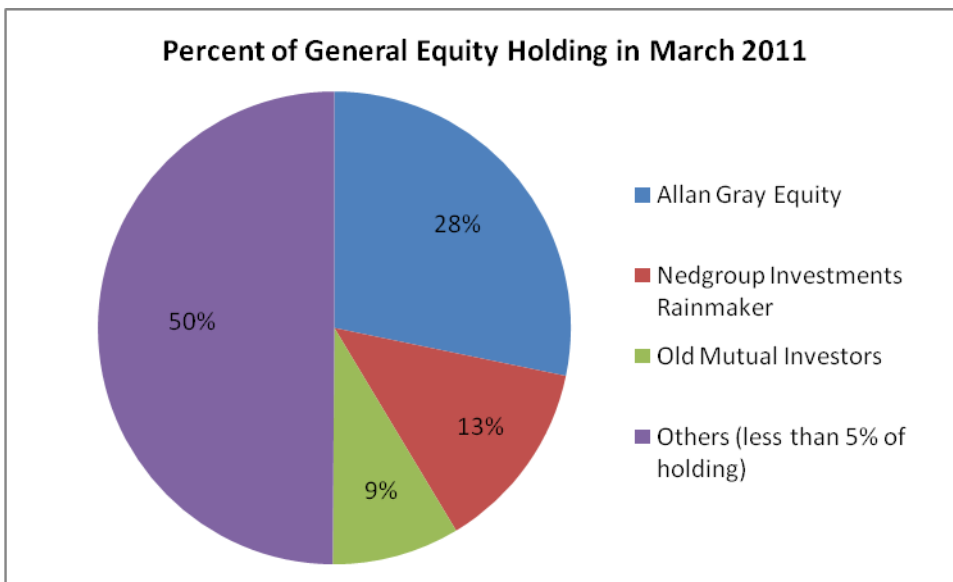
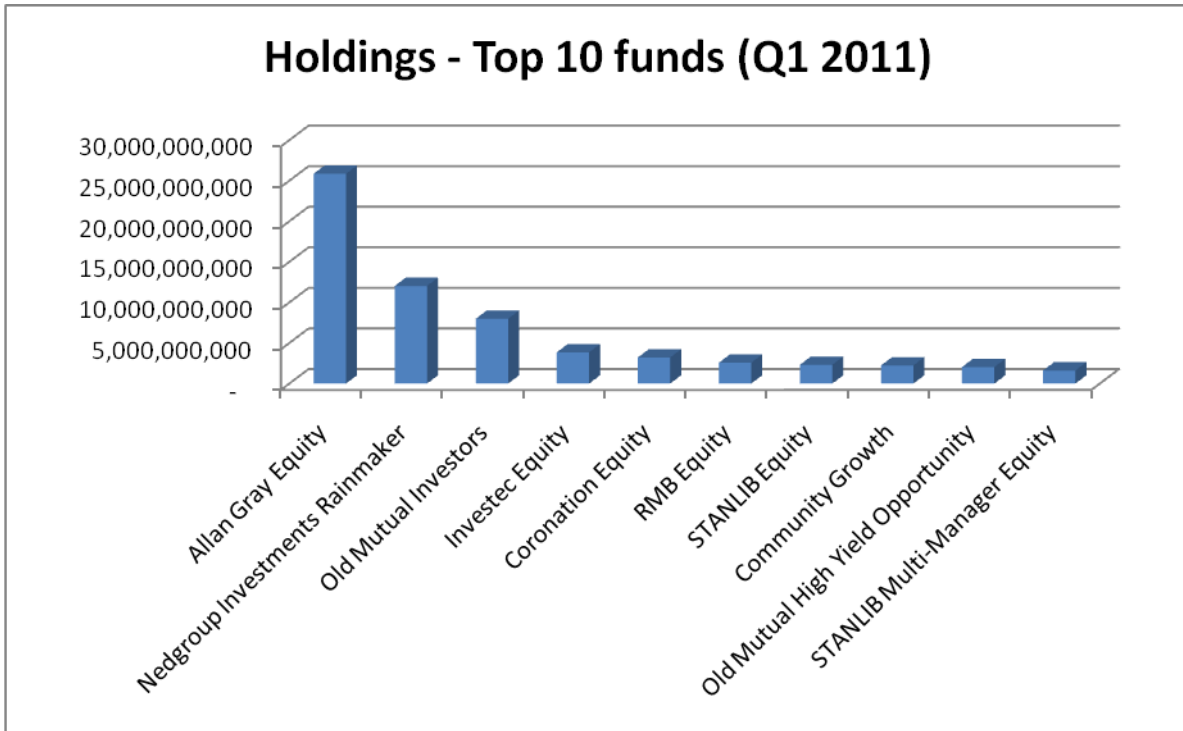


Figure 5-2 Top ten general equity funds, by value invested in Q1 2011



The copy cat analysis was performed on each of the general equity funds. As each fund is different, with different mandates and investing strategies, copy cat effectiveness will vary across funds, and most likely across time.

Allan Gray Equity Fund is the largest equity fund considered and was analysed as a pilot before performing the analysis on all the general equity funds. Samples of the data used for the Allan Gray analysis have been included below to provide detail for those readers interested in more information.

Table 5.2 depicts Allan Gray's total investment in their Allan Gray Equity Fund as per their quarterly disclosures from 2000 to 2011. Table 5.3 shows an example of their portfolio disclosure, in this case for March 2011. Table 5.4 depicts their overall returns, before the deduction of costs, after the deduction of costs as well as the derived portfolio return for their copy cat fund.

Table 5-2 Allan Gray Equity Fund - Total investment per period.

Allan Gray Equity Fund	
Row Labels	Sum of Total Value
31/03/2000 00:00	342,858,256
30/06/2000 00:00	343,888,049
30/09/2000 00:00	420,167,339
31/12/2000 00:00	495,493,429
31/03/2001 00:00	709,296,639
30/06/2001 00:00	1,020,294,109
30/09/2001 00:00	1,102,888,962
31/12/2001 00:00	1,209,541,250
31/03/2002 00:00	1,132,114,174
30/06/2002 00:00	1,507,364,298
30/09/2002 00:00	1,764,758,589
31/12/2002 00:00	2,201,907,902
31/03/2003 00:00	2,213,952,111
30/06/2003 00:00	2,816,644,832
30/09/2003 00:00	3,455,862,570
31/12/2003 00:00	4,699,174,685
31/03/2004 00:00	5,220,641,255
30/06/2004 00:00	4,908,531,618
30/09/2004 00:00	5,819,136,171
31/12/2004 00:00	6,776,019,747
31/03/2005 00:00	7,501,586,926
30/06/2005 00:00	8,079,077,235
30/09/2005 00:00	9,989,901,523
31/12/2005 00:00	11,576,149,887
31/03/2006 00:00	13,362,501,369
30/06/2006 00:00	12,953,174,859
30/09/2006 00:00	13,643,921,643
31/12/2006 00:00	17,043,584,845
31/03/2007 00:00	18,636,264,166
30/06/2007 00:00	18,716,000,000
30/09/2007 00:00	18,673,000,000
31/12/2007 00:00	18,661,984,199
31/03/2008 00:00	17,766,366,905
30/06/2008 00:00	16,908,678,244
30/09/2009 00:00	19,033,967,664
31/12/2009 00:00	21,437,360,537
31/03/2010 00:00	22,238,104,781
30/06/2010 00:00	21,939,882,903
30/09/2010 00:00	23,152,376,753
31/12/2010 00:00	24,375,608,134
31/03/2011 00:00	25,858,186,092
Grand Total	409,708,214,650

Table 5-3 Allan Gray Equity Fund disclosed holding in March 2011

Row Labels	Sum of Total Value
31/03/2011 00:00	25,858,186,092
Additional positions individually less than 1% of fund	123,110,077
AGL	283,226,964
ANG	1,434,494,296
BTI	2,759,003,466
Consumer Gds pos individually less than 1% of fund	504,103,342
Consumer Srvs pos individually less than 1% of fund	560,502,059
DTC	292,174,237
Equity	87,465,924
Exchange Traded Funds	394,380,957
Financials positions individually less than 1% of fund	1,409,323,877
Foreign - Equities	99,428,664
GFI	373,558,326
HAR	743,828,403
Healthcare positions individually less than 1% of fund	192,246,829
ILV	319,680,708
IMP	555,980,040
Industrials positions individually less than 1% of fund	497,144,877
MND	896,415,622
MTN	1,076,000,661
NPK	502,049,176
NTC	325,654,577
REM	1,896,376,913
Resources positions individually less than 1% of fund	1,065,817,564
SAB	2,711,358,727
SAP	632,335,074
SBK	955,428,622
SLM	1,180,756,277
SOL	3,109,240,594
Technology positions individually less than 1% of fund	7,113,817
Telecoms positions individually less than 1% of fund	439,742,077
TON	430,243,345
Grand Total	25,858,186,092

Table 5-4 Allan Gray Equity Fund returns per holding period

Fund Name	Holding Date	Quarterly Returns (Before Costs)	Quarterly Returns (After Costs)	Calculated Copy Cat Return
Allan Gray Equity	31/03/2000	-0.0108	-0.0147	
Allan Gray Equity	30/06/2000	0.0120	0.0081	0.0238
Allan Gray Equity	30/09/2000	-0.0021	-0.0060	0.0098
Allan Gray Equity	31/12/2000	0.0593	0.0554	0.0662
Allan Gray Equity	31/03/2001	0.1709	0.1670	0.1283
Allan Gray Equity	30/06/2001	-0.0375	-0.0414	-0.0202
Allan Gray Equity	30/09/2001	0.0890	0.0851	0.1855
Allan Gray Equity	31/12/2001	0.0890	0.0851	0.0838
Allan Gray Equity	31/03/2002	0.0964	0.0925	0.0342
Allan Gray Equity	30/06/2002	0.0222	0.0183	-0.0249
Allan Gray Equity	30/09/2002	0.0969	0.0930	0.0471
Allan Gray Equity	31/12/2002	-0.1273	-0.1312	-0.1367
Allan Gray Equity	31/03/2003	0.1321	0.1282	0.0675
Allan Gray Equity	30/06/2003	0.1099	0.1060	0.0908
Allan Gray Equity	30/09/2003	0.1675	0.1636	0.1583
Allan Gray Equity	31/12/2003	0.0370	0.0331	0.0543
Allan Gray Equity	31/03/2004	-0.0394	-0.0433	-0.0769
Allan Gray Equity	30/06/2004	0.1437	0.1398	0.1611
Allan Gray Equity	30/09/2004	0.1268	0.1229	0.1640
Allan Gray Equity	31/12/2004	0.0359	0.0320	0.0067
Allan Gray Equity	31/03/2005	0.0937	0.0898	0.0871
Allan Gray Equity	30/06/2005	0.2030	0.1991	0.2016
Allan Gray Equity	30/09/2005	0.1164	0.1125	0.0980
Allan Gray Equity	31/12/2005	0.1379	0.1340	0.1510
Allan Gray Equity	31/03/2006	0.0141	0.0102	0.0150
Allan Gray Equity	30/06/2006	0.0691	0.0652	0.0802
Allan Gray Equity	30/09/2006	0.1795	0.1756	0.1770
Allan Gray Equity	31/12/2006	0.1007	0.0968	0.1028
Allan Gray Equity	31/03/2007	0.0207	0.0168	0.0129
Allan Gray Equity	30/06/2007	0.0155	0.0116	-0.0024
Allan Gray Equity	30/09/2007	0.0219	0.0180	0.0359
Allan Gray Equity	31/12/2007	-0.0133	-0.0172	-0.0525
Allan Gray Equity	31/03/2008	-0.0188	-0.0227	0.0519
Allan Gray Equity	30/06/2008	-0.0889	-0.0928	-0.0806
Allan Gray Equity	30/09/2008	-0.0138	-0.0177	0.0167
Allan Gray Equity	31/12/2008	-0.0388	-0.0427	-0.0541
Allan Gray Equity	31/03/2009	0.0580	0.0541	0.0520
Allan Gray Equity	30/06/2009	0.1226	0.1187	0.1236
Allan Gray Equity	30/09/2009	0.0782	0.0743	0.1219
Allan Gray Equity	31/12/2009	0.0358	0.0319	0.0427
Allan Gray Equity	31/03/2010	-0.0121	-0.0160	-0.0305
Allan Gray Equity	30/06/2010	0.1006	0.0967	0.1191
Allan Gray Equity	30/09/2010	0.0556	0.0517	0.0630
Allan Gray Equity	31/12/2010	0.0330	0.0291	0.0324
Allan Gray Equity	31/03/2011	-0.0023	-0.0062	-0.0196

HYPOTHESIS TESTING

In order to apply hypothesis testing it is assumed that an independent variable has no effect on behaviour (the "null hypothesis"). Under the null hypothesis, any difference between means for groups in an experiment is attributed to chance factors. Null hypothesis testing is a procedure by which the probability of obtaining the difference between means in the experiment is examined. When an outcome is statistically significant, it is concluded that the independent variable caused a difference in participants' scores on the dependent variable (McGrawHill, 2011).

Descriptive statistics alone are not sufficient to determine if groups differ reliably on the dependent variable in the study. Based on descriptive statistics alone, there is no way of knowing whether the group means are reliably different (i.e. not due to chance). Confidence intervals are one way to draw conclusions about the effects of independent variables; a second, more common method is called null hypothesis testing (McGrawHill, 2011).

When researchers use null hypothesis testing, they begin by assuming the independent variable has no effect; this is called the null hypothesis. Under the null hypothesis, any observed difference between sample means can be attributed to chance (McGrawHill, 2011).

There are two possible conclusions to null hypothesis testing: Either reject the null hypothesis or fail to reject the null hypothesis. Outcomes (i.e. observed differences between means) that lead to rejecting the null hypothesis are said to be statistically significant. A statistically significant outcome indicates that the difference between means observed in the study are larger than would be expected if by chance the null hypothesis were true. In this case it is concluded that the independent variable caused the difference between means (McGrawHill, 2011).

A statistically significant outcome is one that has only a small likelihood of occurring if the null hypothesis is true. That is, when the probability value associated with the statistic is low. The consensus among members of the scientific community is that outcomes associated with

probabilities of less than 5 times out of 100 (or 0.05) are judged to be statistically significant. The probability chosen to indicate an outcome is statistically significant is called the level of significance. The level of significance is indicated by the Greek letter alpha (α), in this case the 0.05 level of significance, reported as $\alpha = 0.05$. To determine whether an outcome is statistically significant the obtained probability value is compared to the level of significance (McGrawHill, 2011).

5.5. RESULTS – SUMMARY

Although various statistical tests have been performed and will be discussed in the remainder of this chapter, this section will highlight the overall summary of the important results. Of particular interest is whether the copy cat funds outperform the actual funds. The table below shows each fund considered, with summary information about each fund, provides an indication of the frequency of copy cat outperformance, as well as how large this outperformance was. The table has been ranked from the largest copy cat out performance, in descending order.

Table 5-5 Summary Results – Copy cat fund outperformance

Fund Name	Start Date	End Date	Annual TER	Tenure (Disclosed)	No of quarters	Number of quarters of out performance	Percentage of out performing quarters	Copy cat Percentage out performed	Average Annualised Return	Average Annualised CopyCat Return
PSG Alphen Equity FoF	Sep 2002	Mar 2011	2.76%	9	34	19	56%	13.4%	13.0%	28.2%
Momentum Multifocus FoF	Dec 2000	Mar 2011	2.72%	11	42	32	76%	13.1%	8.8%	24.6%
PSG Alphen Growth	Mar 2000	Mar 2011	2.76%	11	44	31	70%	11.2%	9.0%	21.2%
RMB Equity	Mar 2000	Mar 2011	3.09%	11	45	28	62%	11.1%	17.6%	30.6%
Momentum Aggressive Equity FoF	Dec 2001	Mar 2011	1.91%	10	34	23	68%	8.4%	8.4%	17.5%
Momentum Moderate Equity FoF	Dec 2001	Mar 2011	1.89%	10	34	23	68%	8.3%	8.5%	17.5%
Prudential Equity	Mar 2000	Mar 2011	2.48%	11	45	37	82%	7.9%	12.3%	20.4%
Hermes Equity	Mar 2006	Mar 2011	1.24%	5	18	11	61%	7.6%	3.0%	10.8%
Vega General Equity	Sep 2009	Mar 2011	1.67%	2	7	5	71%	7.3%	5.7%	10.8%
STANLIB Prosperity	Mar 2000	Mar 2011	1.72%	11	45	35	78%	7.3%	9.1%	17.0%
Marriott Dividend Growth	Mar 2000	Mar 2011	1.15%	11	45	27	60%	6.2%	13.8%	20.9%
Coris Capital General Equity	Mar 2000	Mar 2011	1.94%	11	46	34	74%	6.1%	11.5%	18.3%
Element Islamic Equity	Sep 2009	Mar 2011	1.80%	2	7	5	71%	5.8%	4.6%	8.6%
Old Mutual Growth	Mar 2000	Mar 2011	1.15%	11	45	29	64%	5.8%	17.9%	24.7%
Cannon Equity	Sep 2005	Mar 2011	1.48%	6	23	17	74%	5.5%	12.0%	18.2%
Tri-Linear Equity	Mar 2000	Mar 2011	1.67%	11	45	33	73%	5.4%	10.1%	16.0%
Old Mutual High Yield Opportunity	Mar 2000	Mar 2011	1.42%	11	38	29	76%	5.3%	13.0%	19.1%
Maestro Equity	Sep 2005	Mar 2011	2.10%	6	8	5	63%	5.1%	4.8%	15.7%
Analytics Managed Equity	Mar 2002	Mar 2011	1.52%	9	37	25	68%	5.0%	13.9%	19.7%
Capstone Active Equity FoF	Mar 2005	Mar 2011	2.43%	6	25	13	52%	4.0%	18.5%	23.3%

Fund Name	Start Date	End Date	Annual TER	Tenure (Disclosed)	No of quarters	Number of quarters of out performance	Percentage of out performing quarters	Copy cat Percentage out performed	Average Annualised Return	Average Annualised CopyCat Return
ValuGro General Equity	Mar 2005	Mar 2011	1.67%	6	25	12	48%	2.9%	16.7%	20.1%
Gryphon All Share Tracker	Mar 2000	Mar 2011	0.61%	11	45	28	62%	2.9%	12.9%	16.2%
Investec Active Quants	Mar 2000	Mar 2011	0.43%	11	45	30	67%	2.7%	14.2%	17.3%
Coronation Equity	Mar 2000	Mar 2011	1.13%	11	45	30	67%	2.7%	14.9%	18.0%
Element Earth Equity	Sep 2009	Mar 2011	1.73%	2	7	3	43%	2.2%	5.2%	6.7%
Food Equity	Dec 2002	Dec 2010	2.00%	8	33	17	52%	2.1%	17.6%	19.7%
Stanlib Index	Mar 2000	Jun 2009	0.65%	9	38	27	71%	1.7%	11.5%	13.0%
FNB Growth	Mar 2000	Mar 2011	1.56%	11	45	24	54%	1.2%	17.4%	18.9%
Old Mutual Investors	Mar 2000	Mar 2011	1.14%	11	45	23	51%	1.1%	16.3%	17.6%
Absa Select Equity	Mar 2004	Mar 2011	1.15%	7	29	16	55%	0.9%	21.3%	22.4%
Old Mutual Top Companies	Mar 2000	Mar 2011	1.15%	11	45	22	49%	0.6%	16.3%	16.9%
BJM Core Equity	Sep 2009	Mar 2011	1.80%	2	7	3	43%	0.3%	6.2%	6.4%
SymmERY Equity FoF	Sep 2001	Mar 2011	1.67%	10	39	30	77%	0.2%	14.3%	14.6%
Verso Multi-Manager Long Term SA Equity	Sep 2009	Mar 2011	4.44%	2	7	5	71%	0.1%	4.9%	5.0%
Allan Gray Equity	Mar 2000	Mar 2011	1.56%	11	45	25	56%	0.1%	21.4%	22.0%
Investec Equity	Mar 2000	Mar 2011	1.15%	11	45	19	42%	0.0%	18.6%	18.6%
Indequity Technical	Sep 2009	Mar 2011	2.01%	2	7	4	57%	-0.2%	6.8%	6.6%
ABSA General	Mar 2000	Mar 2011	1.76%	11	45	23	51%	-0.2%	15.9%	15.7%
N-e-FG Equity	Sep 2009	Mar 2011	2.06%	2	7	4	57%	-0.4%	6.7%	6.4%
Sasfin Equity	Dec 2005	Mar 2011	1.23%	6	22	11	50%	-0.5%	13.1%	12.6%
Personal Trust SA Equity	Sep 2009	Mar 2011	1.50%	2	7	2	29%	-0.6%	8.4%	7.9%
NFB Equity	Sep 2009	Mar 2011	1.65%	2	7	5	71%	-0.7%	4.2%	3.7%
Nedgroup Investments Rainmaker	Sep 2009	Mar 2011	1.15%	2	7	3	43%	-0.7%	9.6%	9.0%
Matador Equity FoF	Mar 2005	Mar 2011	2.84%	6	19	10	53%	-1.4%	8.8%	7.3%
Metropolitan General Equity Portfolio	Sep 2009	Mar 2011	1.45%	2	7	4	57%	-1.9%	7.3%	5.9%
Harvard House General Equity	Dec 2006	Mar 2011	1.51%	5	18	6	33%	-2.0%	6.1%	3.9%
STANLIB Multi-Manager Equity	Sep 2009	Mar 2011	1.94%	2	7	4	57%	-2.0%	8.2%	6.7%
Sasfin TwentyTen	Dec 2005	Mar 2011	1.23%	6	22	9	41%	-2.1%	9.5%	7.2%
SIM General Equity	Sep 2009	Mar 2011	1.14%	2	7	4	57%	-2.3%	9.6%	8.0%
Nedgroup Investments Quants Core Equity	Sep 2009	Mar 2011	1.15%	2	7	3	43%	-2.3%	9.2%	7.5%
Community Growth	Sep 2009	Mar 2011	0.58%	2	7	4	57%	-2.4%	6.8%	5.1%
Kagiso Equity Alpha	Dec 2009	Mar 2011	1.48%	2	6	2	33%	-2.5%	7.5%	5.7%
Plexus RAFI Enhanced SA Strategy	Sep 2007	Mar 2011	1.23%	4	8	4	50%	-2.5%	5.1%	2.5%
RMB Private Bank Equity	Jun 2004	Mar 2011	0.59%	7	18	10	56%	-2.9%	19.5%	16.0%
STANLIB Shari'ah Equity	Sep 2009	Mar 2011	1.72%	2	7	3	43%	-2.9%	4.9%	2.8%
Huysamer Equity	Sep 2009	Mar 2011	1.30%	2	7	4	57%	-3.1%	8.2%	6.0%
SMMI Equity FoF	Sep 2009	Mar 2011	2.18%	2	7	3	43%	-3.3%	7.4%	5.0%
STANLIB Index	Sep 2009	Mar 2011	0.65%	2	7	3	43%	-3.6%	11.5%	13.0%
27 Four Active Equity	Sep 2009	Mar 2011	1.30%	2	7	3	43%	-3.6%	8.1%	5.5%
Metropolitan Multi-Manager Equity Portfolio	Sep 2009	Mar 2011	1.20%	2	7	3	43%	-3.7%	10.9%	8.1%
Absa Growth FoF	Mar 2000	Mar 2011	3.71%	11	45	27	60%	-3.7%	27.0%	22.3%
Prescient Equity Active Quant	Sep 2009	Mar 2011	1.20%	2	7	4	57%	-3.8%	9.4%	6.6%
Interneuron Capital Equity Portfolio	Sep 2009	Mar 2011	2.01%	2	7	3	43%	-3.8%	7.3%	4.5%
Oasis General Equity	Mar 2003	Dec 2010	1.72%	7	10	1	10%	-3.9%	24.1%	13.0%
Oasis Crescent Equity	Mar 2003	Dec 2010	2.17%	7	10	4	40%	-4.1%	18.5%	7.6%
Nedgroup Investments Equity	Sep 2009	Mar 2011	1.15%	2	7	3	43%	-4.1%	8.4%	5.4%
Imara Equity	Sep 2009	Mar 2011	1.79%	2	7	2	29%	-4.1%	9.4%	6.4%
Stewart Macro Equity FoF	Sep 2009	Mar 2011	2.29%	2	7	3	43%	-4.3%	8.1%	5.0%
Clade Cash Flow Weighted Equity	Sep 2009	Mar 2011	1.07%	2	7	3	43%	-4.3%	8.9%	5.7%
Discovery Equity	Sep 2009	Mar 2011	1.78%	2	7	3	43%	-4.4%	8.9%	5.7%
STANLIB Equity	Sep 2009	Mar 2011	1.23%	2	7	3	43%	-4.4%	9.6%	6.4%
Old Mutual Active Quant Equity	Sep 2009	Mar 2011	1.32%	2	7	3	43%	-4.9%	9.5%	5.9%
Lynx Opportunities FoF	Sep 2009	Mar 2011	2.77%	2	7	3	43%	-5.0%	8.6%	5.0%

Fund Name	Start Date	End Date	Annual TER	Tenure (Disclosed)	No of quarters	Number of quarters of out performance	Percentage of out performing quarters	Copy cat Percentage out performed	Average Annualised Return	Average Annualised CopyCat Return
SIM Top Choice Equity	Sep 2006	Mar 2011	1.13%	5	19	9	47%	-5.2%	14.0%	8.0%
Sanlam All Share Index	Sep 2009	Mar 2011	0.38%	2	7	3	43%	-5.3%	9.7%	5.9%
STANLIB Multi-Manager All Stars Equity FoF	Sep 2009	Mar 2011	1.94%	2	7	2	29%	-5.6%	9.1%	5.0%
FG Mercury Equity FoF	Sep 2009	Mar 2011	2.09%	2	7	2	29%	-5.6%	9.1%	5.0%
PSG Advance Wealth Creator FoF	Sep 2007	Mar 2011	2.48%	4	7	4	57%	-5.7%	2.4%	-2.8%
Prescient Equity Quant	Sep 2009	Mar 2011	0.60%	2	7	2	29%	-6.2%	9.7%	5.1%
Old Mutual RAFI 40 Tracker	Sep 2009	Mar 2011	0.89%	2	7	1	14%	-6.7%	9.4%	4.5%
Satrix RAFI 40 Total Return Portfolio	Sep 2009	Mar 2011	0.53%	2	7	1	14%	-7.3%	10.5%	5.1%
Lion of Africa General Equity	Sep 2009	Mar 2011	1.65%	2	7	2	29%	-8.2%	10.8%	4.6%
STANLIB Nationbuilder	Sep 2004	Mar 2011	1.72%	7	21	6	29%	-8.8%	4.5%	-4.8%
Aylett Equity	Sep 2009	Dec 2010	1.80%	1	4	1	25%	-11.9%	6.3%	1.9%
Alphen Equity Builder	Sep 2009	Mar 2011	0.76%	2	7	1	14%	-21.3%	20.9%	3.1%
						Averages:	51%	-0.3%		

From this table we are able to deduce that in many cases the copy cat fund did outperform the actual fund, however in as many cases the copy cat was unable to do so. The average percentage of outperformance is -0.3%, very close to zero, suggesting that on average copy cat funds performed close to the actual fund. Keeping in mind this is averaging across funds that did outperform as well as funds that did not. The results do not appear to be consistent by fund and have thus lead to performance considerations and statistical tests for individual funds over and above the mean tests originally suggested. These results can be viewed below. The findings and outcomes will be discussed in Chapter 6.

5.6. RESULTS – BEFORE DEDUCTING FEES (HYPOTHESIS 1)

Hypothesis 1: The null hypothesis states that the average return experienced by initial investors is the same as the average return of copy cat funds, before deducting fees. The alternate hypothesis states that the average return is not the same.

$$H_{1_0}: \quad \mu_i = \mu_c$$

$$H_{1_1}: \quad \mu_i \neq \mu_c$$

In order to access this hypothesis a number of statistical tests will be considered. Graphical representations will be used to view basic relationships and frequency distributions, while t tests will be run to determine whether the differences in returns are statistically valid. A paired t-test is used to compare two population means where two datasets exist, where observations from one set can be paired with observations in the other dataset, in this case returns across the same periods.

A t-test is the most commonly used method to evaluate the differences in means between two groups. The t-test can be used on different size groups, as long as the variables are normally distributed within each group and the variation of scores in the two groups is not reliably different. The normality assumption can be evaluated by looking at the distribution of the data or by performing a normality test. The equality of variances assumption can be verified with the F test, or you can use the more robust Levene's test (Statsoft, 2011).

In this report the assumptions will be considered and the Levene test will be used as a measure of the equality of variances. If the conditions are not met it is possible to evaluate the differences in means between two groups using one of the nonparametric alternatives to the t-test (Statsoft, 2011).

The p-level reported with a t-test is the probability of error associated with rejecting the hypothesis when, in fact, the hypothesis is true (Statsoft, 2011).

For this hypothesis two tailed tests will be used. A two-tailed test is a test in which a given statistical hypothesis, H_0 (the null hypothesis), will be rejected when the value of the test statistic is either sufficiently small or sufficiently large. This is the appropriate method to use given that the hypothesis aims to measure equality in means.

The first test was run across all returns to test whether the returns of the copy cat fund were equal to returns of the initial investor, before deducting costs by period. At this point results were not derived by fund.

Thereafter the annualised cumulative difference in returns was considered for each fund, to determine whether, over all disclosed time periods, the copy cat fund generated returns equal to those of the initial investor, before deducting costs. In this case the final cumulative (annualised) return for each fund was compared to that fund's copy cat. The statistical test measured whether, over time, the copy cat fund was able to generate returns equal to the initial investor returns (before deducting costs).

Finally, as it appeared that the results were not the same for each fund and that the statistical tests above were influenced by averages, returns for each individual fund were considered. A sample of these results will be provided across a number of the larger funds in South Africa.

It is necessary to consider the underlying assumptions for this test, namely normality and the equality of variances. The QQ plots and histograms below will provide some evidence for or against these assumptions.

Hypothesis 1 – Test 1 – All returns (Paired)

Below a view of the distribution for the actual returns before costs as well as the distribution of the copy cat returns. Levene’s test for equality of variances is implicit in SPSS for this test. These returns were paired and compared using a two tailed t-test to measure whether the returns are statistically similar.

Figure 5-3 Frequency distributions of the actual fund returns, before deducting costs, and the copy cat fund

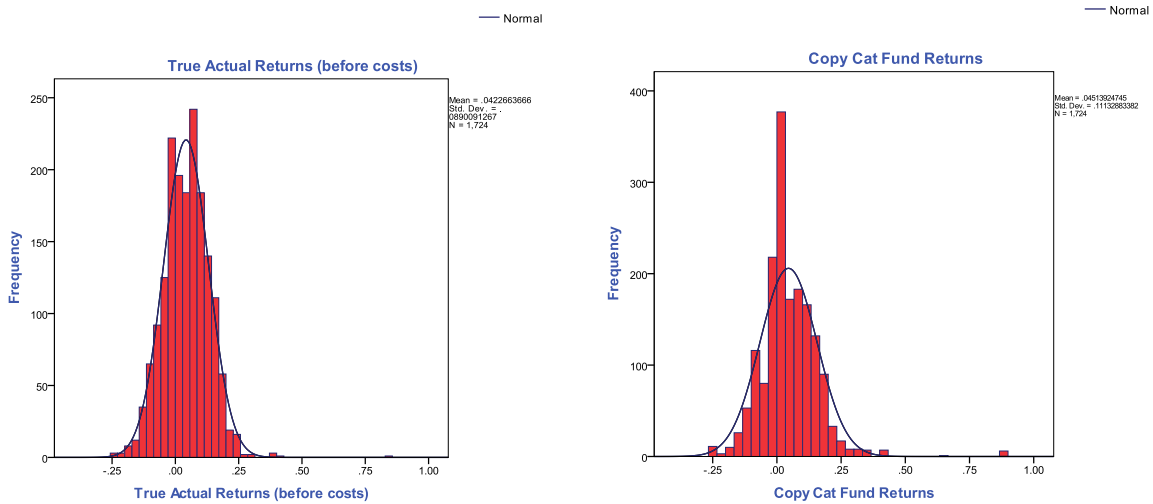
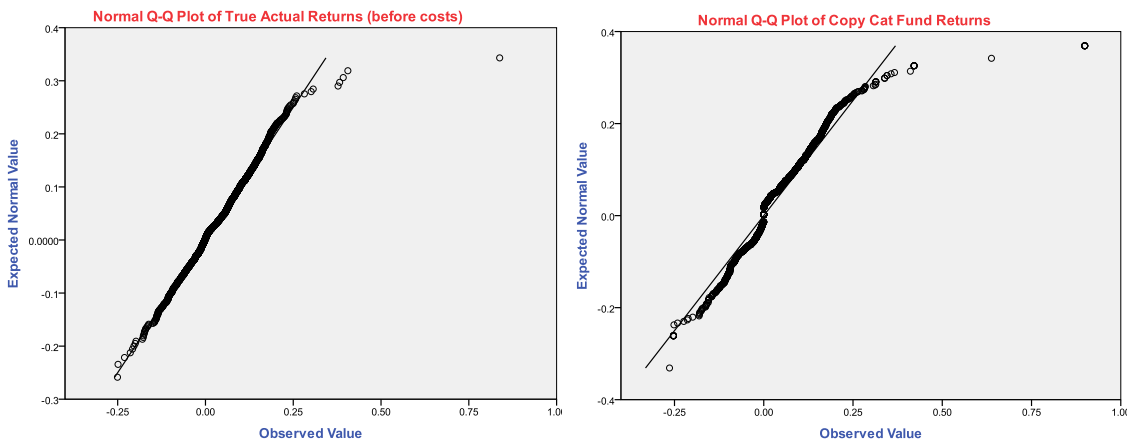


Figure 5-4 Q-Q Plots of the actual fund returns, before deducting costs, and the copy cat fund



Below the statistical two tailed, paired t-test output for the returns, before deducting costs, compared to the copy cat returns by period.

Table 5-6 Paired T-test results of the actual fund returns, before deducting costs, and the copy cat fund

		Paired Samples Statistics			
		Mean	N	Std. Deviation	Std. Error Mean
Pair 1	True Actual Returns (before costs)	.042266366581	1724	.0890091267120	.0021437093854
	Calculated Return Copy Cat - Delayed	.0451392474516	1724	.11132883381696	.00268126061608

		Paired Samples Test					t	df	Sig. (2-tailed)
		Paired Differences							
		Mean	Std. Deviation	Std. Error Mean	95% Confidence Interval of the Difference				
					Lower	Upper			
Pair 1	True Actual Returns (before costs) - Calculated	-	.08574968371	.002065208463	-	.001177698735	-1.391	1723	.164
	Return Copy Cat - Delayed	.00287288087008	734	16	.00692346047570	53			

At a 0.05 level of significance, with an insignificant pvalue of 0.164 (> 0.05) the null hypothesis can not be rejected. We can thus deduce that H_{10} holds true - the returns of the actual fund before the deduction of costs are similar to the returns of the copy cat fund, by period.

Hypothesis H_{10} holds true: $\mu_1 = \mu_c$

Hypothesis 1 – Test 2 – Annualised cumulative returns

Below a view of the distribution for the difference in annualised cumulative returns at the end of the last disclosed period. This will provide an indication of whether the copy cat fund was able to generate the same return as the actual fund, before deducting costs, over the entire disclosed period.

Figure 5-5 Frequency distributions of the annualised cumulative return, before deducting costs, and the copy cat fund

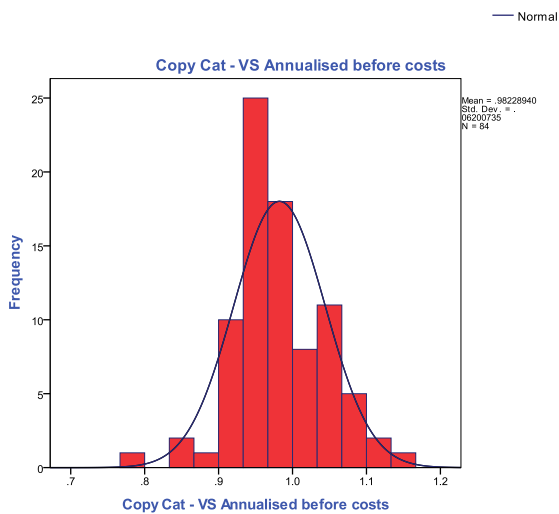


Figure 5-6 Q-Q Plot of the annualised cumulative return, before deducting costs, and the copy cat fund

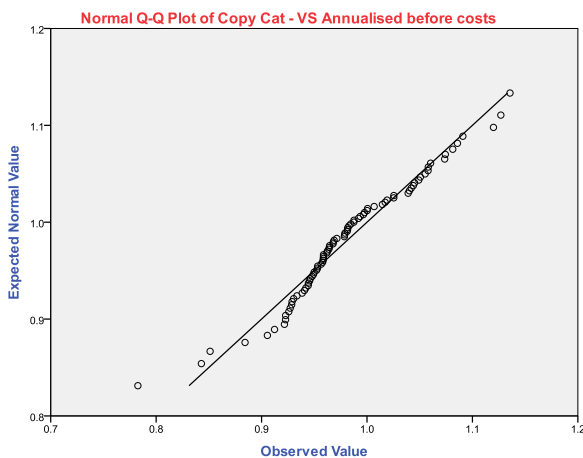
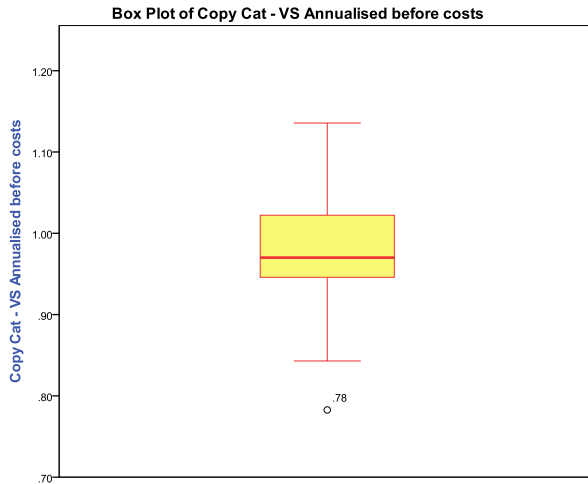


Figure 5-7 Q-Q Plot of the annualised cumulative return, before deducting costs, and the copy cat fund



Below the statistical two tailed, paired t-test output for the annualised cumulative returns, before deducting costs, compared to the copy cat annualised cumulative return.

Table 5-7 Paired T-test results of the annualised cumulative return, before deducting costs, and the copy cat fund

Paired Samples Statistics					
		Mean	N	Std. Deviation	Std. Error Mean
Pair 1	Actual Before Costs (benchmark)	1.000	84	.0000	.0000
	Copy Cat - vs Annualised before costs	.9822894043	84	.06200735383	.00676555697

Paired Samples Test									
		Paired Differences				t	df	Sig. (2-tailed)	
		Mean	Std. Deviation	Std. Error Mean	95% Confidence Interval of the Difference				
					Lower				Upper
Pair 1	Actual Before Costs (benchmark) - Copy Cat - vs Annualised before costs	.01771059571	.06200735383	.00676555697	.00425417502	.03116701641	2.618	83	.011

At a 0.05 level of significance, with a significant pvalue of 0.01 (< 0.05) the null hypothesis should be rejected. We can thus deduce that the cumulative annualised return of the actual fund, before the

deduction of costs, is different from the cumulative annualised copy cat return at the end of the disclosure period.

This result is interestingly different to the first test when considering the results per period, suggesting that over the long term returns will be different. It also highlights a need to consider some individual funds to see how this materialises.

Hypothesis H1₀ is rejected. $\mu_1 \neq \mu_C$

Hypothesis 1 – Test 3 – Returns within each fund

When considering individual funds the returns for each period were paired and compared using a two tailed t-test to measure whether the copy cat returns were statistically similar to those of the actual fund before the deduction of costs. Below a table summarising the p values and resulting conclusion for a sample of the larger South African general equity funds.

Table 5-8 Paired two tail T-test results run on a sample of the larger South African funds

Fund Name	P Value (Paired two tail t test)	Hypothesis
Allan Gray Equity Fund	0.6884 (>0.05)	Null hypothesis is not rejected. $\mu_1 = \mu_C$
Old Mutual Investors Fund	0.874 (>0.05)	Null hypothesis is not rejected. $\mu_1 = \mu_C$
Coronation Equity Fund	0.2837 (>0.05)	Null hypothesis is not rejected. $\mu_1 = \mu_C$
Investec Equity Fund	0.6624 (>0.05)	Null hypothesis is not rejected. $\mu_1 = \mu_C$
Investec Active Quants Fund	0.1656 (>0.05)	Null hypothesis is not rejected. $\mu_1 = \mu_C$
Marriott Dividend Growth Fund	0.2107 (>0.05)	Null hypothesis is not rejected. $\mu_1 = \mu_C$
Cannon Equity Fund	0.1342 (>0.05)	Null hypothesis is not rejected. $\mu_1 = \mu_C$
FNB Growth Fund	0.9282 (>0.05)	Null hypothesis is not rejected. $\mu_1 = \mu_C$
Prudential Equity Fund	0.0057 (<0.05)	Null hypothesis is rejected. $\mu_1 \neq \mu_C$

At a 0.05 level of significance, most of the p values are larger than 0.05. In each of those cases the null hypothesis should not be rejected. This suggests that in each of those cases the return of the actual fund, before deducting costs, is the same as the return for the copy cat fund.

You will notice from the table above that Prudential Equity Fund is the only exception. In their case the null hypothesis is rejected suggesting that for Prudential Equity Fund the returns that they were able to generate, before deducting costs, are not the same as the returns generated by the copy cat.

Allan Gray Equity Fund - Hypothesis H_{10} holds true: $\mu_I = \mu_C$

Old Mutual Investors Fund - Hypothesis H_{10} holds true: $\mu_I = \mu_C$

Coronation Equity Fund - Hypothesis H_{10} holds true: $\mu_I = \mu_C$

Investec Equity Fund - Hypothesis H_{10} holds true: $\mu_I = \mu_C$

Investec Active Quants Fund - Hypothesis H_{10} holds true: $\mu_I = \mu_C$

Marriott Dividend Fund - Hypothesis H_{10} holds true: $\mu_I = \mu_C$

Cannon Equity Fund - Hypothesis H_{10} holds true: $\mu_I = \mu_C$

FNB Growth Fund - Hypothesis H_{10} holds true: $\mu_I = \mu_C$

Prudential Equity Fund - Hypothesis H_{10} is rejected. $\mu_I \neq \mu_C$

5.7. RESULTS – AFTER DEDUCTING FEES (HYPOTHESIS 2)

Hypothesis two is of great interest as in reality a copy cat fund will be compared to the actual fund returns once all costs have been taken into account. This hypothesis will provide evidence to support (or perhaps not support) the theory that copy cat funds are able to outperform the fund they are copying in the South African market because they are able to leverage off the cost savings to generate sufficiently higher returns. The findings in the US research referred to above generate higher returns for the copy cat fund. We would thus expect the null hypothesis to be rejected.

Hypothesis 2: The null hypothesis states that the average return experienced by initial investors, after deducting fees, is more than or equal to the average return of copy cat funds. The alternate hypothesis states that the average copy cat return is larger than the average return of the initial investor, after deducting fees.

$$H_{2_0}: \mu_i \geq \mu_c$$

$$H_{2_1}: \mu_i < \mu_c$$

In order to access this hypothesis a number of statistical tests will be considered. Graphical representations will be used to view basic relationships and frequency distributions, while one tail t-tests will be run to determine whether the differences in returns are statistically valid. A paired t-test is used to compare two population means where two datasets exist where observations from one set can be paired with observations in the other dataset, in this case returns across the same periods.

For this hypothesis however, because the test is to measure whether the copy cat fund is able to generate returns higher than the initial investor a one tailed test was used.

The first test performed considered the paired returns of the initial fund, after the deduction of costs, with the copy cat fund returns, by period. Thereafter the annualised cumulative difference in returns was compared to determine whether, over the long run (i.e. across all disclosed time

periods), the copy cat fund generated returns higher than the initial investor. This is different from hypothesis one as now costs are deducted. And finally, a large focus was then placed on considering the statistical results for individual funds. A sample of these will be provided and discussed.

Hypothesis 2 – Test 1 – All returns (Paired)

Below a view of the distribution for the actual returns after the deduction of costs as well as the distribution of the copy cat returns. Levene’s test for equality of variances is implicit in SPSS for this test. These returns were paired and compared using a one tailed t-test.

Figure 5-8 Frequency distributions of the actual fund returns, after deducting costs, and the copy cat fund

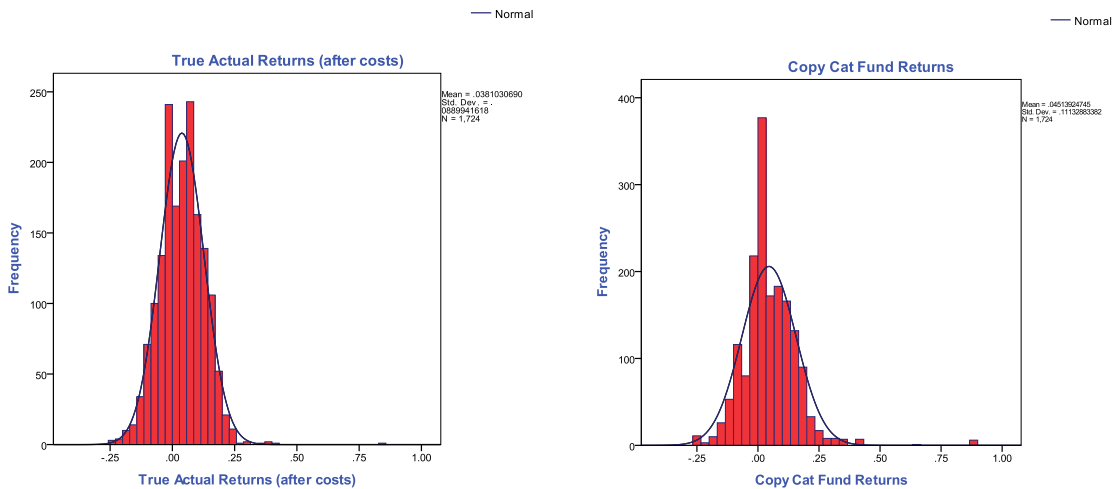
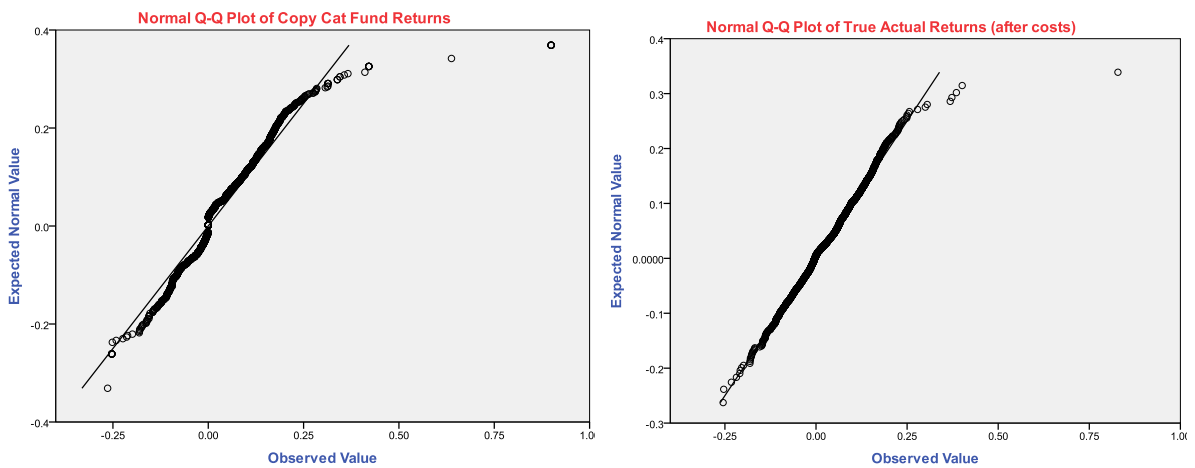


Figure 5-9 Q-Q Plots of the actual fund returns, before deducting costs, and the copy cat fund



The p value generated by the statistical one tailed, paired t-test was 0.082 (> 0.05). At a 0.05 level of significance, with an insignificant pvalue the null hypothesis can not be rejected. We can thus deduce that H_{2_0} holds true - the returns of the actual fund after the deduction of costs is larger or equal to the returns of the copy cat fund, by period.

Hypothesis H_{2_0} holds true: $\mu_1 \geq \mu_c$

It is however interesting to note that the p value is very close to 0.05, so if one were to extend the level of significance to 0.10, the statistical test would actually prove that the copy cat returns are statistically higher than the actual fund. This test is borderline.

Hypothesis 2 – Test 2 – Annualised cumulative returns

Below a view of the distribution for the difference in annualised cumulative returns at the end of the last disclosed period. This will provide an indication of whether the copy cat fund was able to generate higher returns than the actual fund, after deducting costs, over the entire disclosed period.

Figure 5-10 Frequency distributions of the annualised cumulative return, after deducting costs, and the copy cat fund

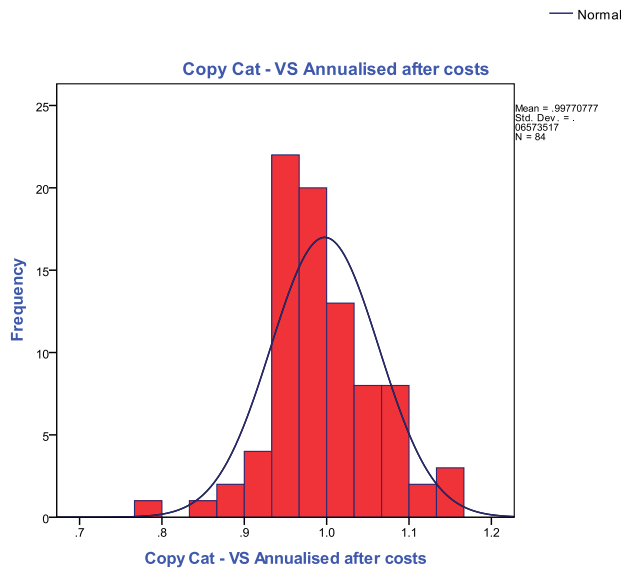


Figure 5-11 Q-Q Plot of the annualised cumulative return, after deducting costs, and the copy cat fund

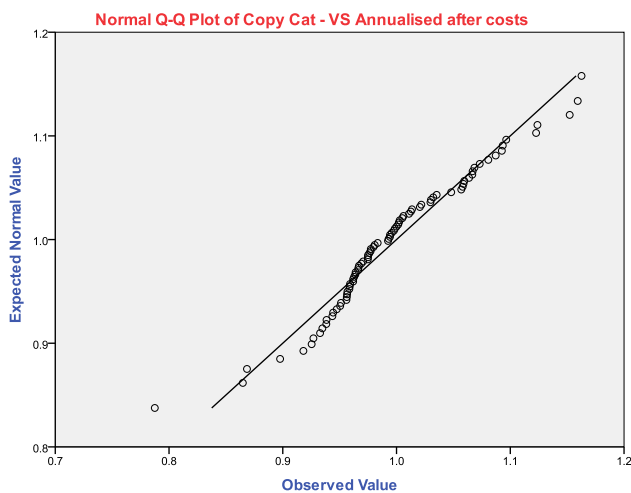
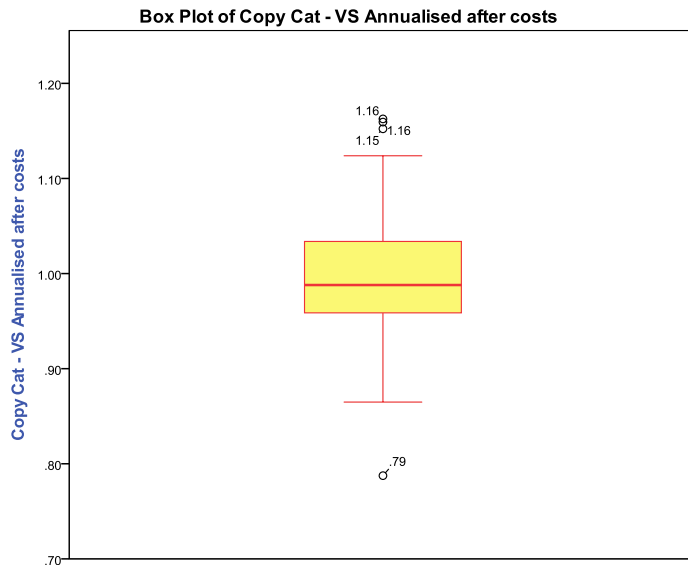


Figure 5-12 A box plot of the annualised cumulative return differences of the actual fund, after deducting costs, and the copy cat



The box plot above shows the difference in annualized cumulative returns, with the straight lines indicating the medians and the circles the outliers. You will notice a few outliers on the top of the graph suggesting that there were a few outliers where the copy cat return was much higher than the average difference in return. Similarly one outlier at the bottom suggesting that in one case the actual fund in fact generated a significantly higher return than the copy cat.

The p value generated from the one tailed paired t-test was 0.375 (>0.05) showing that the null hypothesis could not be rejected. We can thus deduce that the cumulative annualised return of the actual fund, after the deduction of costs, is greater than or equal to the cumulative annualised copy cat return at the end of the disclosure period.

Hypothesis H2₀ holds true: $\mu_1 \geq \mu_c$

This result is stronger than the result of the first test in hypothesis 2, but states that the copy cat fund does not generate higher returns over the long run.

Hypothesis 2 – Test 3 – Returns within each fund

For the purposes of this test a few large South African general equity funds have been displayed below. Frequency distributions have been provided to get an indication of the spread in each fund. Statistical tables will not be provided for each one, but rather an indication of the p value for each fund and a diagram representing the extent of outperformance by the copy cat fund.

The p value will indicate whether the copy cat fund was able to generate higher returns than the actual fund after the deduction of costs. The red line on each graph below provides an indication of the extent of outperformance by the copy cat fund. These results will be discussed in Chapter 6.

Refer to Table 5.5 for detailed results across all funds. Each fund's results will be included on one page to allow for easy comparison and interpretation. Refer below for the output for each of the large South African general equity funds considered.

Allan Gray Equity Fund

Below a view of the distribution for the actual returns of the Allan Gray Equity Fund, after the deduction of costs, as well as the distribution of its copy cat fund returns.

Figure 5-13 Allan Gray Equity Fund - Frequency distributions of the actual fund returns, after deducting costs, and the copy cat fund

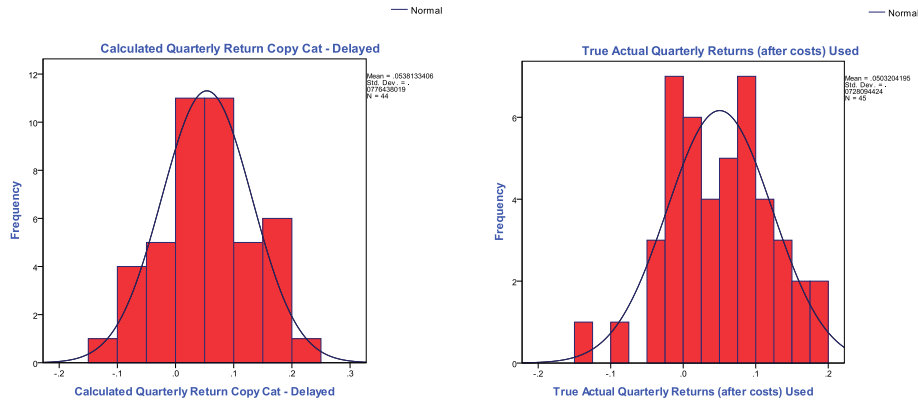
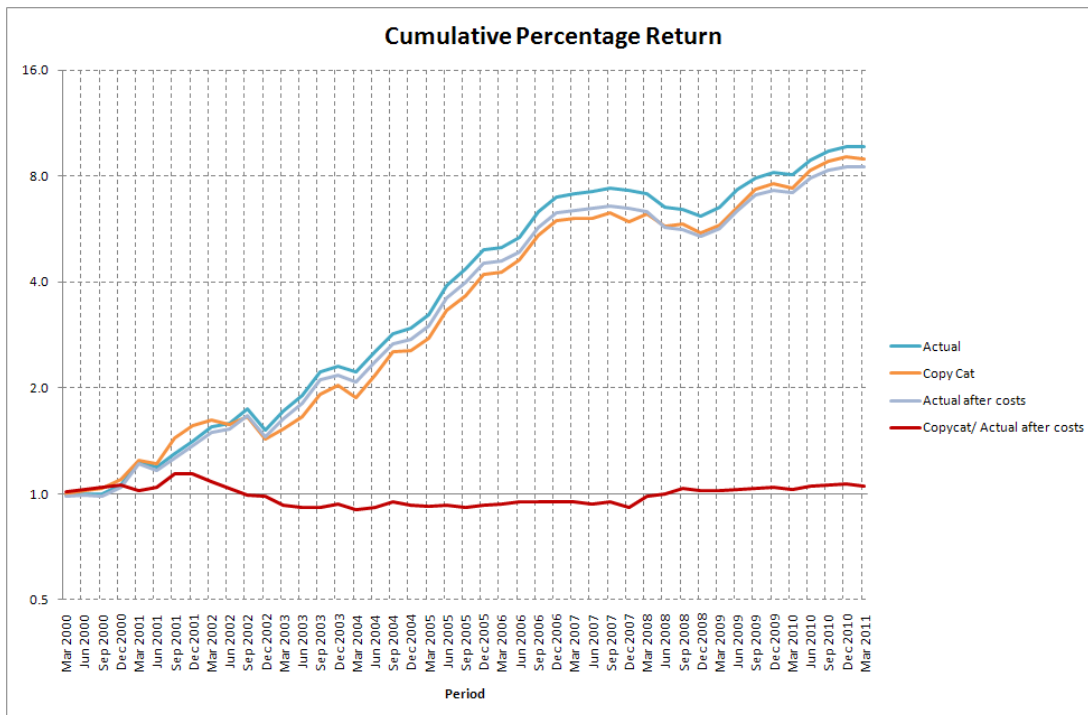


Figure 5-14 Allan Gray Equity Fund – Cumulative Percentage Returns



- *P value = 0.334 (>0.05). Do not reject the null hypothesis*
- **Hypothesis H2₀ holds true: $\mu_1 \geq \mu_c$**

Old Mutual Investors Fund

Below a view of the distribution for the actual returns of the Old Mutual Investors Fund, after the deduction of costs, as well as the distribution of its copy cat fund returns.

Figure 5-15 Old Mutual Investors Fund - Frequency distributions of the actual fund returns, after deducting costs, and the copy cat fund

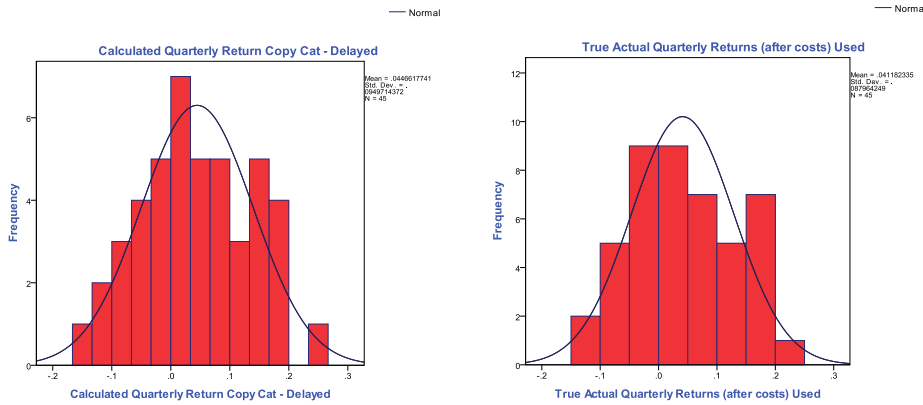
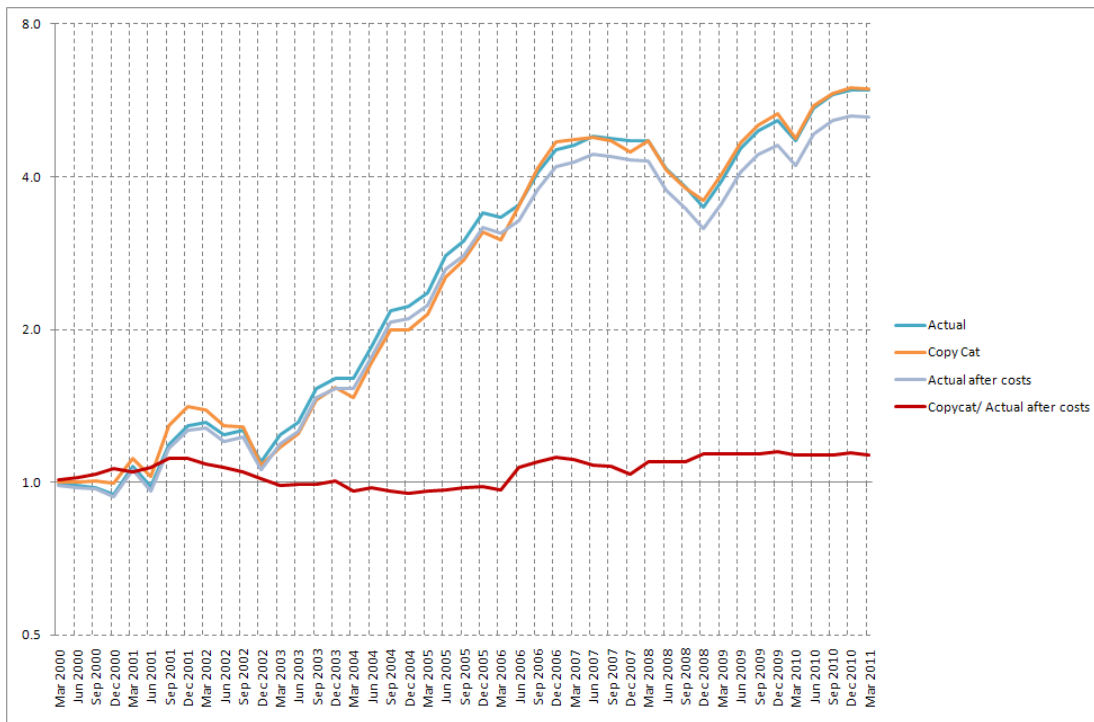


Figure 5-16 Old Mutual Investors Fund – Cumulative Percentage Returns



- $P \text{ value} = 0.1917 (>0.05)$. Do not reject the null hypothesis
- **Hypothesis $H2_0$ holds true:** $\mu_1 \geq \mu_c$

Investec Equity Fund

Below a view of the distribution for the actual returns of the Investec Equity Fund, after the deduction of costs, as well as the distribution of its copy cat fund returns.

Figure 5-17 Investec Equity Fund - Frequency distributions of the actual fund returns, after deducting costs, and the copy cat fund

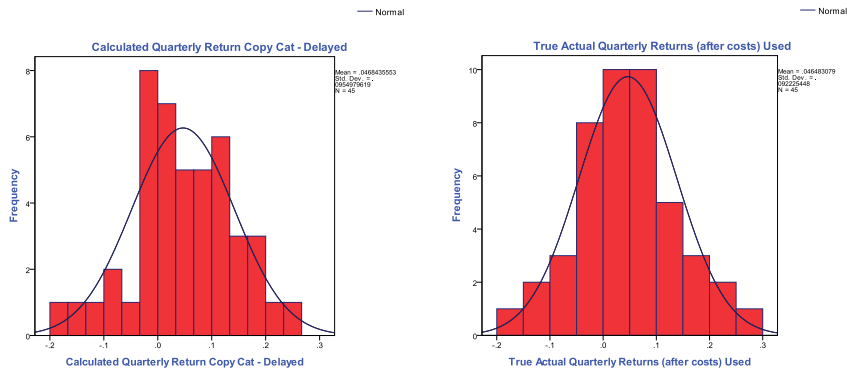
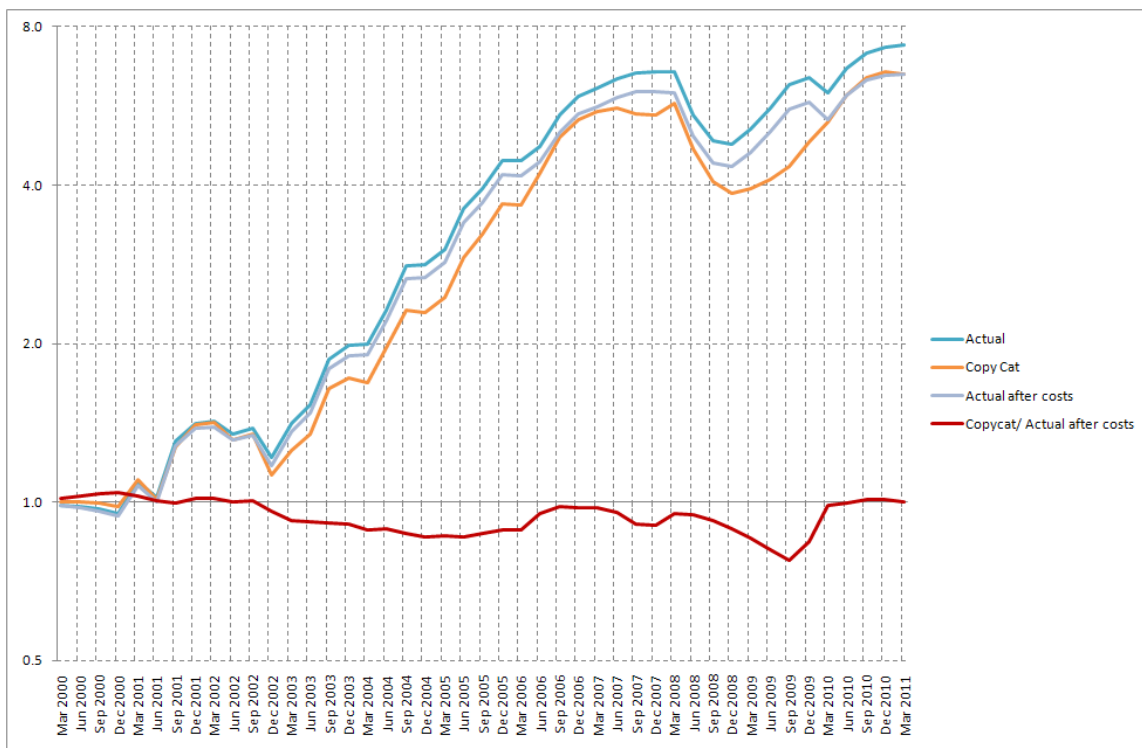


Figure 5-18 Investec Equity Fund – Cumulative Percentage Returns



- P value = 0.475 (>0.05). Do not reject the null hypothesis
- Hypothesis H_{20} holds true: $\mu_1 \geq \mu_c$

Coronation Equity Fund

Below a view of the distribution for the actual returns of the Coronation Equity Fund, after the deduction of costs, as well as the distribution of its copy cat fund returns.

Figure 5-19 Coronation Equity Fund - Frequency distributions of the actual fund returns, after deducting costs, and the copy cat fund

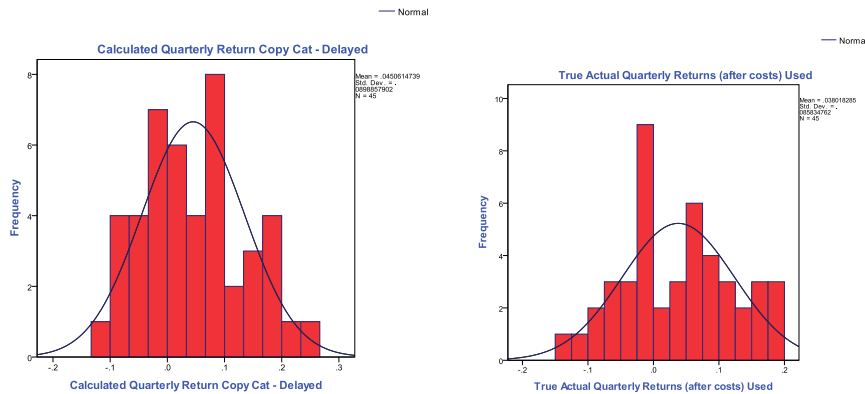
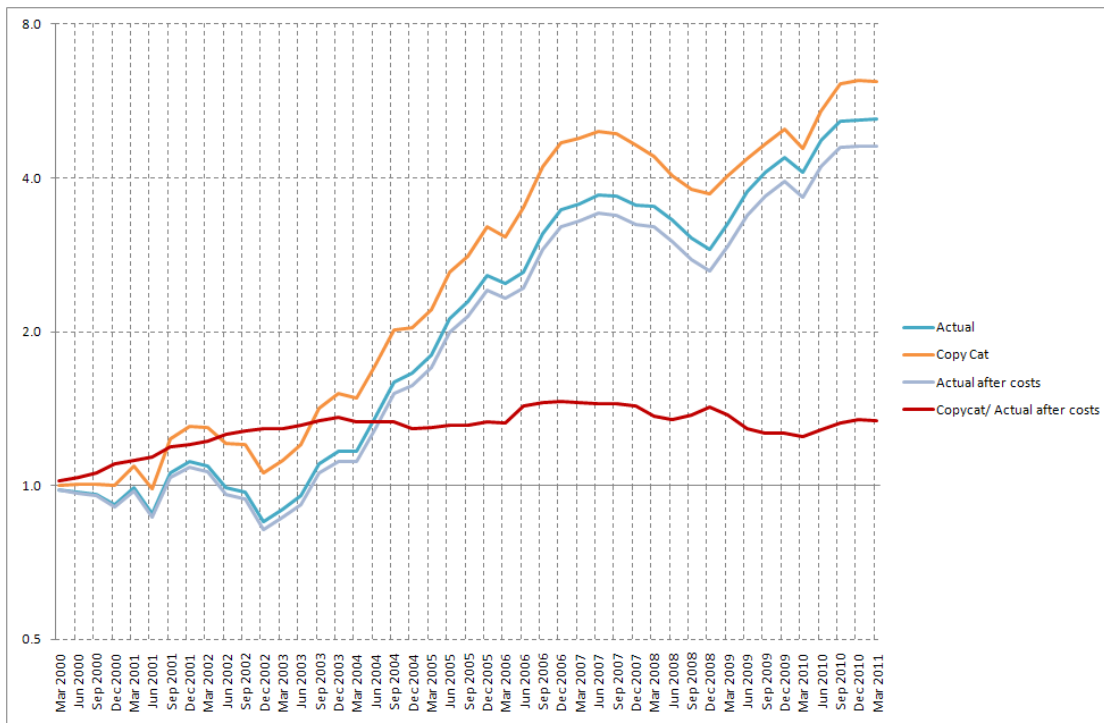


Figure 5-20 Coronation Equity Fund – Cumulative Percentage Returns



- $P \text{ value} = 0.038 (<0.05)$. *Reject the null hypothesis*
- **Hypothesis $H2_1$ holds true:** $\mu_1 < \mu_c$

Marriott Dividend Growth Fund

Below a view of the distribution for the actual returns of the Marriott Dividend Growth Fund, after the deduction of costs, as well as the distribution of its copy cat fund returns.

Figure 5-21 Marriott Dividend Growth Fund - Frequency distributions of the actual fund returns, after deducting costs, and the copy cat

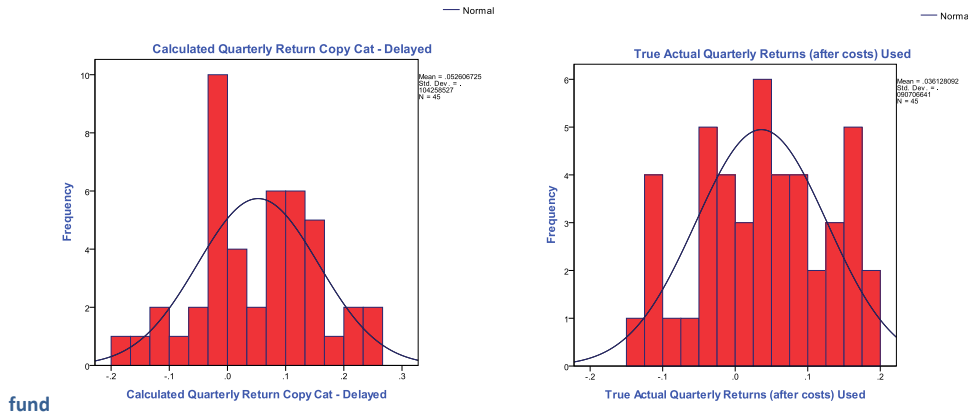
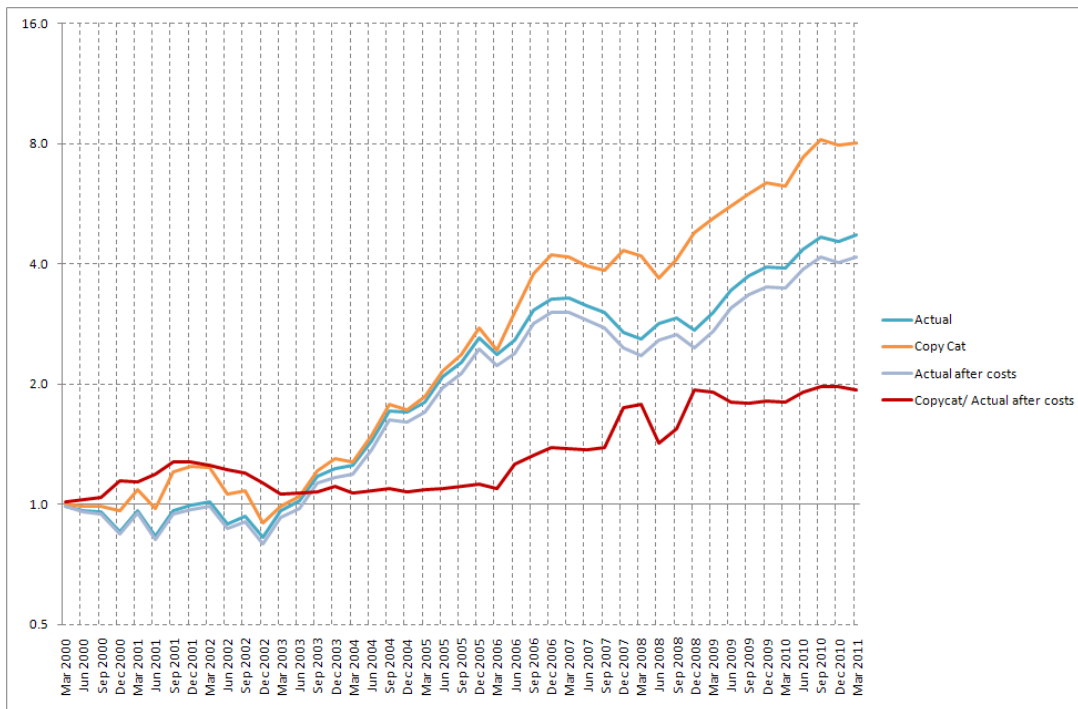


Figure 5-22 Marriott Dividend Growth Fund – Cumulative Percentage Returns



- $P \text{ value} = 0.065 (>0.05)$. Do not reject the null hypothesis
- Hypothesis $H2_0$ holds true: $\mu_1 \geq \mu_c$

FNB Growth Fund

Below a view of the distribution for the actual returns of the FNB Growth Fund, after the deduction of costs, as well as the distribution of its copy cat fund returns.

Figure 5-23 FNB Growth Fund - Frequency distributions of the actual fund returns, after deducting costs, and the copy cat fund

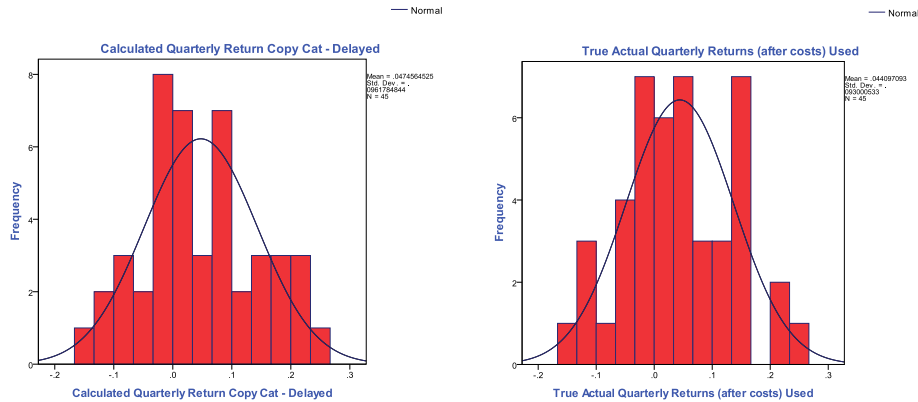
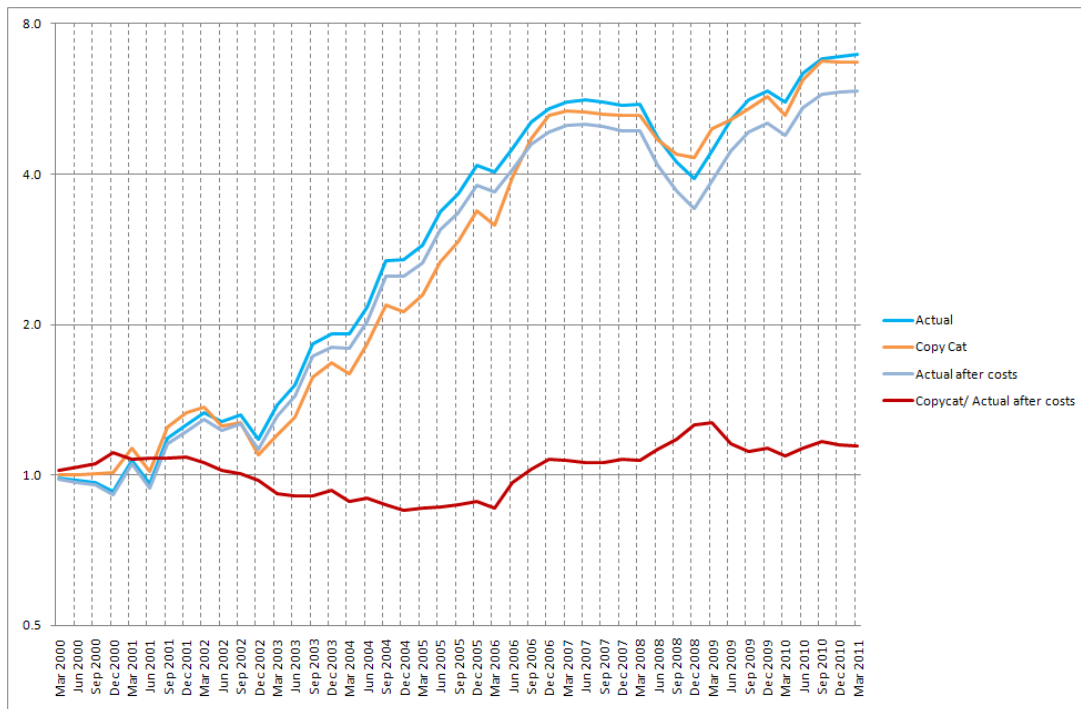


Figure 5-24 FNB Growth Fund – Cumulative Percentage Returns



- $P \text{ value} = 0.2882 (>0.05)$. Do not reject the null hypothesis
- **Hypothesis H_{20} holds true:** $\mu_1 \geq \mu_c$

Prudential Equity Fund

Below a view of the distribution for the actual returns of the Prudential Equity Fund, after the deduction of costs, as well as the distribution of its copy cat fund returns.

Figure 5-25 Prudential Equity - Frequency distributions of the actual fund returns, after deducting costs, and the copy cat fund

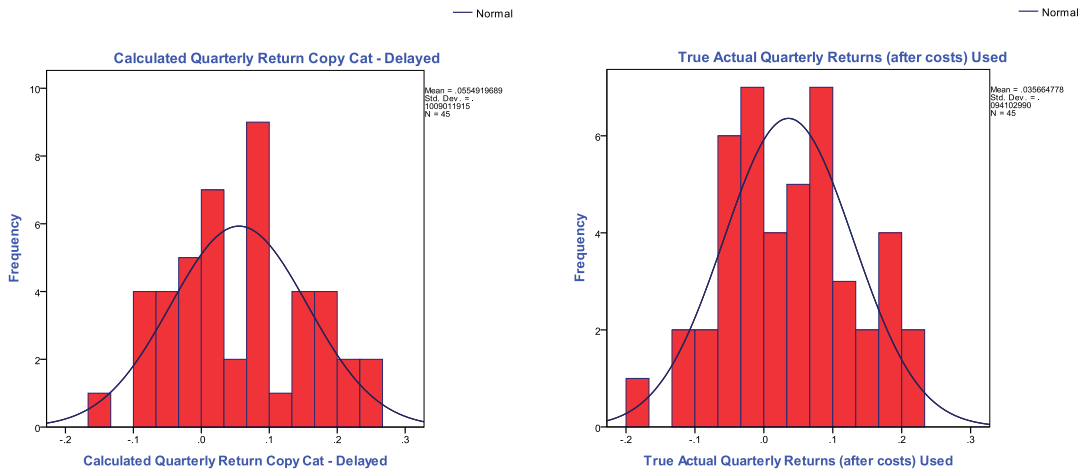
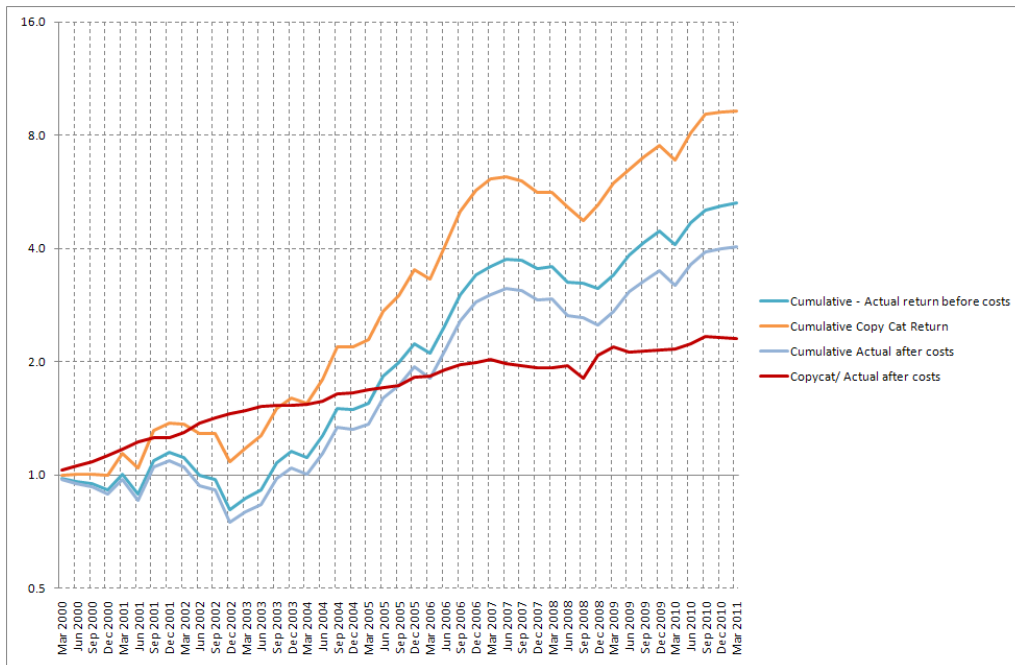


Figure 5-26 Prudential Equity Fund – Cumulative Percentage Returns



- $P \text{ value} = 0.0001 (<0.05)$. *Reject the null hypothesis*
- *Hypothesis H2₁ holds true:* $\mu_1 < \mu_c$

In summary,

Table 5-9 Paired one tail T-test results run on a sample of the larger South African funds

Fund Name	P Value (Paired two tail t test)	Hypothesis
Allan Gray Equity Fund	0.334 (>0.05)	Hypothesis H20 holds true: $\mu I \geq \mu C$
Old Mutual Investors Fund	0.1917 (>0.05)	Hypothesis H20 holds true: $\mu I \geq \mu C$
Coronation Equity Fund	0.0384 (<0.05)	Hypothesis H21 holds true: $\mu I < \mu C$
Investec Equity Fund	0.475 (>0.05)	Hypothesis H20 holds true: $\mu I \geq \mu C$
Investec Active Quants Fund	0.0506 (>0.05)	Hypothesis H20 holds true: $\mu I \geq \mu C$
Marriott Dividend Growth Fund	0.065 (>0.05)	Hypothesis H20 holds true: $\mu I \geq \mu C$
Cannon Equity Fund	0.023 (>0.05)	Hypothesis H20 holds true: $\mu I \geq \mu C$
FNB Growth Fund	0.2882 (>0.05)	Hypothesis H20 holds true: $\mu I \geq \mu C$
Prudential Equity Fund	0.0001 (<0.05)	Hypothesis H21 holds true: $\mu I < \mu C$

When considering the paired one tail t-tests of a few of the larger South African equity funds, the null hypothesis is in most cases not rejected, suggesting that in most cases considered the copy cat fund is not generating significantly higher returns than the initial investor.

6. DISCUSSION OF RESULTS

6.1. HYPOTHESIS 1

Hypothesis 1: The null hypothesis states that the average return experienced by initial investors is the same as the average return of copy cat funds, excluding fees. The alternate hypothesis states that the average return is not the same.

$$H_{1_0}: \quad \mu_i = \mu_c$$

$$H_{1_1}: \quad \mu_i \neq \mu_c$$

Although frequent portfolio disclosure increases transparency and allows investors the ability to validate funds against investment objectives, the frequent disclosure is said to also encourage predatory trading practices in the market, also referred to as copy cat investing (Verbeek and Wang, 2010).

Wermers (2001), Kacperczyk, Sialm and Zheng (2008) and Verbeek and Wang (2010) have over the past decade provided evidence that copy cat investing generates good returns for the copying fund, net of expenses.

The question asked in this section of the report is whether copy cat fund returns are similar to actual fund returns, before deducting costs. In order to access this question various statistical tests were performed on the South African general equity funds.

The South African results did not seem to align completely with those of Wermers (2001), Kacperczyk, Sialm and Zheng (2008) and Verbeek and Wang (2010). When considering the returns achieved within each quarter the null hypothesis was not rejected at a 0.05 level of significance suggesting that the returns of the copy cat fund were equal to those of the actual fund, before the deduction of costs. This aligned with what Wermers (2001), Kacperczyk, Sialm and Zheng (2008) or

Verbeek and Wang (2010) suggest, but when comparing the annualised cumulative return at the end of the disclosure period the returns were not similar. This suggests that in the long run the returns of the copy cat fund are likely to differ from the actual fund, before the deduction of costs.

Frank et al (2004) compared the net returns before trading costs for copy cat funds and the reported returns for the mutual fund, ignoring possible trading costs. They too found the net return indistinguishable from zero in the US market.

Verbeek and Wang (2010) suggest that the copy cat fund returns and the actual fund returns, before the deduction of costs by period, track one another closely. The graphs included in Chapter 5 for the third test across both hypotheses, show graphically that the returns do appear to track relatively closely in the South African general equity fund market. Reaffirming the statistical result for individual returns by period. Prudential is however an example of a fund where this theory does not hold true. Refer to Figure 5-14, 5-16, 5-18, 5-20, 5-22, 5-24 for examples where the copy cat fund does track the actual fund before the deduction of costs, and to 5-26 for the prudential example where this does not hold true.

Although the copy cat fund was only able to replicate their holdings a period later than the initial investment took place there is no evidence to show that the time lag has a negative impact on the copying fund.

This would hardly seem fair or ethical to the initial investing fund. Their trading strategy is publically displayed quarterly for all other investors to copy. Worse yet, without the copy cat fund doing any research or investigation of their own to define their own investing strategies. That said, statistically there is no benefit for the copy cat fund in the long term.

This hypothesis is however only indicative as the real question is ... are copy cat funds able to generate higher returns than the initial investor, after considering costs? These costs will be incurred by the initial fund irrespective of what copy cat funds do.

If the returns are in fact similar for both the initial fund and the copy cat fund without considering costs, what would the impact be if costs are considered? The statistical tests performed in hypothesis 1 only consider whether the returns are similar for the copy cat fund, it does not determine whether the return is higher or lower. One would however expect the inclusion of costs to influence the results.

6.2. HYPOTHESIS 2

Hypothesis 2: The null hypothesis states that the average return experienced by initial investors, after deducting fees, is more than or equal to the average return of copy cat funds. The alternate hypothesis states that the average copy cat return is larger than the average return of the initial investor, after deducting fees.

$$H_{2_0}: \quad \mu_i \geq \mu_c$$

$$H_{2_1}: \quad \mu_i < \mu_c$$

Is the copy cat fund better off? Are the initial funds leveraging off their research and generating higher returns for their investors or are the copy cat funds able to replicate those returns without the cost?

Some funds charge shareholder fees directly to investors whenever they buy or sell shares. In addition, every fund incurs operating expenses. Funds typically pay their operating expenses out of fund assets, passing the costs on indirectly to the investor. Although these fees may not seem significant they can substantially reduce an investor's earnings (ICI, 2010).

Disclosure in South Africa is quarterly, with each fund fulfilling their own fund mandate. Investors expect their fund managers to perform research and invest in the best portfolio. Investors would however not know easily if their fund managers are in fact copying another disclosed holding, albeit a period later. The evidence provided for the first hypothesis shows that the returns achieved by the initial fund are statistically similar to that of the copying fund, ignoring costs, by period. This does not hold true over the entire disclosure period though, leading to some interesting questions. What is the impact of costs? Does South Africa really have high TERs? Do these influence the results? In this analysis actual expense ratios were considered for each fund based on transactional evidence. The actual value spent on research is however not publically available so has not been explicitly included.

In their analysis, Verbeek and Wang (2010) found a substantial cross sectional dispersion in the relative performance of copy cat funds and stated that free riding on the portfolios disclosed by past winning funds and the funds that disclose representative holdings generate significantly better performance net of trading costs and expenses. Verbeek and Wang (2010) found that periodic portfolio disclosure provides outsiders with free riding opportunities to generate the net performance that is comparable to active funds, allowing outsiders to gain the benefits of research without ever undertaking the research themselves and without incurring the same level of expenses (Verbeek and Wang, 2010).

In the South African general equity market the results were very interesting.

Initially when considering the returns per period, by using a paired one tail t-test, the p value generated was 0.082, which when applying a 0.05 level of significance resulted in the null hypothesis not being rejected. This means that the returns for the actual fund, after deducting costs, were either equal to or greater than the returns generated by the copy cat fund. Also when considering the cumulative annualised returns across all funds the statistical tests showed the actual fund returns

to be equal to or higher than the copy cat fund. This is contradiction to the research completed by Werbeek and Wang (2010) in the US mutual fund market.

Frank et al (2004) compare the net returns before trading costs for copy cat funds and the reported returns for the mutual fund, ignoring trading costs. They found the net return indistinguishable from zero. Verbeek and Wang (2010) comment that given the insignificant gross return difference and the considerably lower expense ratios for copy cat funds, the outperformance by copy cat funds in terms of net returns before trading costs is not surprising. The relatively high expenses eliminate almost all of the expected gains from the active investments. This did not hold true in the South African analysis.

Copy cat funds do not incur expenses as do the funds that they are mimicking but they do miss the opportunity to invest in assets that managers identify as good return opportunities between disclosure periods (Mysers, Poterba, Shackelford and Shoven, 2001). Based on the evidence in this analysis the data suggests that the loss in revenue from missing these good opportunities is not made up by the benefit from the reduction in costs for the copy cat fund.

Chalmers *et al* (2001) claim that the relation between mutual fund returns and trading expenses provides a powerful test of the value of active trading. There is however inconsistent evidence, which they believe was due to the use of turnover as a proxy for trading expenses. In turn they estimate trading expenses directly using portfolio holdings and transaction data and found that fund managers fail to recover the cost of transacting. However, Wermers (2000) concluded that active management adds value. He examines trading expenses for funds sorted by style and turnover, using a different approach to that suggested by Chalmers *et al* (2001).

In this analysis actual fund returns were considered and compared to the returns generated by copy cat investors, by applying a buy and hold strategy after the portfolio holdings of the initial fund were disclosed.

In the South African analysis it would appear that active trading has an effect on the returns generated by the initial funds. The statistical tests performed on the group of South African unit trust funds suggests that the copy cat fund is not able to consistently generate higher returns.

What is also interesting to consider is how TERs influence this outcome. Khorana, Servaes and Tufano (2006) study fees charged by 46,799 mutual funds offered for sale in 18 countries, which together account for about 86% of the world fund industry. They examined management fees, total expense ratios and estimated total shareholding costs (which include load charges) and found that fees vary substantially from country to country. They found that larger funds and fund complexes charge lower fees, as do funds selling cross-nationally, while fees are higher for funds distributed in more countries and funds domiciled in so-called offshore locations. Total expense ratios for South African general equity funds vary from close to 0% to as large as 4.5%, showing quite a large variation. Based on the summary provided in Table 5.5, there is no evidence to suggest that larger TER's allowed for easier copy cat outperformance.

At this point it was felt that talking in aggregate terms did not provide a substantial conclusion as to whether copy cat investing could work in the South African general equity fund market. Perhaps because the first two tests were performed across all funds, the funds where copy cat investing could prove lucrative for a South African investor were not apparent. Some detail will now be discussed around the results depicted when considering each fund individually. The summary table has been copied again below for easy reference.

Table 6-1 Summary Results – Copy cat fund performance

Fund Name	Start Date	End Date	Annual TER	Tenure (Disclosed)	No of quarters	Number of quarters of out performance	Percentage of out performing quarters	Copy cat Percentage out performed	Average Annualised Return	Average Annualised CopyCat Return
PSG Alphen Equity FoF	Sep 2002	Mar 2011	2.76%	9	34	19	56%	13.4%	13.0%	28.2%
Momentum Multifocus FoF	Dec 2000	Mar 2011	2.72%	11	42	32	76%	13.1%	8.8%	24.6%
PSG Alphen Growth	Mar 2000	Mar 2011	2.76%	11	44	31	70%	11.2%	9.0%	21.2%
RMB Equity	Mar 2000	Mar 2011	3.09%	11	45	28	62%	11.1%	17.6%	30.6%
Momentum Aggressive Equity FoF	Dec 2001	Mar 2011	1.91%	10	34	23	68%	8.4%	8.4%	17.5%
Momentum Moderate Equity FoF	Dec 2001	Mar 2011	1.89%	10	34	23	68%	8.3%	8.5%	17.5%
Prudential Equity	Mar 2000	Mar 2011	2.48%	11	45	37	82%	7.9%	12.3%	20.4%
Hermes Equity	Mar 2006	Mar 2011	1.24%	5	18	11	61%	7.6%	3.0%	10.8%
Vega General Equity	Sep 2009	Mar 2011	1.67%	2	7	5	71%	7.3%	5.7%	10.8%
STANLIB Prosperity	Mar 2000	Mar 2011	1.72%	11	45	35	78%	7.3%	9.1%	17.0%
Marriott Dividend Growth	Mar 2000	Mar 2011	1.15%	11	45	27	60%	6.2%	13.8%	20.9%
Coris Capital General Equity	Mar 2000	Mar 2011	1.94%	11	46	34	74%	6.1%	11.5%	18.3%
Element Islamic Equity	Sep 2009	Mar 2011	1.80%	2	7	5	71%	5.8%	4.6%	8.6%
Old Mutual Growth	Mar 2000	Mar 2011	1.15%	11	45	29	64%	5.8%	17.9%	24.7%
Cannon Equity	Sep 2005	Mar 2011	1.48%	6	23	17	74%	5.5%	12.0%	18.2%
Tri-Linear Equity	Mar 2000	Mar 2011	1.67%	11	45	33	73%	5.4%	10.1%	16.0%
Old Mutual High Yield Opportunity	Mar 2000	Mar 2011	1.42%	11	38	29	76%	5.3%	13.0%	19.1%
Maestro Equity	Sep 2005	Mar 2011	2.10%	6	8	5	63%	5.1%	4.8%	15.7%
Analytics Managed Equity	Mar 2002	Mar 2011	1.52%	9	37	25	68%	5.0%	13.9%	19.7%
Capstone Active Equity FoF	Mar 2005	Mar 2011	2.43%	6	25	13	52%	4.0%	18.5%	23.3%
ValuGro General Equity	Mar 2005	Mar 2011	1.67%	6	25	12	48%	2.9%	16.7%	20.1%
Gryphon All Share Tracker	Mar 2000	Mar 2011	0.61%	11	45	28	62%	2.9%	12.9%	16.2%
Investec Active Quants	Mar 2000	Mar 2011	0.43%	11	45	30	67%	2.7%	14.2%	17.3%
Coronation Equity	Mar 2000	Mar 2011	1.13%	11	45	30	67%	2.7%	14.9%	18.0%
Element Earth Equity	Sep 2009	Mar 2011	1.73%	2	7	3	43%	2.2%	5.2%	6.7%
Foord Equity	Dec 2002	Dec 2010	2.00%	8	33	17	52%	2.1%	17.6%	19.7%
Stanlib Index	Mar 2000	Jun 2009	0.65%	9	38	27	71%	1.7%	11.5%	13.0%
FNB Growth	Mar 2000	Mar 2011	1.56%	11	45	24	54%	1.2%	17.4%	18.9%
Old Mutual Investors	Mar 2000	Mar 2011	1.14%	11	45	23	51%	1.1%	16.3%	17.6%
Absa Select Equity	Mar 2004	Mar 2011	1.15%	7	29	16	55%	0.9%	21.3%	22.4%
Old Mutual Top Companies	Mar 2000	Mar 2011	1.15%	11	45	22	49%	0.6%	16.3%	16.9%
BJM Core Equity	Sep 2009	Mar 2011	1.80%	2	7	3	43%	0.3%	6.2%	6.4%
SYMMETRY Equity FoF	Sep 2001	Mar 2011	1.67%	10	39	30	77%	0.2%	14.3%	14.6%
Verso Multi-Manager Long Term SA Equity	Sep 2009	Mar 2011	4.44%	2	7	5	71%	0.1%	4.9%	5.0%
Allan Gray Equity	Mar 2000	Mar 2011	1.56%	11	45	25	56%	0.1%	21.4%	22.0%
Investec Equity	Mar 2000	Mar 2011	1.15%	11	45	19	42%	0.0%	18.6%	18.6%
Indequity Technical	Sep 2009	Mar 2011	2.01%	2	7	4	57%	-0.2%	6.8%	6.6%
ABSA General	Mar 2000	Mar 2011	1.76%	11	45	23	51%	-0.2%	15.9%	15.7%
N-e-FG Equity	Sep 2009	Mar 2011	2.06%	2	7	4	57%	-0.4%	6.7%	6.4%
Sasfin Equity	Dec 2005	Mar 2011	1.23%	6	22	11	50%	-0.5%	13.1%	12.6%
Personal Trust SA Equity	Sep 2009	Mar 2011	1.50%	2	7	2	29%	-0.6%	8.4%	7.9%
NFB Equity	Sep 2009	Mar 2011	1.65%	2	7	5	71%	-0.7%	4.2%	3.7%
Nedgroup Investments Rainmaker	Sep 2009	Mar 2011	1.15%	2	7	3	43%	-0.7%	9.6%	9.0%
Matador Equity FoF	Mar 2005	Mar 2011	2.84%	6	19	10	53%	-1.4%	8.8%	7.3%
Metropolitan General Equity Portfolio	Sep 2009	Mar 2011	1.45%	2	7	4	57%	-1.9%	7.3%	5.9%
Harvard House General Equity	Dec 2006	Mar 2011	1.51%	5	18	6	33%	-2.0%	6.1%	3.9%
STANLIB Multi-Manager Equity	Sep 2009	Mar 2011	1.94%	2	7	4	57%	-2.0%	8.2%	6.7%
Sasfin TwentyTen	Dec 2005	Mar 2011	1.23%	6	22	9	41%	-2.1%	9.5%	7.2%
SIM General Equity	Sep 2009	Mar 2011	1.14%	2	7	4	57%	-2.3%	9.6%	8.0%

Nedgroup Investments Quants Core Equity	Sep 2009	Mar 2011	1.15%	2	7	3	43%	-2.3%	9.2%	7.5%
Community Growth	Sep 2009	Mar 2011	0.58%	2	7	4	57%	-2.4%	6.8%	5.1%
Kagiso Equity Alpha	Dec 2009	Mar 2011	1.48%	2	6	2	33%	-2.5%	7.5%	5.7%
Plexus RAFI Enhanced SA Strategy	Sep 2007	Mar 2011	1.23%	4	8	4	50%	-2.5%	5.1%	2.5%
RMB Private Bank Equity	Jun 2004	Mar 2011	0.59%	7	18	10	56%	-2.9%	19.5%	16.0%
STANLIB Shari'ah Equity	Sep 2009	Mar 2011	1.72%	2	7	3	43%	-2.9%	4.9%	2.8%
Huysamer Equity	Sep 2009	Mar 2011	1.30%	2	7	4	57%	-3.1%	8.2%	6.0%
SMMI Equity FoF	Sep 2009	Mar 2011	2.18%	2	7	3	43%	-3.3%	7.4%	5.0%
STANLIB Index	Sep 2009	Mar 2011	0.65%	2	7	3	43%	-3.6%	11.5%	13.0%
27 Four Active Equity	Sep 2009	Mar 2011	1.30%	2	7	3	43%	-3.6%	8.1%	5.5%
Metropolitan Multi-Manager Equity Portfolio	Sep 2009	Mar 2011	1.20%	2	7	3	43%	-3.7%	10.9%	8.1%
Absa Growth FoF	Mar 2000	Mar 2011	3.71%	11	45	27	60%	-3.7%	27.0%	22.3%
Prescient Equity Active Quant	Sep 2009	Mar 2011	1.20%	2	7	4	57%	-3.8%	9.4%	6.6%
Interneuron Capital Equity Portfolio	Sep 2009	Mar 2011	2.01%	2	7	3	43%	-3.8%	7.3%	4.5%
Oasis General Equity	Mar 2003	Dec 2010	1.72%	7	10	1	10%	-3.9%	24.1%	13.0%
Oasis Crescent Equity	Mar 2003	Dec 2010	2.17%	7	10	4	40%	-4.1%	18.5%	7.6%
Nedgroup Investments Equity	Sep 2009	Mar 2011	1.15%	2	7	3	43%	-4.1%	8.4%	5.4%
Imara Equity	Sep 2009	Mar 2011	1.79%	2	7	2	29%	-4.1%	9.4%	6.4%
Stewart Macro Equity FoF	Sep 2009	Mar 2011	2.29%	2	7	3	43%	-4.3%	8.1%	5.0%
Clade Cash Flow Weighted Equity	Sep 2009	Mar 2011	1.07%	2	7	3	43%	-4.3%	8.9%	5.7%
Discovery Equity	Sep 2009	Mar 2011	1.78%	2	7	3	43%	-4.4%	8.9%	5.7%
STANLIB Equity	Sep 2009	Mar 2011	1.23%	2	7	3	43%	-4.4%	9.6%	6.4%
Old Mutual Active Quant Equity	Sep 2009	Mar 2011	1.32%	2	7	3	43%	-4.9%	9.5%	5.9%
Lynx Opportunities FoF	Sep 2009	Mar 2011	2.77%	2	7	3	43%	-5.0%	8.6%	5.0%
SIM Top Choice Equity	Sep 2006	Mar 2011	1.13%	5	19	9	47%	-5.2%	14.0%	8.0%
Sanlam All Share Index	Sep 2009	Mar 2011	0.38%	2	7	3	43%	-5.3%	9.7%	5.9%
STANLIB Multi-Manager All Stars Equity FoF	Sep 2009	Mar 2011	1.94%	2	7	2	29%	-5.6%	9.1%	5.0%
FG Mercury Equity FoF	Sep 2009	Mar 2011	2.09%	2	7	2	29%	-5.6%	9.1%	5.0%
PSG Advance Wealth Creator FoF	Sep 2007	Mar 2011	2.48%	4	7	4	57%	-5.7%	2.4%	-2.8%
Prescient Equity Quant	Sep 2009	Mar 2011	0.60%	2	7	2	29%	-6.2%	9.7%	5.1%
Old Mutual RAFI 40 Tracker	Sep 2009	Mar 2011	0.89%	2	7	1	14%	-6.7%	9.4%	4.5%
Satrix RAFI 40 Total Return Portfolio	Sep 2009	Mar 2011	0.53%	2	7	1	14%	-7.3%	10.5%	5.1%
Lion of Africa General Equity	Sep 2009	Mar 2011	1.65%	2	7	2	29%	-8.2%	10.8%	4.6%
STANLIB Nationbuilder	Sep 2004	Mar 2011	1.72%	7	21	6	29%	-8.8%	4.5%	-4.8%
Aylett Equity	Sep 2009	Dec 2010	1.80%	1	4	1	25%	-11.9%	6.3%	1.9%
Alphen Equity Builder	Sep 2009	Mar 2011	0.76%	2	7	1	14%	-21.3%	20.9%	3.1%
							Averages:	51%	-0.3%	

From the table above it is clear that the results differ substantially by fund. In all of the commentary from this point forward when referring to the “actual fund return”, it references the actual fund return, after the deduction of TER. This is the return actually attained by the fund.

Of the 85 funds:

- The copy cat fund outperformed the actual fund in 35 cases (41% of funds)
- The copy cat fund did not outperformed the actual fund in 49 cases (58% of funds)
- One fund showed no difference

Across the 85 funds:

- When considering the outperformance within a fund, across the quarters disclosed. On average 52% of all quarters recorded an outperformance for the copy cat fund.
- On average across all funds there was a slight underperformance of -0.03% recorded for the copy cat funds.

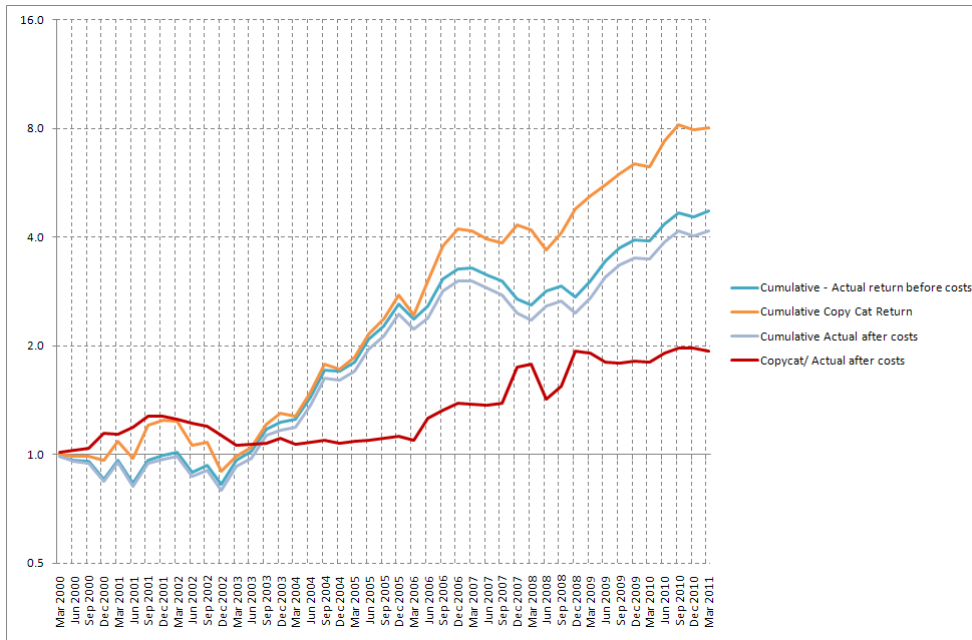
Lets consider some of the funds that showed copy cat fund outperformance. Prudential Equity Fund and Marriott Dividend Growth Fund are examples of funds that showed significant outperformance. This aligns with the statistical tests run against the Prudential Equity Fund returns in the third test of hypothesis two. The p value of that test was 0.001 proving very significant and showing that the quarterly returns for the copy cat were significantly higher than the actual fund quarterly returns. This held true when considering aggregated returns for six monthly returns, annual returns as well as two yearly returns as depicted by the p values in the t-tests shown in the table below:

Table 6-2 Prudential p values by aggregated periods

Prudential Equity Fund	Quarterly returns		Semi annual returns		Annual returns		2 Yearly returns	
	Actual Fund Return	Copy Cat Fund Return	Actual Fund Return	Copy Cat Fund Return	Actual Fund Return	Copy Cat Fund Return	Actual Fund Return	Copy Cat Fund Return
Mean:	3.57%	5.55%	7.62%	11.93%	16.23%	25.18%	30.90%	51.21%
n	45	45	22	22	11	11	5	5
Standard Deviation	0.0941	0.1009	0.1497	0.1753	0.2505	0.2790	0.3762	0.4125
P Value (T test - Paired, 1 tail)	0.0001		0.0014		0.0008		0.0064	

For Marriott Dividend Growth Fund lets consider the cumulative returns are depicted below:

Figure 6-1 Marriott Dividend Growth Fund – Cumulative Percentage Returns



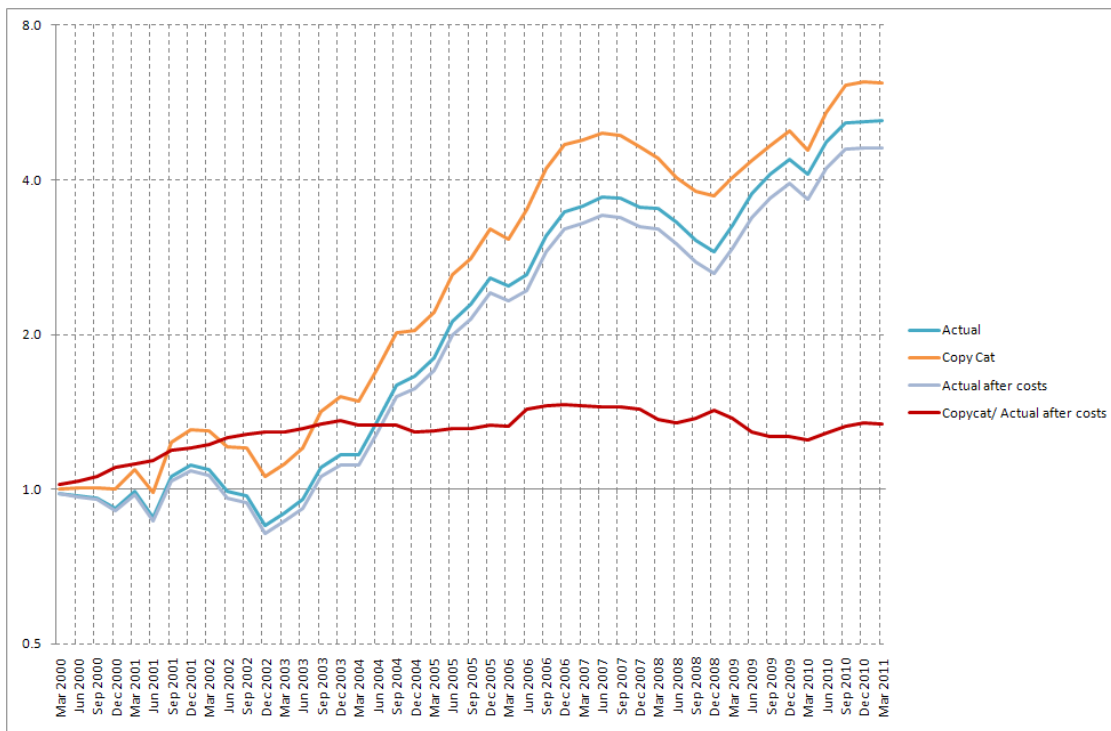
Here it is interesting to note that the copy cat fund shows outperformance, but in this case visually it is apparent that the copy cat fund tracked the actual fund almost exactly from 2003 to 2005. The statistical test show a p value of 0.065, resulting in the null hypothesis not being rejected at a 0.05 level of significance, thus not proving higher copy cat returns consistently. In this case if one were to consider a 0.1 level of significance the null hypothesis would have been rejected. Visually one can see that the period from 2003 to 2005 did not generate significantly higher performance for the copy cat fund, but thereafter the copy cat fund noticeably outperformed the actual fund. Given the performance now one would suggest that Marriott is a good option for copy cat investing, assuming the copy cat fund tracks the performance as it has since 2005.

Coronation Equity Fund, Investec Active Quants Fund, Old Mutual Investors Fund and Allan Gray Equity Fund showed slight outperformance for the copy cat fund. Lets consider these in a bit more detail.

According to the statistical tests performed in Chapter 5, Coronation Equity Fund showed significant outperformance by the copy cat fund, but in the cases of Investec Active Quants Fund, Old Mutual

Investors Fund and the Allan Gray Equity Fund the t-tests did not confirm significant outperformance by the copy cat fund. In these cases it would be expected that the outperformance of the copy cat fund was low or that the returns of the two return series track one another quite closely. The relevant figures from Chapter 5 have been copied below for ease of reference.

Figure 6-2 Coronation Equity Fund – Cumulative Percentage Returns

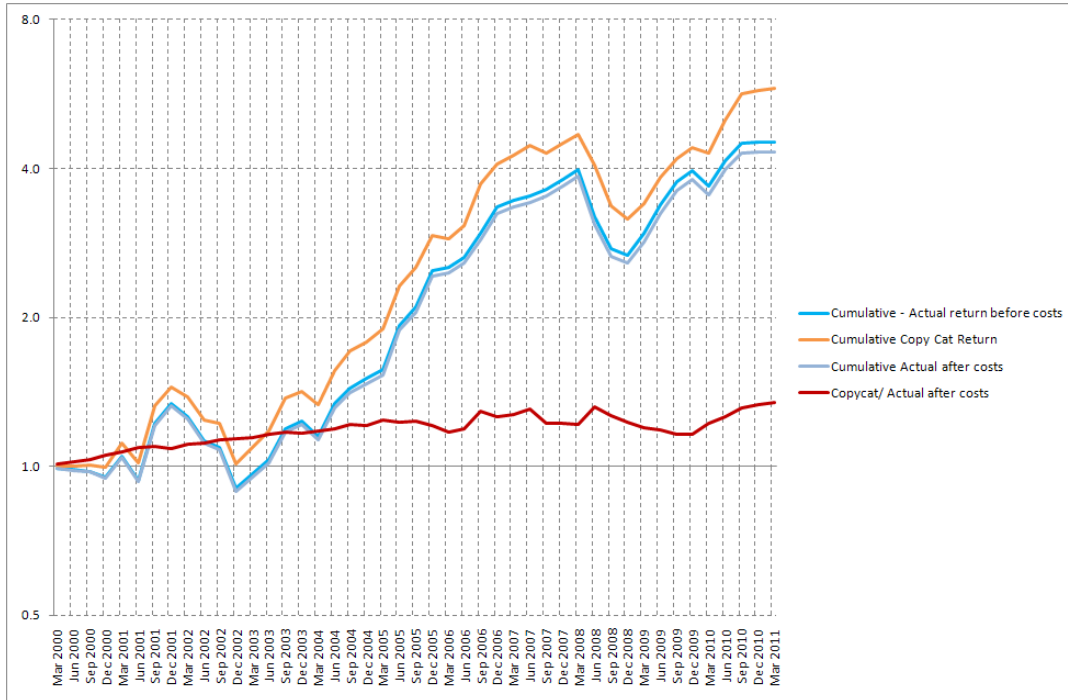


For the Coronation Equity Fund the funds track similar performance, with the copy cat fund tracking above the actual fund, however there has been no growth in this outperformance recently. The red line above is consistently above 1.0 confirming outperformance overall by the copy cat fund. As stated above, this was also confirmed by the statistical one tail t-test. One should note however that the outperformance has been particularly flat in the past eight years. It should be questioned whether this fund will generate lucrative returns for the copy cat if they were to commence investment now.

A little further down the table is Investec Active Quants Fund. In this case the p value generated was 0.0506, which was rejected at the 0.05 level of significance, but could have been accepted if the level

of significance was reduced to 0.1. Here one would say that we are 90% confident that the copy cat fund would provide outperformance. Refer to the figure below for additional visual evidence.

Figure 6-3 Investec Active Quants Fund – Cumulative Percentage Returns



Once again it can be seen that the copy cat fund continuously tracks above the actual fund returns. Statistically, the copy cat fund is able to generate higher returns than the actual fund with a 90% certainty. Outperformance in the last few quarters has been on the incline.

The above mentioned funds generate higher returns for the copy cat fund, and have statistical tests confirming the copy cat fund outperformance, suggesting that funds on the top of the summary table above could be copied quite lucratively.

For the next few funds, the statistical evidence does not necessarily support the copy cat outperformance, but visually one can see some outperformance, supported by the long run outperformance provided in the table above. In these cases it would depend on the investors risk appetite to determine whether to follow a copy cat investment strategy. Refer to the red lines in each of the figures below for an indication of the outperformance in the disclosed period.

Figure 6-4 Old Mutual Investors Fund – Cumulative Percentage Returns

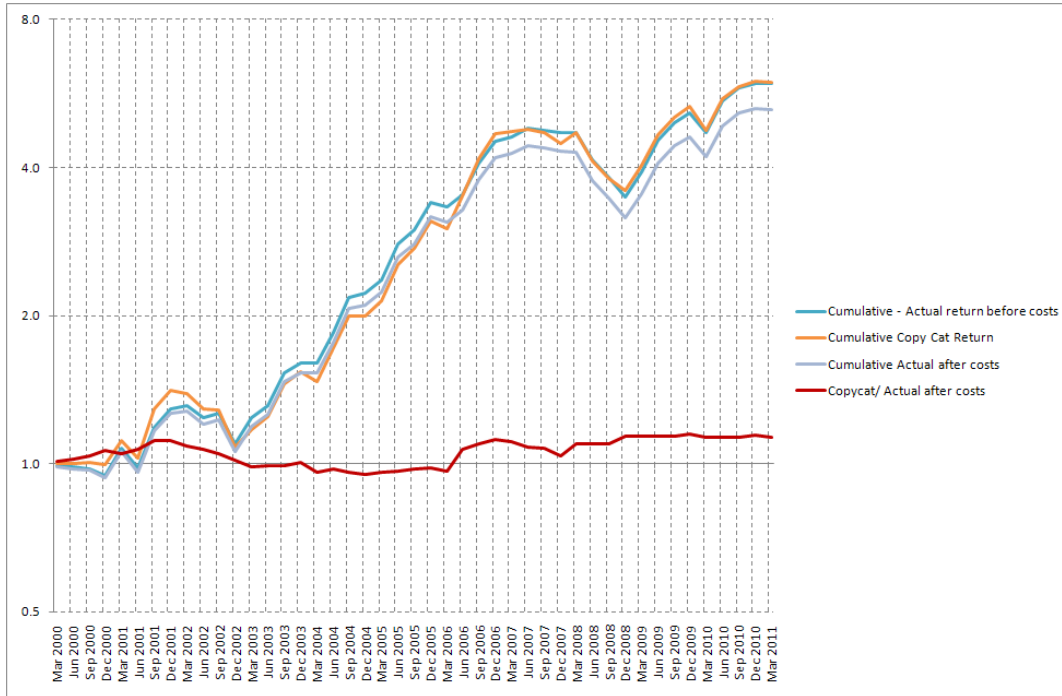
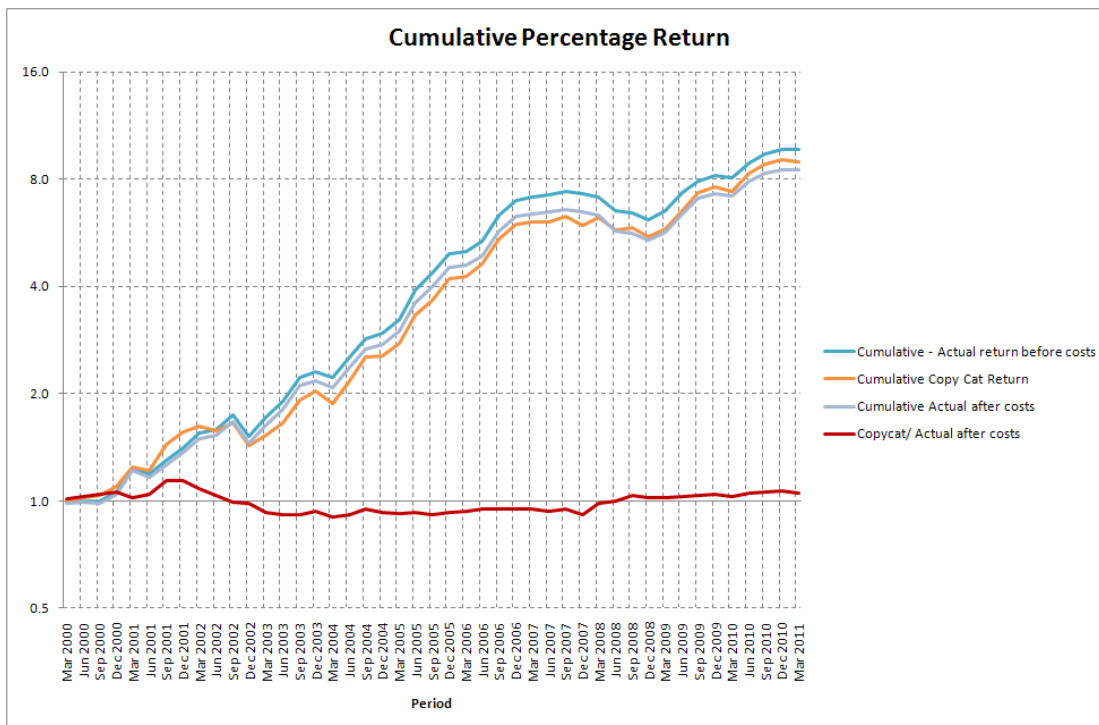


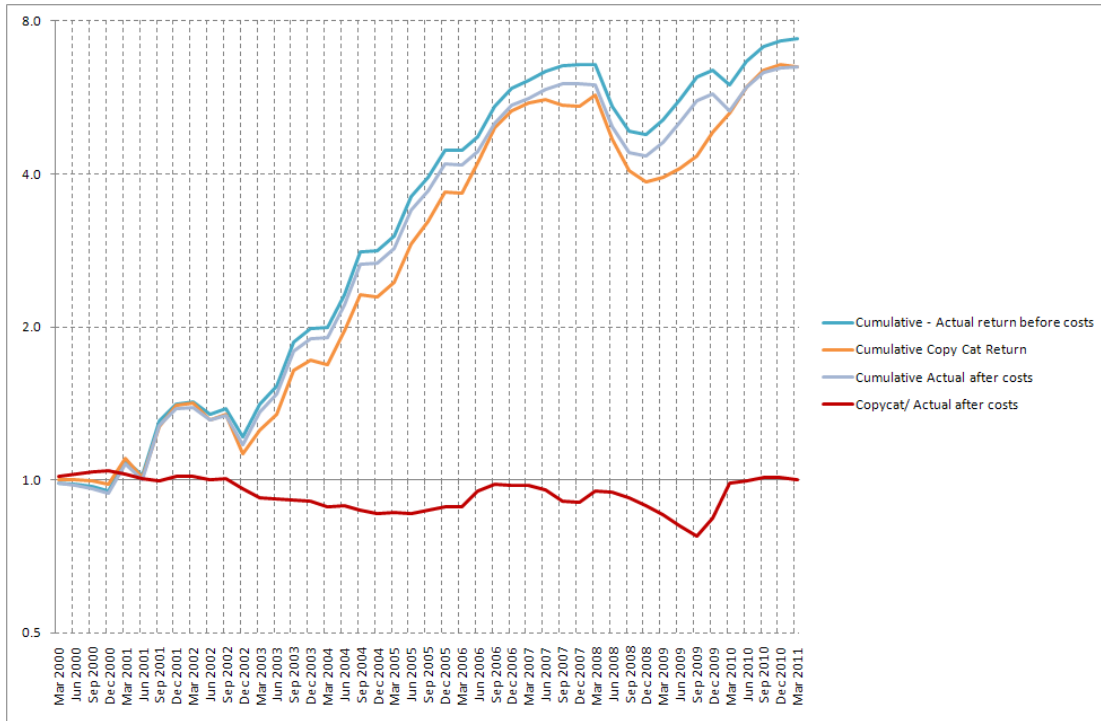
Figure 6-5 Allan Gray Equity Fund – Cumulative Percentage Returns



In both of these cases one would need to proceed with caution. Visually there appears to be no guarantee of outperformance for the copy cat fund.

Then lastly, when considering all the funds that generated lower performance for the copy cat fund it would not be recommended to copy cat these investments. An example of one of those can be seen below:

Figure 6-6 Investec Equity Fund – Cumulative Percentage Returns



As one moves down the summary table the return of the copy cat funds get worse and worse and are not supported by any of the statistical tests. It would thus not be recommended to copy cat the investment strategies of these South African general equity funds.

Each copy cat fund discussed above has generated different results. One would have assumed that if the copy cat fund shows outperformance at the end of the disclosed period it would be a good copying opportunity. We have however seen with certain funds, Coronation for example, that this outperformance was achieved in past historical periods and that in the recent periods the copy cat fund has not been able to generate significant returns.

Other funds like Marriott Dividend Growth Fund have statistical test results suggesting that the copy cat is unable to generate significantly higher returns, yet when ignoring the first few years the outperformance is almost 100%. These tests change when the first few years are ignored.

This leads to the conclusion that the period under consideration significantly influences the results. Averaging over time does not always provide accurate recommendations. It is necessary to consider the statistical tests of significance, along with the historical performance variation of each fund.

When critically interpreting the information in the table above there are a number of things that stand out.

- There is no relationship between copy cat performance and TER by fund. It was suggested in the reason for performing this research that South Africa is a high cost structure environment and that these environments provide a perfect platform for copy cat investing. This has not been proven by this analysis.
- Even though the percentage of outperforming quarters is particularly high for many funds, this does not necessarily translate into overall copy cat outperformance. It would thus not be accurate to consider the number of outperforming quarters a measure of copy cat outperformance.

6.3. RESEARCH LIMITATIONS

South African firms are mandated to disclose all investments to ASISA, but are not mandated to disclose to the public. In some cases only top ten investments are published, in others only holdings over 1%, and in others there is no disclosure at all. This has influenced the study as only available information could be used.

By simulating return profiles based on 'historical' market movement, technically without that actual trading in the real market, actual impacts on the market are ignored. If everyone enters the market simultaneously there is usually a run in the market as is often depicted with futures close outs, impacting spread and in turn influencing trading behaviour immediately. Elton *et al* (2010) provide evidence against herding and believe this will not impact monthly portfolio investigations. As such the impact of herding was ignored.

Numerous assumptions have been made in this analysis. It would be greatly beneficial to use actual intra period trading information, particularly in the actual fund return calculations. The strategy of buy and hold would still have to be applied by the copy cat fund, but if one were able to generate return series for every general equity fund based on true returns and true holdings, including their hedging strategies and investments in other funds the results would be a more real interpretation of effectiveness.

Categorised allocations have been linked to a general index, in this analysis the Satrix 40 Index, to include some variability and due to the fact that these categories were less than 1% of the actual fund holding it was decided that the impact thereof would be small. Each industry categorisation could be linked to appropriate industry indices to provide a more accurate view.

Given that the merger and acquisition data was stored manually over time it is possible that that additional mergers and acquisitions have taken place than those that are known to us at this time. Further confirmation thereof could be beneficial.

As equity price series could only be provided from the year 2000, this limited the period for consideration in this analysis to ten years, rather than the planned 18 years. This was unfortunate given that the holding information was available from 1992. There is however speculation that the holding information from 1992 may have been very sparse and would have required significantly more assumptions to be applied.

If equity prices were not available in the provided market data, it was assumed that the organisation no longer existed. In most cases these equities have been linked to general indices to provide an indication of growth. It is highly recommended that rate information be carefully gathered and confirmed if this research is to be replicated.

7. CONCLUSION

Unit trust funds in South Africa are required to disclose their holdings quarterly, in line with the FSB requirements. Myers et al (2001) stated that one of the costs of more frequent disclosure is the potential reduction in the private benefits from research on asset values. Wermers (2001) stated that it is possible for outsiders to “front run” and copy disclosed holdings. Verbeek and Wang (2010) attempted to address the extent to which more frequent disclosure provided valuable information for outsiders.

This report provides evidence that although returns for copy cat funds are similar to those of the actual fund, before the deduction of costs, in the long run there is no significant benefit to the copy cat fund.

When considering costs, the South African analysis only partly aligns with works performed in the US market completed by Wermers (2001), Frank *et al* (2004) and Coval, Joshua and Stafford (2007). They highlight some of the negative aspects associated with quarterly disclosure, including the likely increase in new costs for mutual funds and the ability for external funds to benefit from the fund research performed by these funds without undertaking it themselves or incurring the actual cost of owning the fund shares. In South Africa the copy cat funds are not able to consistently generate higher returns, suggesting that they are not able to leverage off the savings in cost to the degree stated in the US research. It also suggests that South African firms are able to influence their returns by active trading during the period, which the copy cat fund is not able to replicate.

When costs are deducted, the statistical tests run across all South African general equity funds suggest that the copy cat funds are not able to generate significantly higher returns. It would appear

that the benefit received by these funds of not incurring large TERs and research costs, does not outweigh the active trading benefit for South African funds between disclosure periods.

When considering the total expense ratios across the South African general equity fund market there does not seem to be any relationship with copy cat outperformance. Although copy cat funds should have a loss in revenue due to their inability to determine good opportunities, they save on the costs, but in the South African market this does not seem to result in outperformance across all funds.

Based on this analysis it is however possible to copy cat certain funds quite successfully. It is important to consider both the statistical tests performed over time, but it is also necessary to judge the copy cat outperformance graphically over time. Recent outperformance may not translate into future outperformance.

7.1. RECOMMENDATIONS FOR FUTURE RESEARCH

Equity price series data was only available from the year 2000 for this analysis although holding information was available from 1992, thus limiting this analysis to a decade. It would be worth considering a longer period to determine whether economic cycles influenced the outcome.

This analysis focussed specifically on general equity funds, but could be applied across all funds and fund of funds including all trading instruments, rather than just equity holdings. Including derivatives would add a quantitative challenge as option investments for example trade in and out of the money and may not be as simple to replicate. Assumptions will most likely have to be made in that analysis too, but would be particularly interesting research.

Every fund has a trading mandate, both in this country as well as those internationally. These mandates differ significantly. For the purposes of this research only general equity funds were

considered and within that only basic equity investing. It would be interesting to determine whether the results of this analysis differ by mandate. Additional questions could be considered such as:

- Does hedging make a difference to the overall trading?
- How would one apply hedging?
- Are overdrafts beneficial?
- What influence does cash have on the portfolio?
- Are there any other hidden costs that have not been considered in this methodology?
- Do economic cycles impact results?
- Do changing market rate assumptions significantly change the outcome of this research?
- Are certain mandates easier to replicate than others?

Additional analysis and research could be undertaken to supplement this research, however given the data disclosure related limitations it may be worth repeating this analysis once full holdings are published or once more data is available to provide a fully representative output. Excessive time was spent on data formatting and normalisation so sourcing information from a single source could also lead to less discrepancies and human error.

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APPENDIX 1 – CONSISTENCY MATRIX

Research Hypothesis	Literature	Data Collection Tool	Data Analysis
<p>Average return comparison between initial investors and copy cat funds excluding fees</p> <p>$H1_0: \mu_i = \mu_c$</p> <p>$H1_1: \mu_i \neq \mu_c$</p>	<p>Wermers (2000)</p> <p>Elton <i>et al</i> (2010)</p>	<p>Public data, disclosed South African Funds</p>	<p>Portfolio replication study considering actual timing, actual holdings and fee structures</p>
<p>Average return comparison between initial investors and copy cat funds including fees</p> <p>$H2_0: \mu_i < \mu_c$</p> <p>$H2_1: \mu_i \geq \mu_c$</p>	<p>Verbeek and Wang (2010)</p> <p>Wermers <i>et al</i> (2001)</p> <p>Frank <i>et al</i> (2004)</p> <p>Coval & Stafford (2007)</p> <p>Chalmers <i>et al</i> (2001)</p>	<p>Public data, disclosed by South African Funds</p>	<p>Portfolio replication study considering actual timing, actual holdings and fee structures</p>

APPENDIX 2 – DATA DESCRIPTIONS

Inter alia, the fields of interest in this analysis are provided below:

Fund Details – Fund information as published.

Field	Description
Code	Unique identifier
Fund Name	Fund/ Unit Trust name
Fund of Fund	*A fund of funds unit trust is This field indicates whether the fund is actually a fund of funds
JSE Code	Code of the fund at the JSE
Start Date	Date the fund was created
End Date	Date the fund stopped trading (if applicable)

Fund Holdings – This data shows each fund with their investments per quarter. Ticker details are then provided for each equity investment, along with volume for each item.

Field	Description
Code	Unique identifier
Unit Trust Fund	Mutual/ Unit Trust Name
Share	Equity Share
Holding Date	Reporting period
No of Shares	Number of shares in the holding
Total Value	Total value of that share in the holding

Market Data – Equity and index prices published daily.

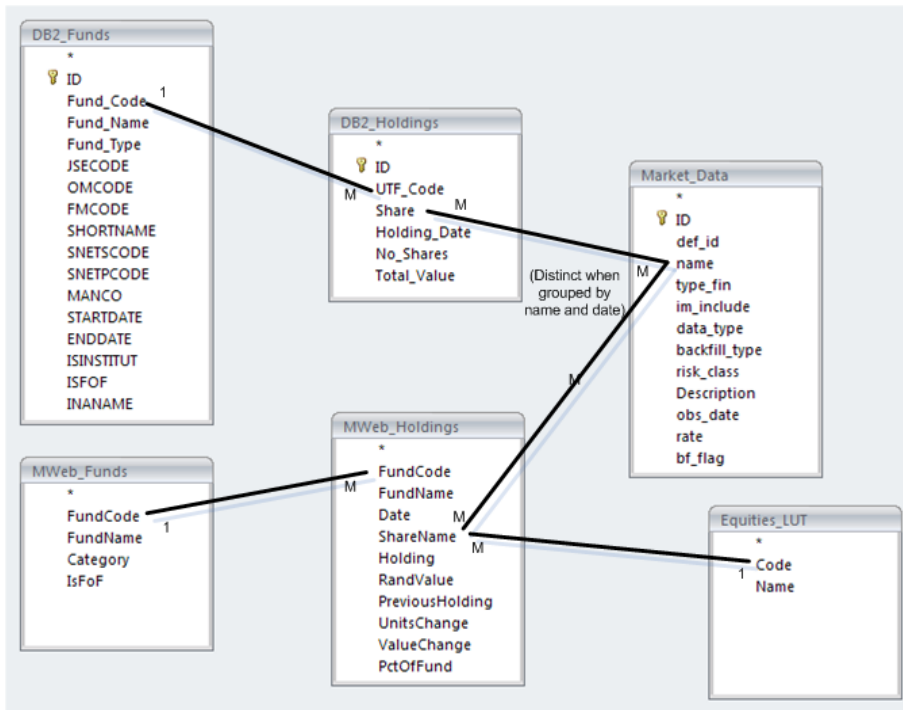
Field	Description
Code	Unique identifier
Name	Equity Ticker
Description	Equity name
Observation Date	Date of published rate
Rate	Market rate

Buy outs/ Mergers – Details have been provided for company name changes, consolidations, mergers and acquisitions etc to allow for linkage to the correct market rates.

Total Expense Ratios - Total expense ratios have been used against each general equity fund as an indication of costs.

APPENDIX 3 – ENTITY RELATIONSHIP DIAGRAM

Below a view of the relationships between the main data tables:



APPENDIX 4 – CATEGORISATIONS LINKED TO SATRIX 40 INDEX

- Resource positions individually less than 1% of fund
- Telecoms positions individually less than 1% of fund
- Technology positions individually less than 1% of fund
- Industrial positions individually less than 1% of fund
- Healthcare positions individually less than 1% of fund
- Customer Srvs pos individually less than 1% of fund
- Additional positions individually less than 1% of fund
- Exchange Traded Funds
- Foreign – Property
- Foreign – Equity
- Foreign – Bonds
- Foreign – Unit Trusts

APPENDIX 5 – FUNDS LINKED TO SATRIX 40 INDEX

In the event that funds invested in other funds, these investments were linked to the Satrix market data to include some variability in the returns. Below the list of funds that have been invested into by other funds:

- Absa General
- Absa Select Equity
- Allan Gray Equity
- Alphen Equity Builder
- BJM Core Equity
- Coris Capital General Equity
- Element Earth Equity
- Element Islamic Equity
- FNB Growth
- Foord Equity
- Gryphon All Share Tracker
- Hermes Equity
- Huysamer Equity
- Imara Equity
- Indequity Technical
- Interneuron Capital Equity Portfolio
- Investec Active Quants
- Kagiso Equity Alpha
- Maestro Equity
- Matador Equity FoF
- Metropolitan Multi-Manager Equity Portfolio
- Nedgroup Investments Equity
- Nedgroup Investments Quants Core Equity
- Nedgroup Investments Rainmaker
- N-e-FG Equity

- Old Mutual Active Quant Equity
- Old Mutual Growth
- Old Mutual Investors
- Old Mutual Top Companies
- Personal Trust SA Equity
- Plexus RAFI Enhanced SA Strategy
- Prescient Equity Active Quant
- PSG Alphen Growth
- RMB Equity
- RMB Private Bank Equity
- Sanlam All Share Index
- Sasfin Equity
- Sasfin TwentyTen
- SIM General Equity
- SIM Top Choice Equity
- STANLIB Index
- STANLIB Multi-Manager Equity
- SYmmETRY Equity FoF
- Tri-Linear Equity
- ValuGro General Equity
- Vega General Equity
- Verso Multi-Manager Long Term SA Equity

APPENDIX 6 – TOTAL EXPENSE RATIOS

FundName	TER
27 Four Active Equity	1.30%
Absa General	1.76%
Absa Growth FoF	3.71%
Absa Select Equity	1.15%
Aeon Enhanced Equity	0.00%
Afena Equity	0.00%
Allan Gray Equity	1.56%
Alphen Equity Builder	0.76%
Analytics Managed Equity	1.52%
APS Equity FoF	0.00%
Aylett Equity	1.80%
BJM Multi-Manager Equity	1.45%
Cannon Equity	1.48%
Capstone Active Equity FoF	2.43%
Clade Cash Flow Weighted Equity	1.07%
ClucasGray Equity	0.00%
Community Growth	0.58%
Coris Capital General Equity	1.94%
Coronation Equity	1.13%
Discovery Equity	1.78%
Dynamic Wealth Optimal	1.46%
Dynasty Wealth Accumulator FoF	0.00%
Efficient Active Quant	1.81%
Efficient Equity	1.15%
Element Earth Equity	1.73%
Element Islamic Equity	1.80%
FG Mercury Equity FoF	2.09%
FNB Growth	1.56%
Foord Equity	2.00%
Gryphon All Share Tracker	0.61%
Harvard House General Equity	1.51%
Hermes Equity	1.24%
Huysamer Equity	1.30%
Imara Equity	1.79%
Indequity Technical	2.01%
Investec Active Quants	0.43%
Investec Equity	1.15%
Investment Solutions M-M Equity FoF	1.21%
Kagiso Equity Alpha	1.48%
Kagiso Islamic Equity	1.35%
Lion of Africa General Equity	1.65%
Lynx Opportunities FoF	2.77%
Maestro Equity	2.10%
Marriott Dividend Growth	1.15%

FundName	TER
Marriott Dividend Growth	1.15%
Matador Equity FoF	2.84%
Mazi Capital Equity	0.00%
Melville Douglas High Alpha	0.00%
Mergence Equity	0.00%
Metropolitan General Equity	1.45%
Metropolitan Multi-Manager Equity	1.20%
MI-PLAN IP Beta Equity	0.58%
Momentum Aggressive Equity FoF	1.91%
Momentum Equity	1.14%
Momentum Moderate Equity FoF	1.89%
Momentum Multifocus FoF	2.72%
Nedgroup Inv Equity	1.13%
Nedgroup Inv Quants Core Equity	0.88%
Nedgroup Inv Rainmaker	1.15%
N-e-FG Equity	2.06%
NewFunds NewSA Index	1.29%
NFB Equity	1.65%
Oasis Crescent Equity	2.17%
Oasis General Equity	1.72%
Old Mutual Active Quant Equity	1.32%
Old Mutual Albaraka Equity	1.87%
Old Mutual Growth	1.15%
Old Mutual High Yield Opportunity	1.42%
Old Mutual Investors	1.14%
Old Mutual RAFI 40 Tracker	0.89%
Old Mutual Top Companies	1.15%
Personal Trust SA Equity	1.50%
Plexus RAFI Enhanced SA Strategy	1.23%
Prescient Equity Active Quant	1.20%
Prescient Equity Quant	0.60%
Prudential Equity	2.48%
PSG Alphen Equity FoF	2.76%
PSG Equity	1.79%
PSG Konsult Creator FoF	3.09%
RMB Private Bank Equity	0.59%
Sanlam All Share Index	0.38%
Sasfin Equity	1.23%
Satrix RAFI 40 Total Return	0.53%
SIM General Equity	1.14%
SIM Top Choice Equity	1.13%
SMMI Equity FoF	2.18%
SPI Equity	0.00%
STANLIB Equity	1.23%
STANLIB Index	0.65%
STANLIB M-M All Stars Equity FoF	2.29%
STANLIB M-M Equity	1.94%
STANLIB Nationbuilder	1.72%
STANLIB SA Equity	1.15%
STANLIB Shari'ah Equity	1.72%
Stewart Macro Equity FoF	2.29%
SYmmETRY Equity FoF	1.67%
Verso Long Term SA Equity	1.57%
Verso M-M Equity FoF	4.44%

APPENDIX 7 – MERGERS/ ACQUISITIONS

Date	Old Code	Old Name	Old Sharenet Code	New Code	New Name	New Sharenet Code	Comment
Mon 04 Jun 2007	GRY	Grayprop	GRAYPROP	FPT	FPT	FPT	Allan Gray Property Trust - Fountainhead Property Trust - now owned by Standard Bank
Mon 11 Jun 2007	SZA	Sizafika	SIZAFIKA	EMG	Emergent	EMERGENT	
Mon 25 Jun 2007	TNT	Tongaat	TONGAAT	TON	Tongaat	TONGAAT	Also spun out HLM Hulamin
Mon 16 Jul 2007	ERP	ERP.com	ERP	SDH	Secdata	SECDATA	
Fri 21 Sep 2007	DTP	Datapro	DATAPRO	VOX	Voxtelecom	VOXTELCOM	Sharenet code first changed from DTP to DATAPRO
Mon 30 Jul 2007	SAE	SA Eagle	S-A-EAGLE	ZSA	Zurich	ZURICHA	
Fri 21 Sep 2007	MSS	Marshall's	MARSHALLS	MIP	Merchant	MERCHANT	Merchant & Industrial Properties Ltd
Mon 20 Aug 2007	YBA	Yomhlaba	YOMHLABA	SAH	SA Coal	SACMH	South African Coal Mining
Mon 20 Aug 2007	SXR	SXR Uranium One	SXR	UUU	Uranium One	URONE	
Mon 03 Sep 2007	QUY	Quyn	QUYN	COL	Colliers	COLLIERS	Colliers SA Holdings Ltd
Fri 21 Sep 2007	VER	Vestor	VESTOR	CVN	Converge	CONVERGE	Reverse listing into Vestor
Mon 22 Oct 2007	SFA	Shops	SHOPS	SAT	SA-Reit	SA-REIT	Sector code = 8733 or 8737 ?
Mon 26 Nov 2007	SCN	Schamin	SCHAMIN	SNU	Sentula	SENTULA	Sentula Mining Ltd
Mon 19 Nov 2007	STO	Sethold	SETHOLD	STO	SetPoint	SETPOINT	
Mon 12 Nov 2007	ACD	Alliance Data	ADCCORP	ALM	Alliance	ALLIANCE	
Mon 19 Nov 2007	ITG	Integrear	INTEGREAR	BCH	BestCut	BESTCUT	And a share split 7.16 for 1.
Mon 26 Nov 2007	JCM	Johncom	JOHNCOM	AVU	Avusa	AVUSA	Later unbundled Element1 ELE
Mon 07 Jan 2008	IND	IndFin	INDFIN	DRC	DnrCapital	DNRCAP	IndFin was a Suspended Cash Shell
Mon 31 Mar 2008	CYB	Cyberhost	CYBERHOST	QHL	QLeisure	QLEISURE	Queensgate Hotels
Thu 20 Dec 2007	GVM	GVM	GVM	CZA	Coal	COAL	Coal of Africa - was GVM Metals Ltd
Thu 13 Mar 2008	ITXEU	Itrix Dow Jones Eu	ITXEURO50	DBXEU	DBXEURO50	DBXEURO50	Were Itrix products
Thu 13 Mar 2008	ITXUK	Itrix FTSE 100	ITXFT100	DBXUK	DBXFT100	DBXFT100	Were Itrix products
Mon 10 Mar 2008	IFW	Infowave	INFOWAVE	ADI	AdaptIT	ADAPTIT	AdaptIT Holdings Ltd
Fri 14 Mar 2008	WLL	Wellco	WELCO	BIO	BioScience	BIOSCI	Bioscience Brands Ltd
Mon 21 Apr 2008	KGH	Kagisano	KAGISANO	CUH	Credit U	CREDITU	Credit U Holdings Ltd
Mon 12 May 2008	SIC	Safic	SAFIC	ACE	Accentuate	ACCENT	Accentuate Ltd
Mon 13 Oct 2008	DRC	DnrCapital	DNR	AND	Andulela	ANDULELA	Was "DNR Capital Ltd" Now "Andulela Investment Holdings Ltd"
Mon 06 Oct 2008	MIX	Matrix	MATRIX	MIX	MixTel	MIXTEL	Mix Telematics Ltd Sector=2791
Fri 19 Sep 2008	SFB	S&B	SFB	SSK	StefStock	STEFSTOCK	Stefanutti Stocks Holdings Ltd
Mon 27 Oct 2008	DTH	DVT	DVT	DTH	DTH	DTH	Was "DYNAMIC VISUAL TECHNOLOGIES HOLDINGS LIMITED", now, "DTH Dynamic Monday, Technology Holdings Limited"
Tue 21 Oct 2008	RCH	Richemont	RICHEMONT	CFR	Richemont	RICHEMONT	Compagnie Financiere Richemont
Mon 17 Nov 2008	ENL	Enaleni	ENALENI	CMP	Ciplamed	CIPLAMED	Cipla Medpro South Africa Ltd
Mon 17 Nov 2008	ACC	AccRoss	ACC-ROSS	PNG	Pinpoint	PINPOINT	Pinnacle Point Group Ltd
Mon 24 Nov 2008	SAT	SA-Reit	SA-REIT	ING	Ingenuity	INGENUITY	Ingenuity Property Investments Ltd
Fri 12 Dec 2008	SAM	Samroc	SAMROC	SCL	Sacoil	SACOIL	SacOil Holdings Ltd
Mon 23 Feb 2009	MTZ	Matodzi	MATODZI	WWR	Whitwater	WHTWATER	White Water Resources Ltd
Wed 24 Dec 2008	ALJ	Alljoy	ALL-JOY	AHL	AH-Vest	AH-VEST	AH-Vest Ltd
Mon 18 May 2009	AFO	Afgold	AFGOLD	GDO	GoldOne	GOLDONE	Inward listing - Was Alease Gold
Mon 19 May 2008	CLE	Clientl	CLIENTL	CLI	Clientl	CLIENTELE	Clientele Life Assurance Company Limited
Mon 22 Jun 2009	NCL	New Clicks	NUCLICKS	CLS	Clicks	CLICKS	New Clicks Holdings - changes to - Clicks Group Ltd Sector=5333
Mon 27 Jul 2009	PLC	Placecol	PLACECOL	SKW	Skinwell	SKINWELL	
Tue 11 Aug 2009	KWV	KWV Bel	KWV-BEL	CVI	Capevin	CAPEVIN	Capevin Investments Limited
Mon 18 May 2009	DEL	Delta	DELTA	DTA	Delta	DELTA	Delta EMD Limited
Mon 23 Mar 2009	STO	Setpoint	SETPOINT	SPO	SetPoint	SETPOINT	Setpoint Technology Holdings Ltd
Mon 09 Nov 2009	MXK	Milkworx	MILKWORX	UBU	Ububele	UBUBELE	Ububele Holdings Ltd
Mon 04 Jan 2010	FSPP	Firstrand B1 Pref	FRND-P	FSRP	Firstrand B P	FIRSTRNDP	FSPPs swapped for FSRPs
Mon 07 Sep 2009	FPF	Finbond	FINBOND	FGL	Finbond	FINBOND	Finbond Group Ltd
Mon 17 May 2010	MYD	Myriad	MYRIAD	LHG	Litha	LITHA	Litha Healthcare Group Limited - Moved from ALT to Main board
Tue 01 Jun 2010	DYM	Dynamic	DYNAMIC	CAP	Capemp	CAPEMR	Cape Empowerment Ltd, Sector=8985
Mon 19 Jul 2010	HVL	Highveld	HIVELD	EHS	EHSV	EHSV	Evrz Highveld Steel and Vanadium Limited
Mon 06 Sep 2010	BWK	Buildw	BUILDWK	CIL	CIL	CIL	Cons Infrastructure Group
Mon 10 May 2010	LBT	Liberty Int Plc	LIB-INT	CSO	CapShop	CAPSHOP	Capital Shopping Centres Group
Fri 17 Sep 2010	ABO	Absolute	ABSOLUTE	BAU	Bauba	BAUBA	name change to Bauba Platinum Ltd (BAU)
Mon 27 Sep 2010	FOS	Foschini	FOSCHINI	TFG	TFG	TFG	"Full Of Shit" finally gets a make-over
Mon 27 Sep 2010	FOSP	Foschini 6.5% Pref	FOSP	TFGP	TFGP	TFG-P	
Mon 22 Nov 2010	BIC	Bicaf	BICAF	CAC	CAFCA	CAFCA	BICC CAFCA Limited to CAFCA Ltd
Mon 29 Nov 2010	MET	Metropolitan	METLTD	MMI	MMI	MMI-HLDGS	MMI Holdings Ltd
Mon 29 Nov 2010	WLO	Wooltru	WOOLTRU	PBT	PBT	PBT	PBT Group Ltd
Mon 07 Mar 2011	SBG	Simeka	SIMEKA	MOR	Morvest	MORVEST	Morvest Business Group Ltd
Mon 31 Jan 2011	CMG	Cenmag	CENMAG	CPN	Capricorn	CAPRICORN	Capricorn Investment Holdings Limited
Fri 13 May 2011	WWR	Whitwater	WHTWATER	GGM	Goliath	GOLIATH	Goliath Gold Mining Ltd - Then had a 1 for 10 Consolidation.
Mon 14 Feb 2011	EFF	Efficient	EFFICIENT	EGF	Efficient	EFFICIENT	Efficient Group Ltd
Wed 23 Feb 2011	MTE	Martell	MT-EGLE	MMP	Marshall	MARSHALL	Marshall Monteagle Plc
Mon 27 Jun 2011	BCD	BRC	BRC	DRN	Delrand	DELRAND	Delrand Resources Ltd
Mon 18 Jul 2011	IMU	Imuniti	IMUNITI	NUT	Nutrition	NUTRITION	Nutritional Holdings Ltd
Mon 08 Aug 2011	GDF	Goldreef	GOLDREEF	TSH	TsogoSun	TSOGO-SUN	Tsogo Sun Holdings Limited