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Return-based style analysis of Domestic Targeted Absolute and Real Return unit trust funds in South Africa

by

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Submitted in fulfilment of the requirements for the degree
MASTER OF COMMERCE in Financial Management Sciences
in the Faculty of Economic and Management Sciences
University of Pretoria
Pretoria

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May 2011

DECLARATION

Student number: 97045323

I, Elbie Louw, declare that:

Return-based style analysis of Domestic Targeted Absolute and Real Return unit trust funds in South Africa

is my own work and that all the sources that I have used or quoted have been indicated and acknowledged by means of complete references.

_____ _____

Signature Date

Elbie Louw

ACKNOWLEDGEMENTS

"To acquire knowledge, one must study; but to acquire wisdom, one must observe."

Marilyn Vos Savant

This has inevitably been a journey in exploration of both knowledge and wisdom. Thus, I would like to express my sincere gratitude to the following people:

Mr Anton du Plooy (ASISA), for his invaluable inputs;

Mr Lionell Wobben and Ms Sandra Schakowski (Profile Media), for generously providing data;

Mr Sollie Millard, for assistance with the statistics and Ms Lidia de Wet, for editing;

My colleagues at the Department of Financial Management (University of Pretoria), for support;

My supervisor, Mr Johan de Beer, for his valuable contributions and guidance;

Etienne Nel, Michael Franze, Peet Badenhorst, Nelius Goosen, Pierre de Klerk, Werner van der Veen, Sunette Mulder, Prof Hugo Lambrechts, Michael van Andel – without your contributions and thought-provoking ideas, this would have been a much isolated expedition;

People encountered in my life - some still part of my journey, others visiting for a time - who have encouraged a love for knowledge, creativity and the expression thereof.

Finally, my heartfelt thanks to my friends and family, in particular my parents, Faan and Anne-Marie, for encouragement, continued support and a sense of humour.

ABSTRACT

Return-based style analysis of Domestic Targeted Absolute and Real Return unit trust funds In South Africa

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Elbie Louw

Study leader: Mr JS de Beer

DEPARTMENT: Financial Management

DEGREE: MCom (Financial Management Sciences)

By means of return-based style analysis (RBSA), heterogeneous style sub-categories were identified within the TARR category of the South African unit trust market to create a framework for sub-categorisation.

The study dealt with TARR funds and their place within the investment universe. The literature review emphasised the importance of asset allocation, which supports the use of RBSA to identify asset allocation. The literature review further provided a motivation for the semi-strong form of RBSA applied to the sample data. In the study, RBSA was applied to two groups within the sample data, namely funds that have data points for the full measurement period (Group 1) and funds that have less than 75 data points (Group 2). A four-phase process was applied to the sample data.

The findings suggest the following:

- in general, return-based style analysis applied to each fund identifies the asset allocation for the fund and is valid; but it is emphasised that for specific periods, the explanatory power of the regression model may become questionable;
- the collective results of return-based style analysis applied to the funds can be used to create a framework for sub-categorisation. The framework proposed was the result of nine out of a potential 54 funds. The explanatory power of the regression results was less questionable. The proposed framework was applied to the remaining 45 funds (Group 2), but there were indeed inconsistencies in the application;

- the framework created did not raise any concerns as a result of the Group 1 analysis. However, it was questionable when applied to the Group 2 funds in its entirety;
- sub-categorisation based on only the allocation to the domestic short-term asset class was definitely a criterion that was true irrelevant of which sample group it was applied to.

Keywords: return-based style analysis; targeted absolute and real return funds; fund categorisation.

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CHAPTER 1: INTRODUCTION

1.1 INTRODUCTION

A *unit trust*[1] is an investment product, which pools the funds of numerous investors, individual and/or institutional[2], and invests in assets according to the mandate of the unit trust. For an individual investor with a small capital amount to invest, the advantages include access to a diversified portfolio, low cost of investment and the opportunity to capture alpha (excess return), as the portfolio is managed by a money manager. For an institutional investor, the opportunity exists for a low-cost product, capturing alpha and access to an existing product with a track record.

The Association of Collective Investments (ACI) (known as the Association for Savings and Investment SA, ASISA, from October 2008) plays an important role in the South African unit trust industry. Among others, the Association for Savings and Investment SA (ASISA) assumes responsibility for the classification system applied to unit trusts. The ACI was established in 1967, originally known as the Association of Unit Trusts (AUT). Towards the end of 2008, the ACI was disbanded and incorporated as part of the Association for Savings and Investment SA (ASISA). The mission of ASISA on behalf of its members is to play "…a significant role in the development of the social, economic and regulatory framework in which our members operate, thereby assisting members to serve their customers better" (ASISA, 2010d).

The classification system of unit trusts in South Africa formed part of the ACI's Code of Practice as published in March 2008 (ACI, 2008a). Herein, unit trusts are classified according to the investment strategy/style proposed in the mandate of the fund.

The classification system proposed by the ACI classifies funds based on the asset allocation within the portfolio. This should lead to homogeneous portfolios within a particular category. However, two categories, namely equity, varied specialist funds and asset allocation, targeted absolute and real return (TARR) funds; are not a grouping of homogeneous funds due to the broad description of the respective categories but rather

[1] Commonly referred to as mutual funds in the US.
[2] Typically, institutional clients include pension funds, endowment funds and medical aid schemes.

'catch-all' categories for funds that do not fit any of the other narrowly defined categories.

Table 1.1: Growth in unit trust industry

Industry			
Date	**Number of funds**	**Total Assets (million)**	**Growth in assets**
31 Dec 2003*	466	227 737	N/A
31 Dec 2004*	529	302 900	33,0%
31 Dec 2005*	614	407 639	34,5%
31 Dec 2006*	750	526 580	29,2%
31 Dec 2007†	831	653 463	24,1%
31 Dec 2008†	884	661 201	1,2%
31 Dec 2009†	904	786 117	19,5%
30 Sep 2010†	937	879 324	11,9%

*Assets held by fund of funds as well as assets held by other SA unit trusts in local unit trusts were ignored to avoid double counting.
†Figures as provided by ACI and ASISA for 2007-2010 include double counting of assets. Were it also to exclude double counting, as in Lambrechts' surveys, growth would be lower than indicated.

Source: Lambrechts (2003:2; 2004:2; 2005b:2; 2006:7); ACI (2008a); ASISA (2009a; 2010b; 2010c)

Following changes to the classification system of unit trusts used at the time, the Domestic, Asset Allocation, Targeted Absolute and Real Return category (subsequently only referred to as TARR) was only implemented as such in the last quarter of 2003 (Lambrechts, 2003:40). Table 1.1 demonstrates the growth in the South African unit trust industry from 2003. The growth of TARR funds (Table 1.2) from inception to date, coupled with both bull and bear market conditions, creates an opportunity to better understand return drivers and fund styles, which is important to industry and investors alike. As these funds propose to offer an absolute return (i.e. return above zero) or real return (i.e. a return targeting inflation) irrelevant of market conditions, the bear market experienced in 2007/2008, created an opportunity to determine inherent style based on asset class exposure during a full economic cycle.

Table 1.2: Growth in domestic and TARR funds

	Domestic funds			TARR funds		
Date	**Number of funds**	**Total Assets (million)**	**Growth in assets**	**Number of funds**	**Total Assets (million)**	**Growth in assets**
31 Dec 2003*	369	208 915	N/A	16	5 062	N/A
31 Dec 2004*	427	285 392	36,6%	39	9 162	81,0%
31 Dec 2005*	511	385 280	35,0%	50	16 131	76,1%
31 Dec 2006*	633	494 705	28,4%	79	28 022	73,7%
31 Dec 2007 †	700	609 624	23,2%	98	33 757	20,5%
31 Dec 2008 †	738	624 165	2,4%	92	34 237	1,4%
31 Dec 2009 †	760	743 708	19,2%	78[3]	38 770	13,2%
31 Sep 2010†	785	835 288	12,3%	81	44 218	14,1%

*Assets held by fund of funds as well as assets held by other SA unit trusts in local unit trusts were ignored to avoid double counting.
†Figures as provided by ACI and ASISA for 2007-2009 include double counting of assets. Were it also to exclude double counting as in Lambrechts' surveys, growth would be lower than indicated.

Source: Lambrechts (2003:2; 2004:2; 2005b:2; 2006:7); ACI (2008a); ASISA (2009a; 2010b; 2010c)

The study aims to conduct return-based style analysis (RBSA) to determine the inherent style of each fund within the TARR category and determine whether sub-groups of homogeneous funds can be created based on similar factor exposure (i.e. asset allocation).

1.2 BACKGROUND

TARR funds are firstly, difficult to analyse and compare with one another due to the extreme heterogeneous nature of the funds within the group as is evident from Table 1.3, which showcases the classification and description of the ACI for the TARR category.

A second factor that obscures any analytical results is the fact that many of the funds do not have a long returns history. Thirdly, many of the funds have only experienced a bull market until the economic downturn and subsequent bear market (2007/2008). In a

[3] Numerous TARR funds were reclassified during the first quarter of 2009 into the prudential categories.

study conducted by Momentum Investment Consulting (2007:3), the issue was raised that persistence of performance within the category is of concern given that until the publication date of the report, many funds within the category have not been exposed to a bear market and thus there may be uncertainty as to how these funds will perform in such a market. This is of particular concern as raised by the authors due to the fact that the main attractiveness of funds within this category in many instances is the capital protection properties of the funds during bear markets. However, at that stage it was not possible to test empirically.

Table 1.3: ACI classification and description of TARR funds

Classification	Description
Domestic	Funds that invest at least 80% of their assets in South African markets at all times.
Asset Allocation	Funds that invest in a range of asset classes: equity, bond, money market and property.
Targeted Absolute and Real Return portfolios	Funds that may also invest in derivative instruments and may/may not be Regulation 28[4] compliant (dependent on the mandate of the fund). The mandate of the portfolio will determine the objective and strategy of the fund thus the ACI do not offer a benchmark for the sector. Based on the classification, the funds should exhibit lower volatility and have an explicit benchmark against which performance will be measured.

Source: ACI (2008a:14)

Due to the broad description of the TARR category, peer comparison is futile. It is contended that there may exist sub-categories within the TARR category that may result in valid peer comparison of fund performance. For accurate peer comparison, sub-categorisation into groups consisting of homogeneous funds would be valuable to evaluate their suitability in a portfolio context and relative performance because the

[4] Regulation 28 of the Pension Fund Act (24/1956) provides limits on investments of retirement funds to protect investors of pension funds.

present category classification does not consider the specific fund styles (Brown & Goetzmann, 1997:374).

Return-based style analysis (RBSA) introduced by Sharpe (1988; 1992) and cited in Swinkels and Van der Sluis (2006:529) and Ter Horst, Nijman and De Roon (2004:29) is suggested as a method to determine the styles of funds within the TARR category and forms the basis for sub-categorisation. It is also applied to classification of unit trust styles or to determine style drifts (Chan, Chen & Lakonishok, 2002; Brown & Van Harlow, 2002).

However, the application of RBSA extends to determine alpha of a fund and calculate risk-adjusted returns (Lhabitant, 2003; Davis, 2001; Annaert & Van Campenhout, 2002) as well as conduct performance evaluation according to information ratios (Bailey, Richards & Tierney, 2007:770).

Brown and Van Harlow (2002:8) emphasis that three general approaches to factor modelling are used: firstly, a single index market model (such as Jensen's 1968), secondly multi-factor models based on portfolio stockholding characteristics (for example, a three-factor model developed by Fama and French in Brown and Reilly, 2009:248), and lastly, factor models based on style indices. The latter, in particular the factor model developed by Sharpe (1992), is the focus.

The purpose of RBSA is to create a factor model by constraint regression of the returns of a fund (or funds) in an attempt to explain the source components of overall return (Ter Horst *et al,*. 2004:30; Swinkels & Van der Sluis, 2006:529).

Although Sharpe's RBSA is accepted in theory and practice, the validity of results depends on:

- Correctly specifying benchmarks: benchmarks, also called factor exposures or indices, should be chosen in such a way that they are representative of the asset class or style component they are supposed to measure. Dor, Jagannathan and Meier (2003:107) in this context emphasis the possibility of multicollinearity that

may arise. Multicollinearity arises when two or more of the independent variables are correlated with one another (DeFusco, McLeavey, Pinto & Runkle, 2004:454,473). In this instance, the result of the regression model becomes problematic and may lead to wrongfully rejecting the null hypothesis (i.e. the hypothesis to be tested) resulting in a type I error, namely when the null hypothesis is incorrectly rejected.

- Number of asset classes/benchmarks: the more asset classes/benchmarks added, the more explanatory power they should add to the regression. However, they may simply increase noise (as weak or irrelevant data is included in the data analysis).

- Style consistency: the assumption is that the style of a fund should be consistent over time if initially correctly classification and no fund reclassification took place. This is one of the assumptions of Sharpe (1992). Practice suggests though that this may not be the case. Dor *et al.* (2003:101) suggest regression analysis on various periods over time to evaluate consistency of results. Style analysis on Italian equity mutual funds found that it is an appropriate technique to classify equity funds (Pattarin, Paterlini & Minerva, 2004:367).

1.3 PROBLEM STATEMENT AND RATIONALE FOR THE STUDY

As previously explained, the Domestic TARR category is somewhat contentious as the ACI classification does not dictate any bounds for any of the asset classes appropriate for the TARR category. This makes peer comparison and identification of inherent styles of funds a challenge.

Currently, there is limited South African research regarding RBSA and none that applies the principles of RBSA to the TARR category. Therefore, this is uncharted waters and creates an opportunity. Academic research on style analysis and performance measurement of TARR funds in South Africa is only relevant from 2003 as October 2003 marked the creation of the category. Subsequently, it is hypothesised that the period from October 2003 to December 2009 warrants sufficient historical information for research purposes as it covers a substantial period. As previously stated, the bull and

bear market experienced since inception of the category is another motivational factor. Further motivation for the study is the soaring assets and number of funds within the category.

The TARR sector is viewed as somewhat controversial in South Africa due to the vast array of funds in this sector that offer so-called absolute returns. It would be of value to industry and academia alike to establish whether the funds in actual fact do hold their name true in bull and bear markets and whether there are indeed sub-categories, which may aid in, amongst others, performance measurement and peer comparison.

The findings from the research would be useful to a number of market participants and interested parties including researchers, fund managers, industry associations, regulators and investors with an interest in unit trusts and/or return-based style analysis.

1.4 RESEARCH OBJECTIVES

The objective of the study is thus to conduct return-based style analysis of TARR funds and create a framework for sub-categorisation. The proposed sub-categorisation will be based on the strategic asset allocation[5] of the funds.

Primary research objective: Identify heterogeneous style sub-categories within the TARR category based on the results of return-based style analysis (as per the strategic asset class exposure).

The research intention in this particular study is two-fold: Firstly, to determine the exposure (to each asset class) over time based on the results of the return-based style analysis. Secondly, and this question is more exploratory, sub-categorise the funds based on homogeneous asset exposures (the results of return-based style analysis).

[5] Long-term policy asset allocation strategy. This is contrasted with tactical asset allocation where the allocation is changed based on short-term market movements.

1.5 PROPOSITIONS

Propositions are defined by Cooper and Schindler (1998:43) as "a statement about concepts that may be judged as true or false if it refers to observable phenomenon".

Thus the following propositions are posed:

Proposition 1

Return-based style analysis applied to each fund identifies the asset allocation for the fund.

Proposition 2

Return-based style analysis applied to each fund is valid.

Proposition 3

The collective results of return-based style analysis applied to the funds can be used to create a framework for sub-categorisation.

1.6 RESEARCH DESIGN

The intention is to use multivariate regression analysis in an attempt to conduct return-based style analysis. The structure followed going forward is thus: firstly, to create a context: an overview of the South African unit trust market and in particular TARR funds is provided in Chapter 2. This is followed by a literature review of RBSA and the different variations thereof (Chapter 3).

From the literature review conducted, Chapter 4 follows with the research methodology, including aspects such as sample design and selection of the appropriate version of RBSA model for the particular sample data. Importantly, the assumptions and limitations of the study form part of the research methodology (Chapter 4). Chapter 5 consequently focuses on the empirical results: applying the proposed methodology to the TARR category and the findings thereof. It is envisaged that, due to the exploratory nature of the research, many thought-provoking ideas may result. However, it is acknowledged that any such ideas may validate further research, which may be outside the scope of this study.

Lastly, Chapter 6 outlines the key findings of the study in the light of the original problem statements and propositions proposed. Conclusions are drawn regarding the feasibility of RBSA as a method for sub-categorisation of the TARR category and whether sub-categories do indeed exist. The chapter concludes with an overview of the contributions and implications of the study.

1.7 SUMMARY

The domestic TARR unit trust category is the subject of the study. The broad definition of the category, which imposes no bounds on any asset class, complicates, among others, performance evaluation and peer comparison. The study aims to use RBSA to identify heterogeneous style sub-categories within the TARR category based on the results of return-based style analysis (i.e. strategic asset class exposure).

The following three propositions are to be judged: firstly, return-based style analysis can be applied to each fund and identifies the asset allocations thereof. Secondly, the return-based style analysis applied to each fund is valid. Lastly, the collective results of return-based style analysis applied to the funds can be used to create a framework for sub-categorisation.

CHAPTER 2: TARGETED ABSOLUTE AND REAL RETURN FUNDS: AN OVERVIEW

2.1 INTRODUCTION

The first unit trust in South Africa was launched in 1965 by Sage (Profile Media, 2004:23). Two years later, the Association of Unit Trusts (AUT) was established to represent the interests of unit trust managers and investors alike (Profile Media, 2004:72).

From humble beginnings, the industry has grown to an asset class with assets under management of R879 324 million on 30 September 2010 (ASISA, 2010c). The Domestic, Asset Allocation, Targeted Absolute and Real Return category (TARR) contributed R44 218 million in assets (ASISA, 2010c). This category was created by the Association of Collective Investments (ACI) in 2003 (Cameron, 2008) and since, has shown substantial growth. Assets of R44 218 million translate into 21% of assets classified as domestic, asset allocation and 5% of all domestic funds, indicative of the popularity of the TARR sub-category (ASISA, 2010c).

The growth in the TARR category can be attributed to the nature of the returns pursued: firstly, an absolute return, that is a return above zero; or a real return, that is a return targeting inflation or lastly, a return benchmarked against a specific target. Since the category started, it experienced a bull market until 2007/2008. The subsequent bear market creates an opportunity to evaluate the funds within the category over a full economic cycle: an opportunity to assess the strategic asset allocations are pursued by the managers of these funds, irrelevant of market conditions. It offers an opportunity to identify funds with similar return drivers (as suggested by the asset allocation mix); valuable information for peer comparison and useful for investors.

This chapter will firstly deal with key terms and concepts relevant to the study. Secondly, the South African unit trust environment is outlined. It is followed by a description of the specifications of the TARR category, including risk and return characteristics of the funds and strategies employed. The asset allocation, benchmarks

and benefits of investing in TARR funds follow. Lastly, the growth in TARR funds and current market composition are examined followed by a summary of the chapter.

2.2 TERMINOLOGY, KEY CONCEPTS AND ROLE PLAYERS

This section deals with terminology, key concepts and important role players in the unit trust industry.

The *Financial Services Board (FSB)* is an independent organisation established through the Financial Services Board Act (97/1990) to regulate South Africa's financial sector in the interest of the public. As such, its role includes:

- supervising compliance of legislation within financial markets;
- guiding government on financial market issues;
- offering consumers, financial institutions and financial bodies, educational programmes (Van Zyl, Botha, Skerritt & Goodspeed, 2009:128).

The FSB has jurisdiction over the unit trust industry in South Africa (Moodley-Isaacs, 2009*).* The Collective Investment Schemes Department of the FSB supervises the unit trusts in South Africa under the Collective Investment Schemes Control Act (CISCA) (45/2002) (Moodley-Isaacs, 2009; Van Zyl *et al.,* 2009:134).

The *Collective Investment Schemes Control Act (CISCA) (54/2002)* is the legislation regulating the unit trust industry in South Africa, enforced by the FSB. The legislation replaced the *Unit Trust Control Act (UTCA)* on 3 March 2003 (Still, 2003b; Van Zyl *et al.,* 2009:194). The UTCA legislation was in effect from 1981 (AUT, 2002). Key features of the new legislation include:

- greater flexibility on the limits and structures of investments;
- regulation of underlying holdings of an investment portfolio as to monitor risks;
- setting of risk-based capital requirements to protect investors further;
- improved disclosure requirements (AUT, 2002).

A c*ollective investment scheme (CIS)* is defined in terms of CISCA (2002) to mean:

"…a scheme, in whatever form, including an open-end investment company, in pursuance of which members of the public are invited or permitted to invest money or other assets in a portfolio, and in terms of which

(a) two or more investors contribute money or other assets to and hold a participatory interest in a portfolio of the scheme through shares, units or any other form of participatory interest; and
(b) the investors share the risk and the benefit of investment in proportion to their participatory interest in a portfolio of a scheme or on any other basis determined in the deed, but not a collective investment scheme authorised by any other Act…".

The definition includes all of the following instruments: open-end investment schemes, participatory bonds, declared collective investment schemes, unit trusts and collective investment schemes in property (Profile Media, 2004:37).

A *CIS in participation bonds (CISPB)* gives investors the opportunity to participate in bond instruments. This is achieved by pooling the investors' (participants') funds and lending it in the form of mortgages over commercial, retail or industrial property.

A *foreign CIS (FCIS)* is established outside South Africa. Such a CIS registers with the FSB so it may sell its products to the South African public.

A *declared CIS (DCIS)* is a CIS other than foreign, securities, property or participation bonds and as such, a 'catch-all' category of funds that do not fall within the definition of any of the other categories.

CIS in property is a collective investment scheme that offers the investor exposure to property. In South Africa, these funds are known as *property unit trusts (PUTs)*. They are, contrary to unit trusts, closed-end investments.

CIS in securities is defined as an open-end investment instrument invested in equities.

An *open-end investment company* is defined as a "…company with an authorised share capital, which is structured in such a manner that it provides for the issuing of different classes of shares to investors, each class of share representing a separate portfolio with a distinct investment policy…" (CISCA, 2002).

A *closed-end investment company* is a company or fund with limited share capital.

A *unit trust fund*[6] is a form of *collective investment scheme*. It entails a fund by which investors' money is pooled and collectively invested in financial instruments. The unit trust fund is managed by a professional portfolio manager (Profile Media, 2004:33). Each investor owns an equal portion or unit of the fund which is priced, based on the underlying value of the assets that the fund is invested in, namely the net asset value (NAV) (Moodley-Isaacs, 2009).

Mutual fund is the term used in the US to describe a unit trust.

The *Unit Trust Association (UTA)* was formed in 1967 (Financial Sector Charter Council, n.d.; Profile Media, 2004:72). The industry association represents the interests of investors, management companies and registered foreign collective investment schemes alike. In 2002, as the UTCA was replaced by CISCA, the UTA subsequently changed its name to the *Association of Collective Investments (ACI)* to reflect the broader scope of the new legislation (Still, 2003a). In 2008, the ACI was amalgamated with the Life Offices' Association of South Africa (LOA), Investment Management Association of South Africa (IMASA) and Linked Investment Service Provider Association (LISPA). The organisation going forward is known as the *Association for Savings and Investment in South Africa (ASISA)* (ASISA, 2009c).

Regulation 28 Compliance or *Prudential Guidelines* refers to Regulation 28 of the Pension Funds Act (24/1956). In an attempt to protect investors' retirement funds, the regulation sets limits on asset class allocations. Unit trusts are registered with the FSB as either compliant or non-compliant with regard to Regulation 28. A unit trust that is

[6] Known as a mutual fund in the US.

'Regulation 28 compliant' or 'managed according to Prudential Guidelines' will thus be suited as a retirement investment.

Management companies (mancos) are registered with the FSB and licensed to sell investment products to the market. CISCA legislation refers to the management company as the "CIS manager". The company fulfils the following functions: launching the CIS, appointing asset or fund managers and trustees, and marketing of the funds. Some functions may be outsourced (Profile Media, 2004:68).

The *asset manager* or *fund manager* of a unit trust manages the pool of funds on behalf of investors. Fund managers in South Africa may choose to become members of ASISA. The manager may be part of the CIS management company or appointed by the CIS.

The value of the underlying assets (securities) managed by the management company/fund manager is referred to as *assets under management*.

Net asset value (NAV) is the price at which a unit trust trades. The value is based on the net asset value of the underlying securities in which the fund is invested. This differs from the market price of a listed security in that the market price is determined by demand and supply and may, for this reason, trade at a premium or discount to NAV.

An *absolute return* focuses on offering the investor a return above zero irrelevant of market conditions (Still, 2004a). It is not, as with a real return, linked to inflation. However, locally and internationally, the term *absolute return* funds are used to include targeted, pure absolute and real return funds (RMB Asset Management, 2006).

Real return is defined as a return in real terms. A fund that offers a real return will focus on achieving a return in line or in excess of inflation (RMB Asset Management, 2006).

A *targeted return* attempts to achieve a return in excess of a specific target (RMB Asset Management, 2006).

An *institutional fund* is an investment product offered exclusively to institutional clients. Institutional clients exclude smaller retail investors (Lambrechts, 2001).

Retail funds are investment products offered to the general public.

Third-party funds or *white-label funds* are unit trust funds of which the fund/asset manager is not licensed by the FSB as a unit trust management company. In this case a company not registered as a management company with the FSB wanting to manage a fund or funds, approaches a licensed management company, which in effect rents its licence to the person, who then uses a different branding or 'white-label' (Cameron, 2009b).

A *linked investment service provider (LISP)* is an independent investment company, which gives investors access to a range of unit trusts offered by different management companies. The result is one portfolio with holdings in different investment companies (Profile Media, 2004:32).

A *hedge fund* is an investment structure, which manages a pool of unregistered private investment funds.

Return-based style analysis (RBSA) is a technique used to analyse the return drivers of funds. The goal is to identify the asset-style mix of a manager (Dor, Dynkin & Gould, 2006:10), determined through regression analysis[7] (Swinkels & Van der Sluis, 2006:529).

Alternative Investment Management Association (AIMA) of South Africa (AIMA SA) was the local chapter of the international AIMA until February 2010. From this point on, the local chapter joined forces with ASISA as part of the Hedge Fund Standing

[7] Regression analysis assumes a linear relationship between independent and dependent variables. Predictions about the dependent variable can be made based on the strength of the relationship between the dependent and independent variables and expectations of the independent variables (DeFusco, McLeavey, Pinto & Runkle 2004:395).

Committee of ASISA. The international organisation was started in 1990 to present the global alternative investment industry (AIMA SA, 2009a; ASISA, 2010a) while the local chapter was originally formed in 2003 (Botha, Rossini, Geach, Goodall, Du Preez, Franz & Rabenowitz, 2009:384).

A *fund fact sheet* is a document that conveys basic information on the fund such as inception date, distribution dates, assets under management and portfolio manager. It is usually updated monthly.

The following section describes the unit trust environment and differentiates it from instruments that share some similar characteristics.

2.3 UNIT TRUST ENVIRONMENT

Unit trust products are a popular investment tool. Apart from being a low-cost investment, it can offer a diversified return even for an investor with little capital to invest. With a unit trust product being an easily accessible investment vehicle to institutional and retail investors alike, assets invested in unit trusts on 30 September 2010 amounted to R879 324 million (ASISA, 2010c).

The TARR category forms part of the universe of collective investment products available to local and international investors. To understand its place within the general product offering, this section will firstly, sketch the South African collective investment environment as legislated by CISCA and also discuss instruments that do not fall under the legislation but do have similar attributes. Secondly, the hedge fund industry will be discussed as this unregulated market has had an influence on the beginnings of the TARR unit trust funds.

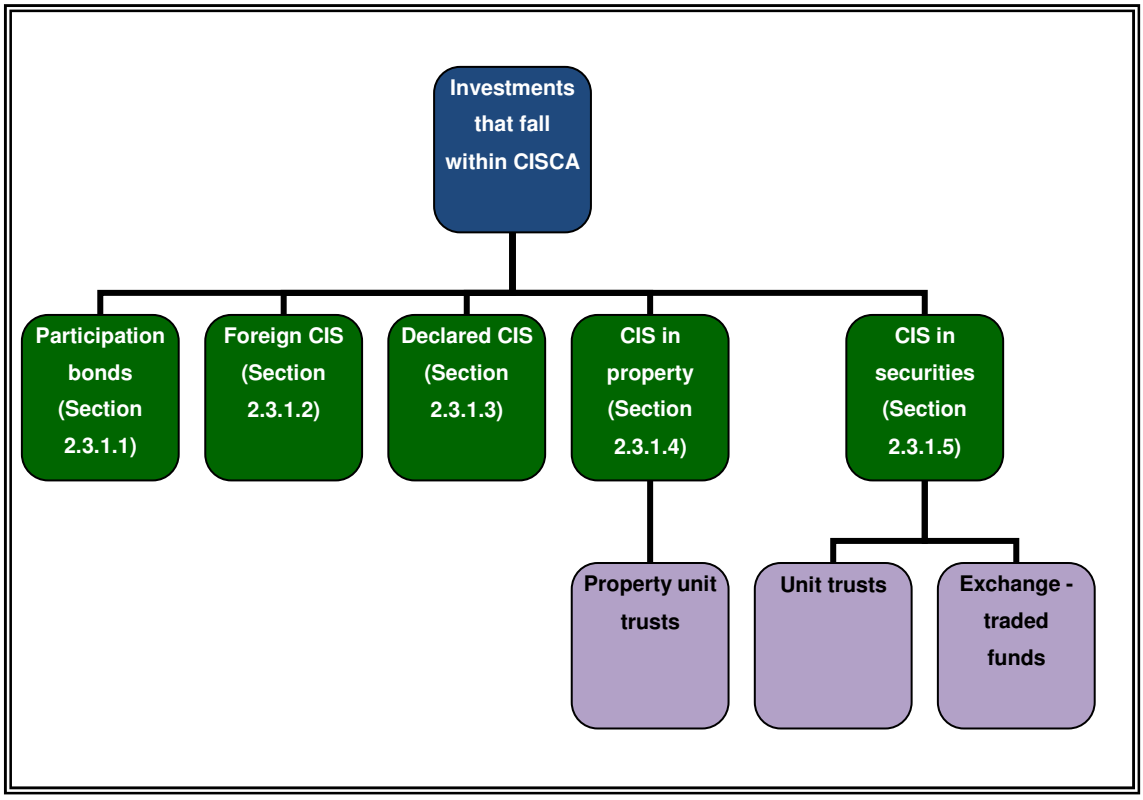
2.3.1 Unit trusts and the Collective Investment Schemes Act

The Collective Investment Schemes Control Act (CISCA) (54/2002) governs all collective investment schemes (CISs) in South Africa. Within the realm of the legislation, this includes the following broad categories (see Figure 2.1):

- CIS in securities;
- CIS in properties;
- CIS in participation bonds;
- Foreign CIS;
- Declared CIS.

This section focuses on creating an understanding of the collective investment schemes in the broader market context.

Figure 2.1: Investments that fall within CISCA



A *collective investment scheme (CIS)* is defined in terms of CISCA (2002) as:

"…a scheme, in whatever form, including an open-end investment company, in pursuance of which members of the public are invited or permitted to invest money or other assets in a portfolio, and in terms of which

(a) two or more investors contribute money or other assets to and hold a participatory interest in a portfolio of the scheme through shares, units or any other form of participatory interest; and

(b) the investors share the risk and the benefit of investment in proportion to their participatory interest in a portfolio of a scheme or on any other basis determined in the deed, but not a collective investment scheme authorised by any other Act…".

For the sake of completion, all five categories will be discussed. CIS in securities (of which unit trusts form part) will be dealt with lastly (Section 2.3.1.5).

2.3.1.1 Participation bonds

A CIS in participation bonds (CISPB) gives investors the opportunity to participate in bond instruments. This is achieved by pooling the investors' (participants') funds and lending it in the form of mortgages over commercial, retail or industrial property. The investment period is set for a minimum of five years and during the investment period participants receive interest income (CISCA, 2002; Van Zyl *et al.,* 2009:197). The six approved CISPBs include Blue Bond Investments Ltd and PS Harvey and Co (FSB, 2010).

2.3.1.2 Foreign collective investment scheme

A foreign CIS is established outside South Africa. Such a CIS registers with the FSB so it may sell its products in South Africa. The funds are denominated in a foreign currency. A local CIS categorised by ASISA as a foreign fund, is not a foreign CIS. It differs in that the management company is established in South Africa offering a CIS that is rand-denominated with international exposure to local investors (CISCA, 2002; Van Zyl *et al.,* 2009:197).

Foreign CISs (FCISs) include Investec International Fund (Ireland) and Stanlib Offshore Unit Trust Scheme (Jersey). The countries in brackets indicate where the FCIS was established. On 1 November 2010, there were 65 FCISs registered with the FSB (FSB, 2010).

2.3.1.3 Declared collective investment scheme

A declared CIS (DCIS) is a CIS other than foreign, in securities, property or participation bonds; thus the 'catch-all' category of funds that do not fall within the definition of any of the other mentioned categories (CISCA, 2002; Van Zyl *et al.,* 2009:197). On 1 November 2010, there were no declared CISs registered with the FSB (FSB, 2010).

2.3.1.4 Collective investment scheme in property

CISs in property (also known as property unit trusts or PUTS) is defined to include "…a scheme the portfolio of which consists of property shares, immovable property, assets determined under subsection (2) [of legislation] or any investment permitted under section 49…" (CISCA, 2002).

According to Botha *et al.* (2009:322), it differs from a CIS in securities (unit trust) categorised as a real estate fund in the following characteristics:

- PUTS are listed on the JSE and the management company must adhere to the trading rules of the JSE;
- PUTS are closed-end funds;
- prices are determined by supply and demand and may thus trade at a premium or discount to NAV.

2.3.1.5 Collective investment scheme in securities

CIS in securities is defined as "a scheme[,] the portfolio of which consists, subject to this Act, mainly of securities" (CISCA, 2002). Securities include instruments such as shares, preference shares, bonds, futures, warrants, options and/or money market

instruments. On 1 December 2010, there were 42 management companies of CIS in securities registered with the FSB (FSB, 2010). All of the schemes within the scope of CISs in securities are either unit trusts or exchange-traded funds[8].

A CIS in securities should not be confused with an investment trust listed on the JSE. Investment trusts do not fall within the CISCA legislation. Although both instruments can give an investor access to a diversified portfolio of securities, the legal structure differs.

An investment trust is a holding company with shares that trade on the JSE. Differences between CIS in securities and investment trusts entail (Botha *et al.,* 2009:368):

- An investment trust is a holding company subject to the provisions of the Companies Act (61/1973) while CIS is offered by financial institutions and governed by CISCA.
- Investment trusts have lower costs.
- Trading the shares of an investment trust is done through a broker while CIS is traded either through an intermediary or financial institution.
- Investment trusts trade at a price quoted on the JSE, which is subject to price movements driven by supply and demand. A CIS trade at net asset value (NAV) which is based on the NAV of the underlying assets invested in. Supply and demand has no influence on NAV.
- An investment trust is a closed-end fund as it only has a limited number of shares available for issue. CISs are open-end funds as there is no limit to the number of units that may be sold. It is not based on the principal of willing buyer and willing seller. Should an investor want to purchase a unit of the fund, the money will simply be used to buy more of the underlying shares. Note though that some unit trust funds do reserve the right to close the fund for further investment should further investments deter the fund to be managed in accordance to the stated mandate thereof (Discovery, 2009).

[8] Funds that track a particular index and trade on the JSE similar to shares (Botha *et al.* 2009:312).

- The income portion of returns received from an investment trust is in the form of dividends, not interest income.
- An investment trust can hold listed and unlisted securities with no limitations. CISCA legislation puts limitations on the extent of unlisted securities that CIS may invest in.

Table 2.1 contrasts the differences between CIS in securities and investment trusts.

Table 2.1: Differences between CIS in securities and investment trusts

	CIS in securities	Investment trusts
Applicable legislation	Collective Investment Schemes Control Act (45/2002)	Companies Act (61/1973)
Listing	Not a listed instrument	Listed on the JSE
Trading	Through intermediary or financial institution	Through a broker
Price traded	NAV	Market price driven by supply and demand
Open-/closed-end structure	Open-end	Closed-end
Income portion of returns	Not distributed to investors, reinvested	Distributed to investors in the form of dividends
Investment in unlisted securities	Restricted by legislation	No limitations
Other investment restrictions	Restricted by legislation	No limitations

Source: Van Zyl *et al.* (2009:202); Botha *et al.* (2009:368)

Table 2.2 indicates which instruments fall within the definition of CIS in securities and which instruments fall outside the scope thereof. It indicates that CIS in securities do not include hedge funds. Hedge funds will be discussed next.

Table 2.2: Instruments included as CIS in securities

Included as part of CIS in securities	Not included under CICSA legislation as CIS in securities
Exchange-listed funds *Unit trusts*	*CIS in properties* • Also called property unit trusts (not to be confused with a unit trust categorised as real estate/property) *Foreign CIS* • Foreign registered CIS offered to South African investors *Declared CIS* *Participation bonds* *Investment trusts* *Hedge funds*

2.3.2 Hedge funds

"Saying you are invested in a hedge fund is a little like saying you play sports - it is a statement that conveys some information but could actually mean a great many different things." (Brown and Reilly, 2009:912).

Hedge funds are assumed to date back to the early 1950s with the first official hedge fund considered to be that of Alfred Winslow Jones in 1952 in the US. The fund employed a long-short[9] strategy (AIMA SA, 2009b).

In South Africa, the first funds were started around the mid-1990s and are regulated as part of the Financial Advisory and Intermediaries Services Act (37/2002). There exists a collaborative effort between industry and the FSB to enhance regulation of the hedge fund industry. The view between all parties is unanimous that further legislation will most likely be incorporated into the CISCA legislation (AIMA SA, 2009a).

Currently, the most popular investment vehicle in the South African hedge fund market is fund of funds (FoFs). In 2008, 60% of all assets were invested by FoFs (AIMA SA, 2009a). Growth in 2008 of approximately 17% resulted in funds under management to be R30,3 billion at the end of June 2008 compared with the end of June 2007 when it

[9] A traditional hedge fund strategy, which takes long and short equity positions. Long and short positions will vary depending on market expectations (Solnik & McLeavey 2008).

was R25,9 billion (Novare Investments, 2008). It must be noted that these figures exclude money in absolute return funds and unit trusts that use leverage[10]. All funds included in the survey use some form of leverage and short asset exposure or short selling[11,12].

Hedge funds are defined unilaterally as a pool of private capital managed as an unregistered pool of funds, most commonly in the form of a limited partnership (Bodie, Kane & Marcus, 2008:99; Marx, Mpofu, Van de Venter & Nortjé, 2006:14; Botha *et al.,* 2009:384). The uniformity in the definition to this point is in the mechanics and legal structure of the investment.

However, there is a lack of consensus on an expanded definition in the literature thus Table 2.3 offers a number of variations thereof.

[10] Use of leverage entails borrowing a portion of the funds to be invested.
[11] A short position is a position in an instrument that benefits if share prices fall.
[12] Short selling entails the following: selling borrowed securities with the intention of buying them back at a later date. The investor is anticipating a decrease in price, which will lead to a profit on the transaction (Brown & Reilly 2009:1024).

Table 2.3: Definitions of hedge funds

Date	Authors	Definition
2006	Marx, Mpofu, Van de Venter & Nortjé (2006:14)	Objective of a hedge fund is to consistently achieve returns outperforming market returns under any market conditions.
2008	Bodie, Kane & Marcus (2008:99)	Managers pursue investment strategies involving leverage, short selling and substantial use of derivatives. These strategies would typically not be open to a mutual fund (unit trust) under the regulatory environment.
2009	Botha *et al.* (2009:384)	Hedge fund managers can use a multiplicity of strategies to achieve either magnified returns (increasing gearing that is, leverage and riskiness of fund) or strategies focused on risk aversion.
2011	Solnik & McLeavey (2009)	Original definition: A fund that plays against the market (i.e. bets against the market) with the use of futures, short selling and other derivatives. Current common denominator: Not in the strategy followed, but the attempt to achieve absolute returns. This can be achieved with varying risk and return strategies. It is common practice to focus on performance relative to a benchmark.
2005	Ward & Muller (2005:49)	Hedge funds are actively traded funds focused on achieving only positive returns. It attempts to do so by engaging in short selling, derivative products and leveraged positions.
n.d.	AIMA SA (n.d.)	The funds use some sort of long-short strategy or short selling; the funds use leverage; a performance fee and management fee are charged.
2009	Brown & Reilly (2009:1019)	Strategies often use arbitrage[13] trading, leverage, derivatives, short selling.

From the further definitions offered, it is concluded that:

- Hedge funds focus on offering absolute returns to investors;
- The strategies employed, inherent risks and return expectations may vary significantly.

[13] Simultaneous buying and selling a comparable security to make a riskless profit from a price discrepancy (Botha *et al.,* 2009:384).

The goal of hedge funds is thus to offer absolute returns to investors through a wide array of strategies. Hedge funds should not be confused with portfolio hedging, which entails a current position in an asset or portfolio and taking an offsetting position to protect the asset/portfolio against a potential loss.

Hedge funds and TARR unit trust funds are thus similar in their promised return. TARR funds offer either a real or absolute return to an investor similar to hedge funds.

The strategies employed by hedge funds versus that used by the more regulated TARR unit trusts in pursuit of absolute or real returns, however, differ, limiting the array of employable strategies. The TARR funds are also explicitly held out to be low volatility instruments.[14]

The strategies used by TARR funds will be discussed in a later section. Strategies employed and used within the hedge fund market are not within the scope of the research objectives.

2.4 SPECIFICATIONS OF THE TARGETED ABSOLUTE AND REAL RETURN FUND CATEGORY

Within the realm of CIS in securities, Table 2.2 indicates that exchange-traded funds as well as unit trusts fall within the scope of the legislation.

The ACI assumed responsibility for the categorisation system of the unit trust funds. The classification system discussed here is based on all changes from October 2003 to date.

Based on a three-tier categorisation system, all unit trusts are classified as firstly, whether it satisfies the first-tier classification as a domestic, worldwide or foreign fund; secondly as either equity, fixed interest, real estate or asset allocation funds, and lastly, based on the style (i.e. specific asset allocation) employed.

[14] The risk characteristic used by the ACI to describe the TARR category is "below average short-term volatility" (ACI, 2008b:14).

The TARR category falls within the following three-tier classification:

Domestic (D)

- **Asset Allocation (AA)**
  - **Targeted Absolute and Real Return category (TARR)**

As foreign and worldwide funds do not fall within the sample, only the domestic first-tier (Table 2.4) and asset allocation (second-tier) categories are relevant.

Table 2.4: First-tier classification of unit trust funds ACI

First-tier category	Description
Domestic	Funds that invest at least 80% of their assets in South African markets at all times.
Worldwide	Funds invested in both South African and foreign markets. No minimum criteria for either asset class.
Foreign	Funds that invest at least 85% of their assets outside South Africa at all times.

Source: ACI (2008a:9)

The domestic category includes all funds that invest at least 80% of their assets in South African markets at all times. The funds are subsequently classified (second-tier classification) based on the dominant asset class invested in as indicated in Table 2.5.

Table 2.5: Second-tier classification of domestic unit trust funds ACI

Second-tier category	Description
Equity	Minimum of 75% of portfolio must be invested in JSE- listed shares and 1) minimum of 80% of equity portfolio must be invested in JSE sector/s as defined by category; 2) maximum of 20% of equity portfolio may be invested outside the JSE sector/s provided that these investments comply fully with the category definition.
Fixed interest	Portfolios invested in bond, money and other income-earning securities.
Real estate	Portfolios invested in listed property shares, collective investment schemes in property and property loan stocks[15]. Minimum of 50% of portfolio must be invested in real estate securities.
Asset allocation	Portfolios that invest in a wide spread of investments in equities, bond, money and property markets.

Source: ACI (2008a:10, 13, 15, 16)

The asset allocation category prior to October 2003 made provision for the following sub-categories only:

- prudential;
- flexible;
- flexible property.

Subsequent changes to the asset allocation category entailed:

- the category asset allocation - flexible property was changed to real estate – general (Lambrechts, 2005a:5) - that is, real estate became a second-tier classification;
- the asset allocation - prudential category was split into prudential low equity, prudential medium equity, prudential high equity and prudential variable equity;
- and the TARR category was added (Lambrechts, 2003:40).

[15] An investment vehicle in which the investor either buys shares or debentures, and shares in the income stream of the property or portfolio the company invests in (Botha *et al.* 2009:322). The investment vehicle does not fall within the CISCA legislation.

The resulting sub-categories used today are:

- prudential low equity;
- prudential medium equity;
- prudential high equity;
- flexible and
- targeted absolute and real return (TARR).

The details of each category are described in Table 2.6. Importantly all prudential funds must comply with Regulation 28 of the Pension Fund Act, while this is not the case for the flexible and TARR categories.

The prudential categories are distinguished based on the equity exposure within the fund: prudential low equity, equity exposure of less than 40%; prudential medium equity, equity exposure of between 40 and 65%; prudential high equity, equity exposure of more than 60%; and prudential variable equity, equity exposure of between 0 to 75%. The flexible and TARR categories have no requirement with regards to minimum or maximum equity exposure.

Note that the TARR category is the only category that may invest in derivative instruments beyond the maximum allowance of 2,5%.

Table 2.6: ACI classification and description of domestic asset allocation categories

CATEGORY / *CHARACTERISTIC*	Prudential low equity	Prudential medium equity	Prudential high equity	Prudential variable equity	Flexible	TARR
Volatility:	Reduced short-term volatility	Average volatility	Higher probability of short-term volatility	Higher probability of short-term volatility	Not explicitly defined	Below average short-term volatility
Aim:	Long-term capital growth	Medium- to long-term capital growth	Maximises long-term growth	Maximises long-term growth	Not explicitly defined	Managed towards a predetermined, explicit benchmark
Equity exposure (incl. international):	Below 40%	40%-65%	Above 60%	0%-75%	No requirement	No requirement
Investment in derivatives:	Max. 2,5%	Max. 2,5%	Max. 2,5%	Max. 2,5%	Yes	Yes
Regulation 28 compliant:	Yes	Yes	Yes	Yes	Depends on mandate of fund	Depends on mandate of fund
Variation in risk and return objectives of individual funds:	Yes	Yes	Yes	Yes	Yes	Yes
Other information:					May be aggressively managed with shifts in market and/or asset class exposure	Does not necessarily offer capital or performance guarantees

Source: ACI (2008a:14)

The classification and subsequent characteristics in terms of the ACI classification system are not specific in defining the TARR funds beyond the allowable asset classes or characteristics from Table 2.6 and Table 2.7 (e.g. maximum or minimum asset allocations).

Table 2.7: ACI classification and description of TARR funds

Classification	Description
Domestic	Funds that invest at least 80% of their assets in South African markets at all times.
Asset allocation	Funds that invest in a range of asset classes: equity, bond, money market and property.
Targeted absolute and real return portfolios	Funds that may also invest in derivative instruments and may/may not be Regulation 28, dependent on the mandate of the fund. The mandate of the portfolio will determine the objective and strategy of the fund thus the ACI does not offer a benchmark for the sector. Based on the classification, the funds should exhibit lower volatility and have an explicit benchmark against which performance will be measured.

Source: ACI (2008a:14)

As the TARR category explicitly includes both targeted absolute return funds and real return funds, this is further clarified. A targeted absolute return fund differs from a real return fund in that a targeted absolute return fund aims to achieve a return greater than zero (RMB Asset Management, 2006) while a real return fund is targeting a specific return greater than inflation.

Another description for a targeted absolute return fund is balanced fund, which aims to offer investors a *particular* or *definite* return. Firstly, this return may be an absolute

value, and secondly, it is common practice for the return expected, to be achieved over a specified investment horizon (Du Preez, 2005). According to Hoenig (2003) the funds offer a good return (even if a low return as such) yet still positive (thus never negative). An alternative description emphasises positive returns irrelevant of market conditions and higher returns than traditional asset classes (Macquarie, n.d.). In contrast, real return funds focus on offering a return similar or in excess of inflation (Still, 2004a).

Momentum Investment Consulting (2007:4) focuses on the goal of these funds, that is, offering a positive or absolute return irrelevant of market conditions and extended to the aforementioned aim for a return in excess of inflation over time. Waring and Siegel (2006:14) argue that to a certain extent the popularity of absolute return funds lies in what they propose to offer a client and that an uninformed investor may view this superior to any other investment product which, in essence, only offers a relative return (as is the case with most investments). The misconception though lies in the common one-dimensional belief that "absolute is superior".

Should a TARR fund thus have an absolute return focus, it has in essence, the same goal as a hedge fund. Similar to flexible funds, TARR funds have no limitations with regard to the investments it can make in different asset classes. The difference between flexible and TARR funds though, is the fact that for TARR funds, the return and volatility are defined (be it only qualitative). The low-risk characteristic[1] compared with that of hedge funds does not make it plausible that the strategies employed by TARR funds will be similar to those employed by hedge funds. The risk and return characteristics and most common strategies used by the unit trust TARR funds will be discussed further.

[1] The risk characteristic used by the ACI to describe the TARR category is "below average short-term volatility" (ACI, 2008a:14).

2.5 RISK AND RETURNS OF TARGETED ABSOLUTE AND REAL RETURN FUNDS

The risk and return characteristics of the TARR funds might vary substantially depending on the return and risk requirement of the fund.

An analysis of the funds in the sector indicates the following norm: The higher the return requirement of the fund, the longer the investment period over which this will be achieved. A higher return requirement also increases the inherent risk of the fund (Momentum Investment Consulting, 2007:4). Balanced funds, also known as prudential funds, and TARR funds differ in their approach to risk. Whereas balanced funds have a longer-term focus, the goal of TARR funds is to limit risk exposure over the short to medium term as well (Du Preez, 2005). The focus is thus on limiting downside risk rather than outperforming an asset-based benchmark.

The fact sheets and mandates of the TARR funds describe the risk as moderate or lower (no aggressive funds). Some of the funds do indicate a risk measure, mostly focused on downside risk in the sense that it attempts not to achieve a negative return or return lower than inflation in a 12-month rolling period (Du Preez, 2005[2]). The investment strategy employed to satisfy these risk and return characteristics forms the next part of the discussion.

2.6 STRATEGIES EMPLOYED BY TARR FUNDS

The strategies used to achieve absolute returns or real returns are common in the hedge fund industry and include short selling and leverage. The strategies not only focus on achieving absolute returns but also on achieving less volatility over time (Bloemker & Knight, 2009).

[2] Should a portfolio be benchmarked against a rolling period, a rolling period of 24 months will entail the following: Assume the measurement period started in January 2002: the first 24-month period will be from January 2002-December 2003. The next rolling period will be from February 2002-January 2004 and so forth.

The goal of the funds of absolute return investments is geared towards constantly offering inflation-beating returns, while employing strategies in line with the risk preference of the fund. The most common objective is capital protection (Old Mutual, 2009a.). The strategies employed to achieve this however, are very diverse. It has been suggested that the TARR category should be divided into four sub-categories as to assist in peer comparison based on the strategies employed (Koekemoer as quoted by Cameron, 2008).

The norm in South Africa for TARR funds (RMB Asset Management, 2006) is to use more conventional strategies than those used by hedge funds to achieve positive returns which include:

- high exposure to defensive sectors such as property[3];
- low exposure to volatile asset classes such as equity;
- use of derivative instruments;
- investment in instruments providing an inflation hedge such as inflation-linked bonds;
- aggressive tactical asset allocation[4].

Strategies employed range from share selection (bottom-up approach)[5], dynamic asset allocation[6], strategic asset allocation[7], use of derivative structures and quantitative strategies[8] (Old Mutual, 2009b; Munzara, 2007). The strategies are employed on a stand-alone basis or jointly.

[3] Sectors in the market of which the earnings will not be negatively influenced by a bear market (Brown & Reilly, 2009:455). These include pharmaceuticals and food and beverages (Brown & Reilly, 2009:412).
[4] A shift from the long-term strategic asset allocation, changing weights invested in each asset class based on short-term market expectations (Brown & Reilly, 2009:1025).
[5] Choosing specific securities that will meet risk and return requirements of the fund.
[6]The use of a long-term strategic asset allocation with short-term tactical shifts based on market expectations.
[7] Long-term strategic asset allocation strategy. No changes based on short-term market movements.
[8] Computer-driven models that determine the asset allocation and/or share selection of the fund (Du Preez, 2005).

A more comprehensive identification of strategies is as follows (Momentum Investment Consulting, 2007:5):

- cash plus alpha strategies: hedge largely all market risk in an attempt to offer return similar to cash and adding alpha with superior share selection. This is the group with the lowest volatility;
- fundamental asset allocation, low equity strategies: low level of equity while equities are often chosen for their expected dividend yields. Some hedging is still employed and asset allocation includes all main asset classes therefore it also starts with a strategic asset allocation;
- fundamental asset allocation, flexible equity strategies: funds are based on a strategic asset allocation with tactical asset allocation based on market expectations. Hedging may be employed while all major asset classes are included in the portfolio;
- quantitative strategies: manage equity exposure actively. A significant level of hedging is used to create a floor for capital protection. The floor is moved upwards over time and may be very mechanical;
- aggressive/high equity strategies: the funds have high net equity positions and are occasionally viewed as more suitable to the unit trust domestic-asset allocation-flexible category. Hedging may be used but greater emphasis is placed on the manager's ability to time the market. This is the group which exhibits the highest levels of risk.

Table 2.8 summarises varying strategies as identified in the literature. The next section describes the asset allocation of the TARR category.

Table 2.8: Varying strategies identified by different authors

Strategy	Share selection	Share selection	Strategic asset allocation	Cash plus alpha strategies
	Dynamic asset allocation	Asset allocation	Tactical asset allocation (market timing)	Fundamental asset allocation, low equities
	Use of derivative structures	Quantitative strategies		Fundamental asset allocation, flexible equities
				Quantitative strategies
				Aggressive/high equity strategies
Reference	Old Mutual (2009a)	Du Preez (2005)	Munzara (2007)	Momentum Investment Consulting (2007:5)

2.7 ASSET ALLOCATION OF TARGETED ABSOLUTE AND REAL RETURN FUNDS

As described earlier in this chapter, the definition of the fund category allows no restrictions on asset allocations. Any fund that is Regulation 28 compliant though, will be bound by the restrictions thereof. As some TARR funds are marketed as Regulation 28 compliant, this is further discussed.

2.7.1 Prudential Investment Guidelines

The Prudential Investment Guidelines of the Pension Fund Act (24/1956), specifically Regulation 28 thereof, set requirements with regard to the maximum exposure for asset classes that funds must comply with (PPS Investments, n.d.; Masie, 2008). The detail is presented in Table 2.9[9].

Table 2.9: Regulation 28 requirements

Regulation 28 Last updated in 1998 and sets out the maximum asset allocations for retirement funds as follows:	
Equity	**75%**
Unlisted equity	5%
Market cap < R2 bn	10%
Market cap > R2 bn	15%
In the participating employer*	10%
Property	**25%**
In one property company or development	5%
Equity and property	**90%**
Interest-bearing assets (fixed income)	**100%**
In one institution	20%
Kruger Rands	**10%**
Other	**2,5%**
(includes hedge funds, private equity, derivatives and venture capital)	
International investments**	**15%**
Unit trusts	**100%**
(limited to permitted maxima for underlying assets)	
* subject to exemptions ** the offshore allocation was increased to 20% in the 2008 budget	

Source: Masie (2008)

[9] Currently Regulation 28 is being reviewed and the second draft version is out for comment until 28 January 2011 (South African Government Online, 2010). This study does not deal with aspects in the draft version.

The allocation to international investments reflected the then current exchange controls, namely foreign investment limited to only 15%. Although the allocation for international investments was increased to 20% in the 2008 budget (loosening exchange controls, hence investment across borders increased), the Pension Fund Act has not been amended accordingly. This currently results in funds applying to the FSB for approval prior to utilising the additional 5% granted in the budget (Masie, 2008).

The pension fund legislation is currently being reviewed by the FSB. It was originally written in 1956 and amended in 1998, yet much has changed since then. The goal of Regulation 28 was to create a safety net for investors by forcing fund managers to deal prudently with fund assets. However, fund managers are using practices contrary to the spirit of the act (Cameron, 2009a).

One of these practices entails how hedge funds are packaged and offered to fund managers of pension funds. Hedge funds are 'packaged' as either insurance policies or through special purpose vehicles[10] (SPVs) such as companies, partnerships and debentures to circumvent the restriction of 2.5% imposed by the legislation for any alternative investments that are not specifically dealt with in the legislation (Cameron, 2009a).

A circular issued by the FSB (2009) to fund managers stated that the FSB was aware of managers that promote funds to be in compliance with Regulation 28 while the deed[11] with the FSB was not specified to this extent. In the circular, the FSB set a deadline of 30 September 2009 for all such funds to amend fund deeds by means of a supplemental deed.

[10] "A legal entity created solely to serve a particular function, such as facilitation of a financial arrangement or creation of a financial instrument" (WebFinance, Inc., n.d.).
[11] Defined as "the agreement between a manager and a trustee or custodian, or the document of incorporation whereby a collective investment scheme is established and in terms of which it is administered, and includes the deed of a management company…" (CISCA, 2002).

2.8 BENCHMARKS FOR TARGETED ABSOLUTE AND REAL RETURN FUNDS

Unit trusts in the asset allocation category (including TARR) set their own benchmarks in contrast to the majority of second-tier categories where ASISA specifies the benchmark (ACI, 2008a; Cameron, 2008).

As the asset allocation and strategies within the TARR category can vary significantly, the category is not ranked by ASISA (ACI, 2008a). The fund category objective is simply stated to offer a targeted absolute or real return and below-average volatility.

The majority of funds in the category benchmark the portfolios against an inflation target and tend to do so over a rolling period (of which three years is a popular time frame).

The inflation benchmarks range from CPI to CPI plus 8% (information and comparison done from the June 2006 fact sheets of the funds). It is worth noting that the Dynamic Wealth Optimal Fund CPI plus 8% benchmark, specifically states its benchmark to be "over a rolling five year period", which is significant and must be taken into consideration as the return objective will only be achieved over the medium term.

From January 2009, Statistics SA (Stats SA) discontinued publishing CPIX figures. The implication of the change was that funds that originally used a target of CPIX changed their benchmark to headline CPI. The original calculation methodology for headline CPI was replaced with a newly reweighted and rebased CPI (Old Mutual, 2009b). The change resulted in South Africa's CPI being in line with international standards (Fraters, 2009). The characteristics of TARR funds (including risk and return) set the scene to understand the benefits of TARR funds.

2.9 BENEFITS FROM INVESTING IN TARGETED ABSOLUTE AND REAL RETURN FUNDS

Advantages include:

- Legal structure of unit trust funds: the industry is regulated by the FSB, which requires mancos to be registered. Funds are under the regulation of CISCA, which requires a deed for each fund/manco or supplemental deed as well as mandate describing the characteristics of the fund including benchmarks, general strategy and whether the fund is Regulation 28 compliant (Moodley-Isaacs, 2009). The legislation also requires the appointment of a trustee, which is usually a bank or financial institution (Moodley-Isaacs, 2009).
- Diversification: an investor that would not otherwise have the opportunity to invest in a diversified portfolio due to a small investable amount can do so through a unit trust.

Subsequently, the growth in the TARR category, as discussed in the next section, attests to the popularity and benefits thereof.

2.10 GROWTH OF TARGETED ABSOLUTE AND REAL RETURN CATEGORY

The first quarter (quarter ended 31 December 2003) from inception of the TARR category include the funds listed in Table 2.10. As the TARR category was only started in October 2003 (fourth quarter of 2003), certain funds were reclassified based on the new classification system; hence funds in the category with inception dates prior to October 2003.

Table 2.10: Funds in TARR category on 31 December 2003

Fund	Inception Date
ABSA Inflation Beater	1 October 2002
Allan Gray Optimal	1 October 2002
Coronation Absolute	2 December 2002
Coronation Capital Plus	2 July 2001
Investec Absolute Balanced	1 July 2003
Metropolitan Absolute Growth	1 May 2002
Metropolitan Inflation Linked Bond	21 October 2002
Metropolitan Property Absolute Income	1 August 2003
Metropolitan Dynamic Asset Allocator FoFs*	N/A
Nedbank Inflation Beater	2 April 2002
Old Mutual Dynamic Floor Fund	1 November 2002
Old Mutual SYmmETRY Income*	N/A
Prudential Inflation Plus	1 June 2001
RMB Absolute Focus	31 December 2002
Sanlam Inflation Linked	1 April 1999
Sanlam MM Inst Positive Return Fund One*	N/A
* Institutional funds. The information from Lambrechts (2003) only includes inception dates of retail funds.	

Source: Lambrechts (2003:21, 49)

The TARR category of South African unit trusts is predominantly real return funds focusing on CPI or CPI plus a number of basis points that is, the general use of the term absolute return funds as including targeted and more pure absolute return funds.

The fourth quarter of 2008 showed 92 funds in the TARR category, while this number dropped to 78 for the fourth quarter of 2010 (ASISA, 2009a; 2010b). The reason for the decrease was due to funds in the TARR category being reclassified to the prudential low, medium, high or variable equity categories, which were more indicative of their investment styles (ASISA, 2010b). Note that the prudential categories *require* funds to be Regulation 28 compliant while this is not the case for the flexible and TARR category (Table 2.6). On 30 September 2010, 81 funds formed part of the TARR category (ASISA, 2010c).

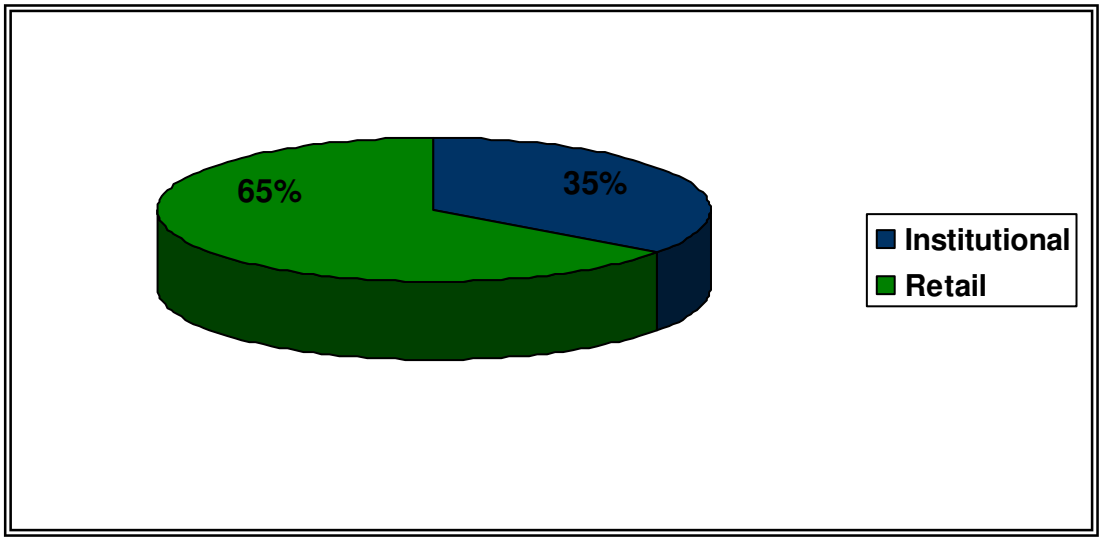
2.11 COMPOSITION OF TARGETED ABSOLUTE AND REAL RETURN CATEGORY ON 31 DECEMBER 2009

The sector on 31 December 2009 included 78 funds as indicated in Appendix A. In the next section, the characteristics of the funds are compared. As the study only includes funds that were in the category to this date, the composition beyond 2009 is not relevant.

2.11.1 Institutional versus retail funds

On 31 December 2009 (last quarter of 2009), the market composition was 35% institutional while 65% of funds were directed at the retail sector (Figure 2.2). However, the number of funds is no indication of the assets under management.

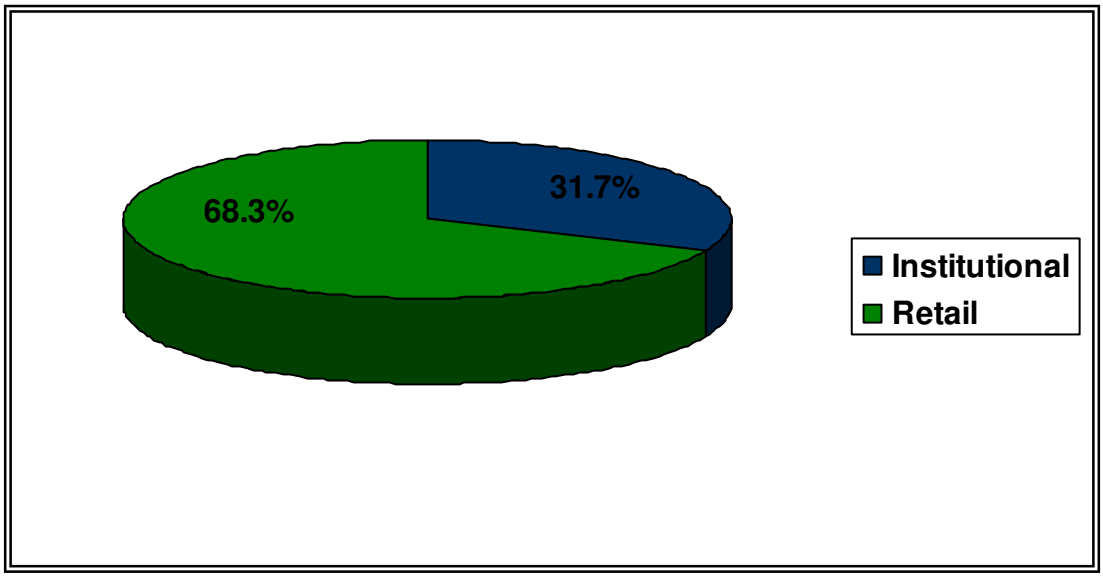
Figure 2.2: Number of funds – 31 December 2009: Institutional versus retail



Source: ASISA (2010b)

The assets under management for the quarter ending 31 December 2009 indicate retail product dominance as assets under management for the retail funds were R34 731 million (68,3%) while institutional funds contributed R11 732 million (31,7%) to the asset under management (Figure 2.3).

Figure 2.3: Asset split - 31 December 2009: Institutional versus retail



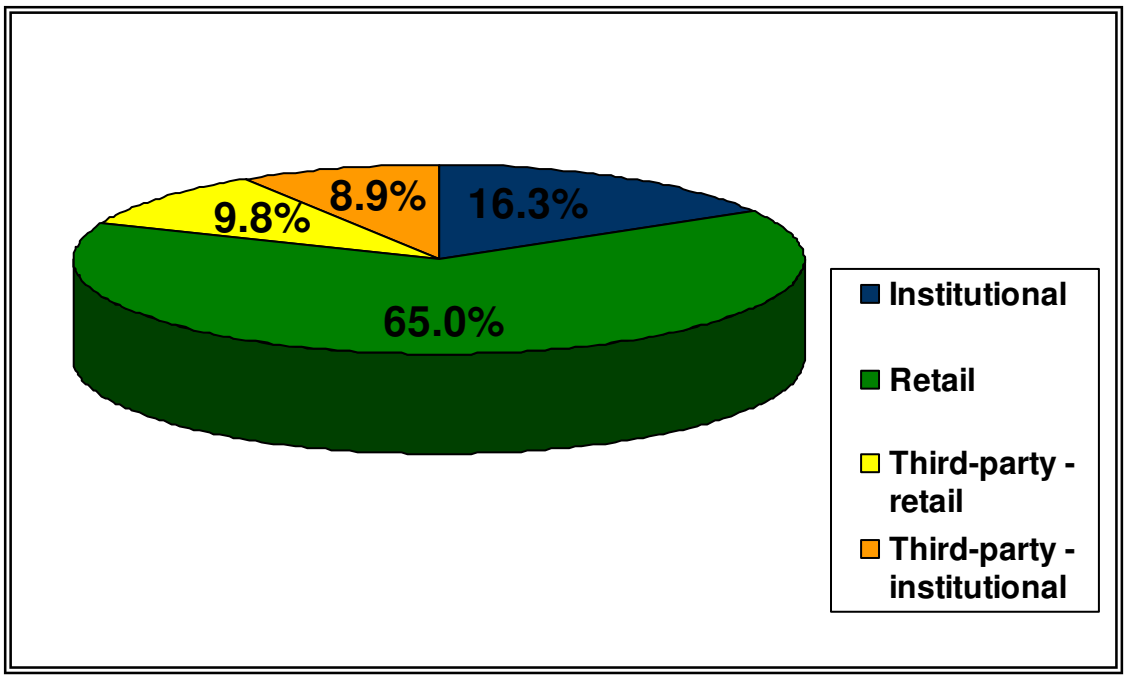
Source: ASISA (2010b)

Information on institutional funds is not as accessible and easily available because of the wholesale nature thereof. Given the current status of the category (65% of funds being retail, which include 68,3% of assets in the category), the study will continue to focus on the retail funds as representative of the TARR category (51 funds with assets to the value of R34 731 million).

2.11.2 Third-party funds

Third-party or white-label funds as they are known, are funds managed by an asset manager who does not have a licence with the FSB. To be able to offer its product to the general or institutional market, the fund is administered by an asset management company which has a licence from the FSB (Still, 2004b).

Figure 2.4: Market composition: retail, institutional and third-party funds



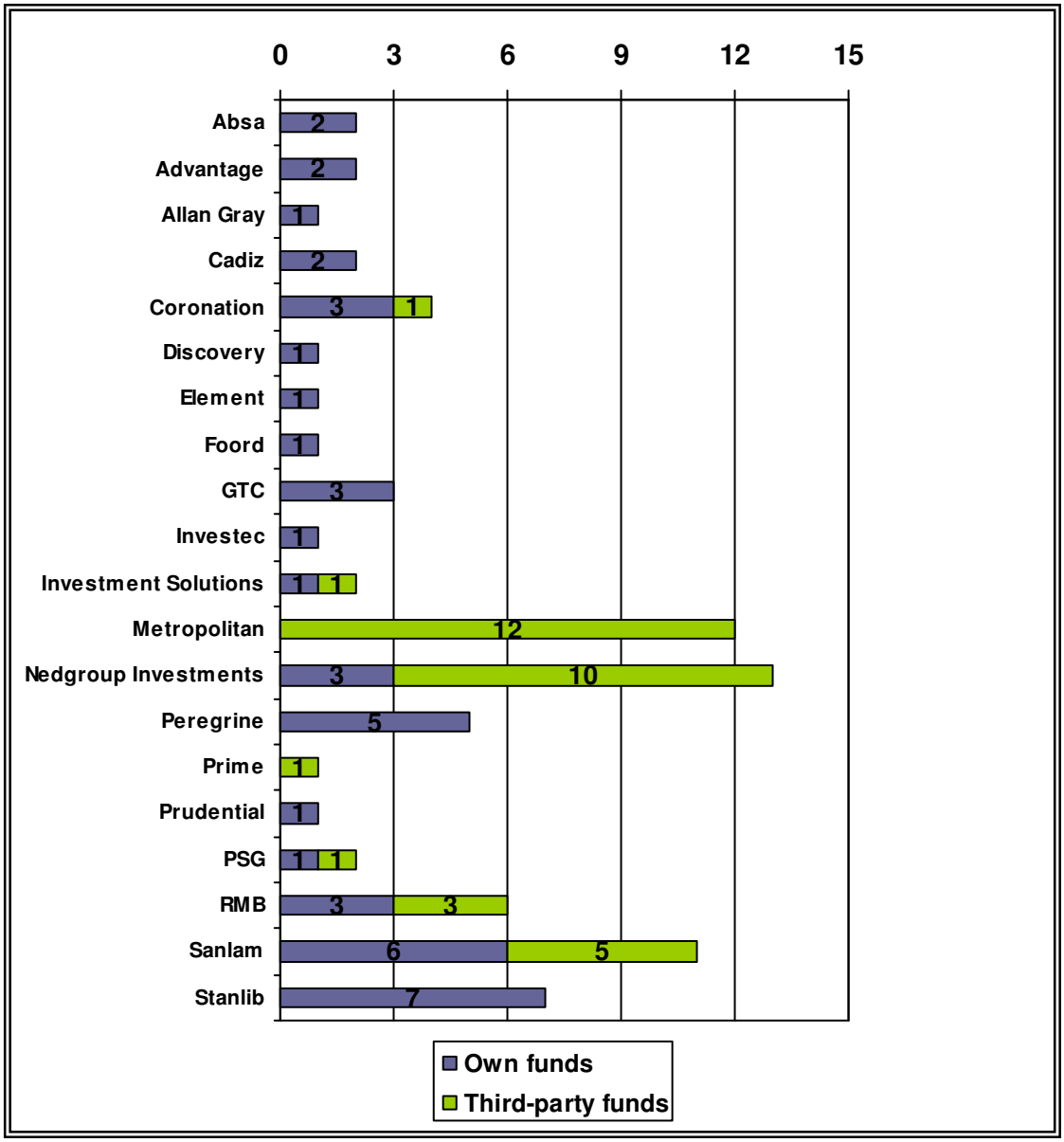
Source: ASISA (2010b)

The third-party asset manager may not have the administrative capacity or sufficient size required by the FSB for awarding of a licence. The managers of white-label funds are still bound by the rules of ASISA as they must become affiliate members. Third-party funds were 19% of total funds on 31 December 2009 (Figure 2.4).

2.11.3 Funds per management company

Of the 20 management companies (registered on 31 December 2009), which offer TARR funds as part of their product offering and registered on 31 December 2009, Nedgroup dominates the category, although through third party funds. Figure 2.5 presents the composition per management company.

Figure 2.5: TARR funds per management company



Source: ASISA (2010b)

2.12 SUMMARY

In this chapter, the regulatory environment governing TARR funds was discussed, which includes the regulatory framework in terms of CISCA legislation. The specifications of the 20% asset under management as part of the domestic, asset allocation category were further defined as funds that may invest in money market, fixed-income, equities, property as well as derivative instruments.

Further to the definition, the risk and return characteristics of the funds within the category may vary depending on the mandate of the fund. However, all funds within the category pursue an absolute or real return thus focusing on offering a positive return (i.e. greater than zero) or a return in excess of inflation.

The major strategies employed to achieve the risk and return goals focus on: 1) share selection; 2) a strategic asset allocation with tactical asset allocation shifts with varying degrees of equity exposure and 3) quantitative strategies with benchmarks based on the goal of the fund. Currently, most funds focus on offering a real return and this is reflected in the benchmarks dominated by either CPI or CPIX.

The growth in the sector and current market composition were discussed to set the scene for the chapters to follow. In Chapter 3, the literature review of return-based style analysis follows.

CHAPTER 3: RETURN-BASED STYLE ANALYSIS

3.1 INTRODUCTION

> *To constitute a style, an investment philosophy should be held in common by some group of investors. Style might be said to be a reflection of a portfolio manager's guiding investment philosophy and may be characterised by the fundamental set of principles that is consistently applied in the investment decision making process.*
>
> (Robertson, Firer & Bradfield 2000:11).

The Domestic, Asset Allocation, Targeted Absolute and Real Return (D-AA-TARR[1]) category of the unit trust market is very broadly defined (Table 3.1) with no limitations on the asset allocation to any asset class. The individual fund managers thus have substantial discretion as to the exposure to all investable asset classes (also note that positions range from long and/or short positions to no exposure at all). The category definition may thus not be indicative of similarity in investment strategies employed by managers or asset class exposure as fund managers have substantial autonomy.

"Names [of mutual funds] can be just as deceptive when it comes to the investment objectives that are commonly used to group types of funds..." according to Donnelly (1992:C1).

Although it is acknowledged that a large proportion of the funds pursue a similar return objective, namely a targeted real return or targeted absolute return (often linked to CPI), it is no guarantee that the strategies employed are indeed similar. The extent of discretion may thus lead to significant divergence in overall risk and return and secondly very different risk and return drivers (DiBartolomeo & Witkowski, 1997:32).

[1] Subsequently only referred to as TARR.

Table 3.1: ACI classification and description of TARR funds

Classification	Description
Domestic	Funds that invest at least 80% of their assets in South African markets at all times.
Asset Allocation	Funds that invest in a range of asset classes: equity, bond, money market and property.
Targeted Absolute and Real Return portfolios	Funds that may also invest in derivative instruments and may/may not be Regulation 28 dependent on the mandate of the fund. The mandate of the portfolio will determine the objective and strategy of the fund thus the ACI does not offer a benchmark for the sector. Based on the classification, the funds should exhibit lower volatility and have an explicit benchmark against which performance will be measured.

Source: ACI (2008a:14)

It stands to reason that any restrictions to individual asset allocations imposed by the investment manager may be indicative of the particular strategy of the manager. Should such a bias be consistent over time, it further supports the notion that it should reflect the manager's style. Any changes in asset allocation may suggest that the fund manager is not maintaining his/her style bias.

It can also be useful to identify misclassification of the funds. In the case of Domestic, Asset Allocation, Targeted Absolute and Real Return funds, if the manager-specific restrictions lead to a style more reflective of a different category, it may suggest misclassification as a TARR fund[2]. The Financial Services Board[3] (FSB) found in 2009 that many collective investment schemes were promoted to the public as being

[2] Within the scope of the asset allocation category, misclassification would have to include an analysis regarding Regulation 28 compliance. This may be difficult to conduct with return-based style analysis and more prudent through holdings-return analysis.

[3] The Financial Services Board (FSB) is an independent organisation established through the Financial Services Board Act (97/1990) to regulate South Africa's financial sector in the interests of the public (Van Zyl *et al.,* 2009:128). See Chapter 2 for a more detailed description.

Regulation 28 compliant[4] although this was not stated as part of the investment philosophy of the fund according to the FSB (FSB 2009). As previously mentioned, Regulation 28 imposes asset allocation limitations. The FSB subsequently required that, should a fund be marketed as Regulation 28 compliant, the investment philosophy according to the supplemental deed, should state this. This led to a number of funds' supplemental deeds being amended. The implication with regard to the TARR category consequently was reclassification of some of the funds to the prudential categories[5].

Proper style classification of the funds within the TARR category is important for a number of reasons (DiBartolomeo & Witkowski, 1997:32):

- the extent of discretion leads to significant divergence in overall risk and return and different risk and return drivers of individual funds;
- management style identification is commonly used for the basis of performance measurement and calculation of management fees;
- proper identification of overall style creates a framework for identifying any changes in style (whether deliberate or unintentional, tactical or strategic of nature);
- it offers invaluable information for a client to ensure selection of an appropriate fund.

Due to the broad definition of the TARR category, a change in style will not necessarily require a reclassification of the fund.

To achieve the objective of identifying the inherent style of a fund, Sharpe (1988; 1992) introduced return-based style analysis (RBSA), which has been accepted as an appropriate and valid method for determining the asset allocation mix of a fund. RBSA is used to determine the asset class mix, also called asset allocation, for each fund in the TARR category in an attempt to determine the style of the individual funds based on asset mix.

[4] Regulation 28 or Prudential Guidelines of the Pension Funds Act (24/1956). The regulation sets limits on asset class allocations to protect investors' retirement funds.
[5] Unit trust funds that comply with the Prudential Guidelines of the Pension Funds Act (24/1956). The sub-categorisation (low, medium, high and variable equity) is based on the extent of equity exposure.

The chapter proceeds as follows. Section 3.2 motivates the importance of asset allocation. It is followed by a review of different methods for determining fund style and misclassification of funds. Section 3.4 creates context on analytical techniques prior to Sharpe's prominent 1988 and 1992 research regarding return-based style analysis and asset class mix. Research beyond this period is presented next. Holdings-based analysis is subsequently contrasted with RBSA. Lastly, Section 3.8 highlights practical considerations regarding RBSA in terms of the literature.

3.2 THE IMPORTANCE OF ASSET ALLOCATION

Would you believe in stock funds with few stocks, or income funds that pay no income? Investors don't always get what they think they're paying for (Schiffres & Parmelee, 1995).

The asset allocation decision is an important choice by a fund manager for two reasons: firstly, it is widely recognised that the asset allocation decision is the main determinant of return, and secondly, the effective asset mix of a fund indicates the fund strategy. The asset classes invested in are the main factor considered for the classification system of the ACI (ASISA). Secondary, is the risk of the funds (although this is not quantified within the classification system). For reference, the second- and third-tier classification tables included in Chapter 2 are repeated in this section (see Tables 3.2 and 3.3).

Table 3.2: Second-tier classification of domestic unit trust funds ACI

Second-tier category	Description
Equity	Minimum of 75% of portfolio must be invested in JSE-listed shares and 3) minimum of 80% of equity portfolio must be invested in JSE sector/s as defined by category; 4) maximum of 20% of equity portfolio may be invested outside the JSE sector/s provided that these investments comply fully with the category definition.
Fixed interest	Portfolios invested in bond, money and other income-earning securities.
Real estate	Portfolios invested in listed property shares, collective investment schemes in property and property loan stocks[6]. Minimum of 50% of portfolio must be invested in real estate securities.
Asset Allocation	Portfolios that invest in a wide spread of investments in equities, bond, money and property markets.

Source: ACI (2008a:10, 13, 15, 16)

[6] An investment vehicle in which the investor either buys shares or debentures, and shares in the income stream of the property or portfolio the company invests in (Botha *et al.*, 2009:322). The investment vehicle does not fall within the Collective Investment Schemes Control Act (CISCA) legislation.

Table 3.3: ACI classification and description of domestic asset allocation categories

CATEGORY / *CHARACTERISTIC*	Prudential low equity	Prudential medium equity	Prudential high equity	Prudential variable equity	Flexible	TARR
Volatility:	Reduced short-term volatility	Average volatility	Higher probability of short-term volatility	Higher probability of short-term volatility	Not explicitly defined	Below average short-term volatility
Aim:	Long-term capital growth	Medium- to long-term capital growth	Maximises long-term growth	Maximises long-term growth	Not explicitly defined	Managed towards a predetermined, explicit benchmark
Equity exposure (incl. international):	Below 40%	40%-65%	Above 60%	0%-75%	No requirement	No requirement
Investment in derivatives:	Max. 2,5%	Max. 2,5%	Max. 2,5%	Max. 2,5%	Yes	Yes
Regulation 28 compliant:	Yes	Yes	Yes	Yes	Depends on mandate of fund	Depends on mandate of fund
Variation in risk and return objectives of individual funds:	Yes	Yes	Yes	Yes	Yes	Yes
Other information:					May be aggressively managed with shifts in market and/or asset class exposure	Does not necessarily offer capital or performance guarantees

Source: ACI (2008a:14)

The distinguishing factor within the asset allocation category for prudential funds (Table 3.3) is the extent of exposure to the equity asset class, contrasted with the TARR category, which includes potentially unlimited derivative instruments as part of the investable asset class universe along with no limitations on exposure to any asset class. Importantly, TARR funds do not have to be Regulation 28 compliant.

In a study by Brinson, Hood and Beebower (1986:43), it was concluded that 93,6% of the variation in returns could be explained by asset allocation. Research by Blake, Lehmann and Timmerman (1999) suggests 99,5% variation in returns is explainable by asset allocation and Bogle (in Blake *et al.,* 1999:429) concludes that asset allocation accounts for 94% of difference in total returns. According to Ibbotson and Kaplan (2000:32), asset allocation accounts for 90% of variability of returns over time, while only for 40% across funds. A more recent study by Vestergren and Redin (2009:24) based on a sample of Swedish mutual funds suggests an average R-square[1] of 92,43%, still substantial and significant.

The subsequent question is thus: how reliable are current unit trust classification methodologies and what the extent of misclassification is. This question is explored in the next section.

3.3 MUTUAL FUND CLASSIFICATION OR MISCLASSIFICATION

Donnelly (1992:C1) proposes that many mutual funds are misclassified and leads to an inaccurate classification of the inherent style of the fund. He adds that the investment objectives of fund categories may be just as misleading. Schiffres and Parmelee (1995) emphasises that knowing a fund's name or official category is not enough and that even a fund mandate may not be sufficient as much leeway may be given to the fund manager. Kim, Shukla and Tomas (2000:310) as well as Swinkels and Van der Sluis (2006:531) elaborate that although some deviations may not be significant or influence the relevance or peer comparison, should these deviations become significant, they in essence mislead investors.

[1] Indication of the explanatory power of a regression analysis. The higher the R-square, the better the fit of the analysis.

Swinkels and Van der Sluis (2006:531) also add that misclassification may be an attempt to distort investors' perception of the risk of the funds.

Fung and Hsieh (1997:283) state that the style of a fund is determined by at least two components namely, location choice, which refers to the asset classes invested in, and the trading strategy employed, that is whether long/short strategies are employed, the use of leverage and derivative instruments.

Christopherson (1995:32) emphasises the importance of style classification in assigning appropriate benchmarks for performance evaluation, assessing whether managers do indeed stick to their investment philosophies and ensuring appropriate asset allocation from a sponsor perspective should a multi-management strategy be employed. Chan *et al.* (2002:1408) further argue that the increase in assets under management by mutual funds has also increased the focus on style. Investors have greater choice and thus the style of funds is more important in the context of overall portfolio construction.

The concerns regarding misclassification of mutual funds consequently raise the question as to whether the classification of mutual funds is firstly arbitrary or explainable, and secondly, whether misclassification hampers investors from meeting their stated risk and return requirements (DiBartolomeo & Witkowski, 1997:32). DiBartolomeo and Witkowski (1997) studied the results of RBSA on 798 equity load and no-load[2] open-end funds. The researchers concluded that 40% of the funds were misclassified based on the results of the RBSA.

Robertson *et al.* (2000) analysed the South African equity unit trust category by means of RBSA. Their initial results showed that more than half of the general equity unit trusts were misclassified.

[2] No load is a fund with no commissions charged when buying and selling the fund whereas a load fund charges when buying and/or selling the fund.

Brown and Goetzmann (1997:374) found substantial differences in the behaviour of mutual funds within the growth category of the study's sample data, which is supposed to follow the same goal; namely growth investing. The researchers conclude that this is the result, among other possible factors, of differences in the types of shares held, timing, diversification and/or sector concentration. The effect is that the divergence within the category does not lead to good predictions of future returns. The research supports the notion that analysis of returns for classification purposes is superior or equal to the industry classifications. The researchers propose, in addition to Sharpe's style analysis, a further approach based on clustering time series analysis of monthly returns with the *k*-means algorithm.

Contrary to Brown and Goetzmann (1997); Hendricks, Patel and Zeckhauser (1993) and Goetzmann and Ibbotson (1994) argue that past returns are indeed indicative of future returns. This has profound implications if one needs to evaluate the future performance of a particular style bias of a fund manager. This is contradictory to Jensen's (1968) research[3].

Brown and Goetzmann (1997:374) thus reason that style classification must be "…objective and empirically determined, consistent across managers and related to the manager's strategy…". The piece that follows, explores the research leading up to Sharpe's research of 1988 and 1992.

3.4 DETERMINING FUND STYLE: BUILDING A RESEARCH FOUNDATION PRIOR TO SHARPE

It was accepted in practice and academia that styles or categories do exist, be it within a particular asset class or for diversified portfolios, thus subsequently, researchers and practitioners alike began analysing the premise of style classification. Bailey and Arnott (1986:24) simply used judgement[4] in assigning a manager to a particular category based

[3] Jensen (1968:415) concludes that past returns were not indicative of future returns.
[4] Should a judgemental approach focus on the analysis of actual portfolio holdings and transactions, it is similar to a fundamental (i.e. holdings) approach to style analysis (Lucas & Riepe 1996:11).

on fundamental factors such as P/E ratios[5], financial data of portfolios and interviews with managers, in contrast with more statistical and refined techniques. In a study by Richards and Tierney in Tierney and Winston (1991:33), the researchers used a screening process to determine investment style and group portfolios accordingly. However, these techniques could be biased and subjective. The research regarding acceptable statistical methodologies to analyse and understand various areas within financial markets (including style analysis) became the foundation for the statistical technique of return-based style analysis.

Researchers attempted to identify which part of the return earned by a fund was due to style or market exposure (e.g. not manager skill or alpha). Hence, statistical regression models, which could identify the drivers of returns of a fund, was the premise.

The following section thus creates a foundation regarding the development of style analysis and factor regression analysis, the two key aspects that culminate in Sharpe's 1992 research, which became recognised as an alternative or complementary method to fundamental analysis[6] (i.e. holdings analysis) for style analysis. Although little research had as primary objective style analysis, it created a foundation for the principles of Sharpe's (1992) style analysis. The primary focus of the research was asset allocation and fundamental security characteristics.

A study by King (1966) applied various statistical techniques (among others, factor analysis[7] and cluster analysis[8]) and found that shares with similar characteristics tend to cluster together. LeClair (1974) studied the historical returns of groups of funds (e.g. growth, balance, income). The results supported King's study in that clustering of funds with similar investment styles or philosophies was evident. The researcher was also confident that the analysis properly classified funds to the correct category when compared with the category proposed by the industry classification system. Farrell

[5] Price/earnings ratio is an indication of how expensive a share is. It is calculated by dividing the market price of the share by the earnings. There are different variations of the P/E ratio (e.g. trailing, forward).
[6] Analysing actual portfolio data and making inferences based thereon versus statistical methodologies such as return-based style analysis.
[7] A statistical technique, which analyses the relationship between different variables.
[8] A statistical technique, which, when applied to raw sample data, groups the data into clusters.

(1975) subsequently used cluster analysis on a sample of shares to determine whether natural categories arise. The research considered risk and return patterns among shares and the resulting correlations. Yet again, high correlated shares tended to group naturally.

Bailey and Arnott (1986) used cluster analysis (of risk-adjusted returns using the capital asset pricing model, CAPM) to identify inherent groups of managers with similar investment styles. In this research, the cluster analysis was, overall, consistent with the results of a judgemental categorisation of managers (conflicting only with regard to three managers out of a sample of 59).

Arnott, Kelso, Kiscadden and Macedo (1989) maintain that style is the main factor driving the return patterns of funds. In the analysis, three broad groups of factors (encompassing 12 individual factors), namely calendar effects[9], market conditions and economic conditions, were used to construct the factor analysis and determine the style of funds.

In a study by Arbel, Carvell and Strebel (1983), a sample of US companies drawn from the New York Stock Exchange (NYSE) was analysed. Institutional holdings data was used to divide the companies into three institutional concentration rankings. The classification ranged from intense institutional holdings to 'institutionally neglected securities'. The subsequent statistical analysis supported the classification in that neglected securities did indeed offer abnormal returns. To gauge risk, CAPM was used.

Multi-factor models are widely accepted to be used for style analysis. In contrast to a single-factor model (such as CAPM), multi-factor models presume that the return on an asset is a function of the sensitivity of that asset to a number of independent variables. The sensitivities (e.g. betas or coefficients) to the independent variables are indicative of the overall style of the asset (Robertson *et al.,* 2000:11). The factor models also have an application in determining the excess return of a fund earned over time (Jensen, 1968; Brown & Goetzmann, 1995; Blake, Elton & Gruber, 1993). Determining excess returns

[9] Factors based on seasonality and serial correlation (Arnott *et al.,* 1989:30).

(i.e. alpha) is a central aspect to performance measurement. Many studies subsequently used a multi-factor model as acceptable for style analysis (Dowen & Bauman, 1986; Sharpe, 1992; Rennie & Cowhey, 1990; Ferson & Harvey, 1991; Brinson *et al.,* 1986).

Dowen and Bauman (1986) used a four-factor model (P/E ratio, market capitalisation and institutional ownership in addition to systematic risk). The outcome of the research supported the premise that a multi-factor model has superior, even though only slightly, explanatory power to the single-factor CAPM. Jones (1990) applied a 13-factor model to the total sample data of equity shares, the different sectors within the sample data and different investment styles. The results show that all the factors do not have the same importance to all sectors and styles. Choosing the correct style factors thus is critical.

Rennie and Cowhey (1990) changed the basic principles of a multi-factor model to create a so-called benchmark portfolio that is indicative of the manager's investment style and includes all securities within the investable universe that meets the style criteria. The performance of the actual portfolio, of which the holdings may differ due to securities that the investment manager deem to be undervalued or meet the additional criteria for inclusion in the portfolio, is then compared with the benchmark portfolio. Thus it is not only critical for style analysis but also for the appropriate benchmarking of a portfolio.

Ferson and Harvey (1991) applied a six-factor APT model, which included economic variables such as unexpected inflation as well as a market premium[10] as the independent variables, to fixed-income instruments and equities and found that not only do the factor premiums change over time, but also the sensitivity to those factors. The conclusion that factor premiums change over time, is important for this study. Given the two different asset classes that were analysed, the researchers argued that the input of different risk factors to forecast future returns will differ from one asset class to the next. Brown and Goetzmann (1995) as well as Blake *et al.* (1993) used multi-factor models to evaluate the performance of mutual funds and bond mutual funds respectively.

[10] The return on a proxy for the market portfolio over and above the risk-free rate of interest. In the study by Ferson and Harvey (1991:51), a value-weighted index was used.

Other research at this time focused on policy asset allocation decisions (Brinson *et al.* 1986; Brinson, Singer & Beehower 1991), portfolio measurement (including risk and return) and benchmark construction (Tierney & Winston, 1991 and Troutman, 1991). As previously explained, both the Brinson *et al.* studies (1986; 1991) concluded that more than 90% of the variation in returns could be explained by asset allocation. The methodology employed by Brinson *et al.* (1986) entailed the following: the researchers constructed a benchmark portfolio, indicative of the policy asset allocation. Using the calculated exposures over the sample period with risk premiums for each asset class, the researchers were able to construct a benchmark portfolio which they deemed to be indicative of the overall style of the portfolio during the sample period. This enhanced performance measurement as the actual sample period average portfolio returns could be compared with the style benchmark and decomposed into a passive return and active return component. Analysing the relationship between risk and return (i.e. performance measurement), on the one hand and fund objectives on the other, Ang and Chau (1982:47) found that although different fund classifications met their fund objectives, the performance of such groups over time was not consistent. Shawky (1982) concluded that the risk of the funds seemed to be in relation to the objectives of the funds.

In summary, the building blocks to Sharpe's research of 1988 and 1992 are:

- development of factor models, albeit the application thereof focus on different primary research objectives (e.g. benchmark construction, separating active from passive return);
- research that questions whether inherent style is consistent with fund objectives;
- the premise that funds are misclassified and research focused on valid and reliable ways to test it;
- use of judgemental and cluster analysis techniques (with its inherent limitations and advantages) for style analysis;
- the general acceptance of the importance of asset allocation.

3.5 RETURN-BASED STYLE ANALYSIS (RBSA): SHARPE'S ORIGINAL MODEL

The method proposed by Sharpe entails an analysis of the returns of funds in relation to appropriate style indices. The resulting style weights (also called exposures, sensitivities, coefficients) are indicative of the style of the funds, or differently phrased, the return drivers of the fund (Dor *et al.,* 2006:10).

The original Sharpe model is constrained in that 1) short selling is prohibited and 2) the sensitivity factors have to sum to 1. Due to these restrictive assumptions, quadratic optimisation[11] is the appropriate statistical technique to apply:

$$\tilde{R}_i = \left[b_{i1}\tilde{F}_1 + b_{i2}\tilde{F}_2 + \ldots + b_{in}\tilde{F}_n\right] + \tilde{e}_i \qquad (1)$$

Where:

R_i = the return on asset i

F_{i1} = value of factor 1

e_i = the non-factor component of return on i (i.e. error term)

b_{i1} = the sensitivity of R_i to factors F_{i1} to F_{in}

Thus, the key assumptions of the original Sharpe model include:

- the non-factor return component (i.e. e_i) is uncorrelated with the non-factor return component for any other asset (i.e. e_k). Thus the only source of correlation between different asset returns is the factors identified. Differently stated by Chen and Knez (1996), should the return achieved by a manager be the linear relationship of the identified factors (thus e_i=0), it indicates that the manager thus possesses no skill. The error term e_i is thus the return due to selection while the first term (in brackets) is the return due to style (i.e. $\left[b_{i1}\tilde{F}_1 + b_{i2}\tilde{F}_2 + \ldots + b_{in}\tilde{F}_n\right]$).
- the sensitivities to factors (b_{i1} to b_{in}) must sum to one and short selling is prohibited (thus $b_{i1}, b_{i2}, \ldots, b_{in} \geq 0$).

[11] A variation on a linear programming methodology when constraints are imposed.

In his original model, Sharpe used 12 asset classes (Table 3.4) as the independent factors in the regression model[12]. Each asset class/factor is represented by the returns on a market capitalisation index[13]. The indices were chosen specifically due to the fact that each index can be tracked with a passive strategy, namely it should not include any active component.

Table 3.4: Asset classes: Original Sharpe model

Asset Class	Description
Bills	Cash equivalents with less than 3 months to maturity *Index: Solomon Brothers' 90-day Treasury Bill Index*
Intermediate Term Government Bonds	Government bonds with less than 10 years to maturity *Index: Lehman Brothers' Long-Term Government Bond Index*
Long-Term Government Bonds	Government bonds with more than 10 years to maturity *Index: Lehman Brothers' Long-Term Government Bond Index*
Corporate Bonds	Corporate bonds with ratings of at least Baa by Moody's or BBB by Standard & Poor's 500 *Index: Lehman Brothers' Corporate Bond Index*
Mortgage-Related Securities	Mortgaged-backed and related securities *Index: Lehman Brothers' Mortgage-Backed Securities Index*
Large-Capitalisation Value Stocks	Stocks in Standard & Poor's 500 stock index with high book-to-price ratios *Index: Sharpe/BARAA Value Stock Index*
Large-Capitalisation Growth Stocks	Stocks in Standard & Poor's 500 stock index with low book-to-price ratios *Index: Sharpe/BARAA Growth Stock Index*
Medium-Capitalisation Stocks	Stocks in the top 80% of capitalisation in the US equity universe after the exclusion of stocks in Standard and Poor's 500 stock index *Index: Sharpe/BARAA Medium Capitalisation Stock Index*
Small-Capitalisation Stocks	Stocks in the bottom 20% of capitalisation in the US equity universe after the exclusion of stocks in Standard and Poor's 500 stock index *Index: Sharpe/BARAA Small Capitalisation Stock Index*
Non-US Bonds	Bonds outside the US and Canada *Index: Salomon Brothers' Non-US Government Bond Index*
European Stocks	European and Non-Japanese Pacific Basin stocks *Index: FTA Euro-Pacific Ex Japan Index*
Japanese Stocks	Japanese Stocks *Index: FTA Japan Index*

Source: Sharpe (1992:9)

[12] Contrast with latter research where the researchers used existing category returns and not asset class returns to determine misclassification rather than inherent style of a fund (Section 3.6).
[13] An index of which the constitutions (i.e. shares) are weighted according to the market capitalisation (total outstanding shares) of each share in the index.

For illustrative purposes, Sharpe conducted unconstraint regression analysis, constraint regression analysis and quadratic optimisation; discussed in detail in the following section.

3.5.1 Style analysis regression models: important issues going forward

A multiple regression model is applied to the returns of a fund (dependent variable[14]) using the returns of different asset classes[15] (independent variables[16]). In Sharpe's original research (1992), the impact of the constraints on the values of the factor exposures (b) was illustrated.

In the first statistical analysis, no constraints were implemented on the values of coefficients (thus it could be negative, 0 or positive *and* the sum of the coefficients did not have to be one; appropriate statistical technique: unconstraint regression).

In the second analysis, coefficients were constrained in that the sum of all coefficients had to equal one (statistical methodology: constraint regression analysis). In Sharpe's research, this did not significantly reduce the explanatory power of the regression (measured by R-square).

But many mutual funds restrict short positions (i.e. negative coefficients). Thus in the last and third analysis, both constraints (i.e. sum of all coefficients equal one and coefficients must be non-negative) were implemented by using the technique of quadratic programming[17], which was more in line with the investment strategy of the sample data in the research. Although the explanatory power of the regression was once again slightly reduced, the constraints introduced were more reflective of the investment style of the fund and thus most appropriate. Applying quadratic programming is known as the so-called Sharpe RBSA model.

[14] The value to be determined or analysed. In regression analysis, the value of the dependent variable is caused by exposure to the independent variables.
[15] Or category returns should the research objective be to determine misclassification.
[16] The variables that cause or are the drivers of the value of the dependent variable.
[17] A variation on a linear programming methodology when constraints are imposed.

Ter Horst *et al.* (2004:30) later defined these three forms of RBSA as *weak, semi-strong and strong* style analysis:

- *Weak style analysis:* no constraints are imposed on factor sensitivities (also called coefficients, style weights).
- *Semi-strong style analysis:* the analysis employs only the constraint of factor weights adding to 1. Swinkels and Van der Sluis (2006:532) argue that this restriction does not imply that short sales in general are restricted, but only that they are not allowed in style categories.
- *Strong style analysis:* the analysis refers to the model proposed by Sharpe (1992) as described in Section 3.5, which applies both constraints, namely the portfolio constraint (i.e. weights adding to 1) and style weights being non-negative (Lobosco & DiBartolomeo, 1997; Sharpe, 1992; DiBartolomeo & Witkowski, 1997; Robertson *et al.,* 2000).

The characteristics and objectives of the sample data analysed, would determine which one of the three forms of style analysis would be most suited to apply. It is essential, whatever restrictions are imposed in the statistical analysis, that they mirror those imposed in the fund objectives or categorical classification (Sharpe 1992). Hence, applying Sharpe's 1992 model (quadratic programming) to funds that allow short selling and/or leverage would not be an appropriate use of the model.

The following section explores research subsequent to that of Sharpe (1992), focusing on the particular research question and outcomes of the studies. Restrictions, shortcomings and limitations from the literature review are emphasised.

3.6 RESEARCH SUBSEQUENT TO SHARPE

As mentioned previously, not only did research on classification of funds benefit from Sharpe's 1992 study, but also research on policy asset allocation decisions, benchmark construction and portfolio measurement. In research subsequent to Sharpe, return-based style analysis was prominently applied to all these areas.

Thus, much of the research subsequent to Sharpe (1992) covers a range of topics other than primarily style analysis. This section refers to such studies only to the extent that they are relevant in understanding RBSA. Studies that focus on classification of funds or misclassification of funds by means of RBSA are scrutinised in more detail. Table 3.5 presented at the conclusion of this section, includes a list of the most prominent and relevant research.

Choosing the appropriate return-based model (weak, semi-strong or strong) depends on the investment restrictions of the sample, that is, the restrictions imposed by the model should mirror the restrictions of the investment strategy.

A study by Brown and Goetzmann (1997) suggests that the classification system used for equity mutual funds is not indicative of the actual style biases as suggested by the results of style analysis. The extent to which funds may switch between categories due to changes in style was an aspect further researched. An average switching ratio[18] of 11% was evident.

DiBartolomeo and Witkowski (1997), in an attempt to test for misclassification of funds, regress the returns of funds, not against market indices, but against the return of specific existing categories, namely US mutual fund categories/indices. They claim that if a fund is correctly classified, the coefficient of the mutual fund index to which the fund belongs should be the greatest. They used an iterative process where, if the first regression indicated that a fund was not correctly classified, they reclassified it to the appropriate category and again ran a regression analysis. According to DiBartolomeo and Witkowski (1997), 40% of the funds in the study were misclassified and 25% of the misclassified funds categorised in a classification lower than the inherent risk of the fund.

Robertson *et al.* (2000) applied the methodology employed by DiBartolomeo and Witkowski (1997) to the South Africa general equity unit trust category. Although the sample was much smaller than that used in the DiBartolomeo and Witkowski (1997)

[18] "The percentage of funds that change classification each year" (Brown & Goetzmann, 1997:391).

study (51 compared with 748 equity funds) and over a shorter time period (48 versus 60 months), it too concluded that many of the funds were indeed misclassified. Of the 24 general equity funds within the sample, 13 (or 54%) were misclassified.

DiBartolomeo and Witkowski's research (1997) as well as that of Robertson *et al.* (2000) support the hypothesis that misclassification of funds does indeed occur. DiBartolomeo and Witkowski (1997) attribute the misclassification to mainly two possible reasons: firstly, the classification system may be vague and open to interpretation[19], and secondly, competition within the industry may motivate a manager to deviate in the pursuit of higher returns to maintain competitiveness rather than comply with the mandate.

Lobosco and DiBartolomeo (1997) focused their research on defining a confidence level for the regression coefficients that will be indicative of whether it is indeed a true reflection of actual exposure. Their study focused on creating confidence intervals[20] for the style coefficients defined. For *goodness of fit* of the analysis, R-square is still valid. Confidence intervals on the individual style weights though are indicative of the *quality of fit* for individual style weights. The research by Lobosco and DiBartolomeo (1997) adds additional strength to the Sharpe style analysis by not only relying on R-square to test the rigour of the style analysis but adding statistical significance as an additional measure.

Cognisance should be taken of the following dynamics with regard to the confidence intervals (Lobosco & DiBartolomeo, 1997:82):

- as the standard error of the style analysis regression increase, so will the confidence interval;
- there is an inverse relationship between the confidence intervals and number of return observations. Therefore, the more observations the tighter the confidence intervals.

[19] As the TARR category also has no bounds for any asset class, this is a concern relevant thereto.
[20] A statistically estimated range for a population based on a specific probability.

The approximation of style weights has the following benefits (Lobosco & DiBartolomeo, 1997):

- one can determine whether any difference in style weights (i.e. over time or for comparison of funds) is at all significant;
- confidence intervals may be used to eliminate applying certain blends of indices used in the analysis and
- asset class selection is clear.

The view of Kim, Shukla and Tomas (2000) supports the results of other researchers, namely that fund misclassification does indeed occur. The researchers concluded that in the sample data of the study, 54% of the funds were indeed misclassified. However, their conclusion does not though support the notion that fund managers stray from their set objectives in an attempt to improve peer comparison.

An interesting study by Gallo and Lockwood (1999) examined the change in investment style of a fund prior to and subsequent to a change in fund managers by means of Sharpe's (1992) RBSA methodology. The researchers conducted RBSA analysis for a five-year period preceding a change in fund manager and then subsequently for the five-year period after a change in fund manager. The highest coefficient was deemed to be indicative of the fund style. Comparing the result of the 'pre-highest' factor exposure with the 'post-highest' factor exposure, the researchers could deduce whether there was a change in investment style.

Sáez and Izquierdo (2000) evaluated a sample of Spanish mutual funds. Weekly return data was used in the analysis over a period of six years and three months during the 1990s. The overall results of the study support the research on US and South African mutual funds by DiBartolomeo and Witkowski (1997) and Robertson *et al.* (2000) respectively that misclassification of funds do indeed occur although the misclassification according to Sáez and Izquierdo (2000) is slightly lower than that according to DiBartolomeo and Witkowski (1997).

To gauge how factor exposures change over time, researchers have conducted RBSA over rolling periods (Lucas & Riepe, 1996; Annaert & Van Campenhout, 2002). Annaert and Van Campenhout (2002:4) built further on this research in analysing variations over time. The researchers did not only employ RBSA over rolling periods but also conducted variance decomposition[21]. The study officially tested for multiple breaks by employing econometric test procedures. The researchers were not only interested in the statistical significance of the results, but also tried to judge what possible reasons motivated the breaks. For purposes of the research, Annaert and Van Campenhout (2002:8) did not restrict the style weights in their analysis to 1) being non-negative and 2) adding to one (similar to the assumptions as in Swinkels & Van der Sluis, 2006). Annaert and Van Campenhout (2002:8) concluded in their analysis that the style exposures did indeed vary over time and that style breaks were indeed evident. All the funds in the analysis exhibited at least one style break, while 60% of funds exhibited more than one. Annaert and Van Campenhout (2007) conducted RBSA and subsequently applied econometric tests[22] to examine style breaks.

A study by Ahmed and Nanda (2005:465) applied RBSA to a sample of quantitative equity funds to determine the appropriate benchmarks for the funds, namely the appropriate category. Based on the results, the funds were subsequently categorised into large-cap growth, small-cap growth, large-cap value and small-cap value[23].

Scher and Muller (2005) used RBSA by Sharpe to determine the exposure of equity unit trusts in South Africa. Annually, the researchers conducted a style analysis based on the previous 12 months' return data (on aggregate). From the results, it was concluded that 1) the explanatory power of the model increased over time, possibly due to a greater emphasis by managers on style consistency and focus (Scher & Muller, 2005:8) and 2) that growth and large cap styles dominated during the sample period.

[21] In the study, the researchers split the total variation in three separate parts: 1) variation contributed due to differences in time, 2) differences between funds and 3) the residual variance (Annaert & Van Campenhout, 2002:10).
[22] The examination of economic motivations for style breaks and the analysis thereof, fall outside the scope of this research study.
[23] The researchers used the Wilshire Indices for the classification. Growth and value are distinguished based on the analysis of two ratios, namely price-to-book ratio and projected price-to-earnings ratio (Wilshire Associates, n.d.).

Swinkels and Van der Sluis (2006:530) attempted to improve the precision of the results of RBSA in their research. The researchers sought to determine changes in style exposures by using a sample period of 60 months and evaluating the style analysis over rolling periods of 24 months each (for each rolling period, dropping the first month's data and adding the subsequent month). The study acknowledged that there was little theoretical reasoning for the rolling period approximations yet they recognised that it might cause sub-optimal use of the data by choosing a random rolling period[24]. In using rolling windows, Swinkels and Van der Sluis (2006:533) conceded that although the use of rolling periods suggests that the style exposure does not stay constant over the full sample period, it is indeed implied that style consistency exists for each rolling window. To weight the factor exposures for each rolling period, Swinkels and Van der Sluis (2006:530) applied the Kalman filter in the study with reference to the Kalman smoother[25]. Both techniques fall outside the scope of this study. Swinkels and Van der Sluis (2006:532) employed the semi-strong form of RBSA (i.e. negative factor exposures are allowed).

Pattarin *et al.* (2004) applied Sharpe's style analysis to a group of Italian mutual funds. The researchers found that the Sharpe style analysis and institutional classification were alike. Pattarin *et al.* (2004:354) criticise the traditional classification by industry organisation. Firstly, they question the truthfulness of the classification as it depends on information provided by the investment managers themselves and on occasion intentional misreporting may be prevalent in an attempt by the manager to have the fund compared with a group of funds where superior performance is likely. To counter the risk inherent in misreporting, they suggest that actual holdings data should be analysed. Secondly, classification systems created by profit-seeking organisations inherently suffer from a trade-off between superior information/classification and profit maximisation. Lastly, implementing more extensive controls automatically results in a more cumbersome and time-consuming activity, which may lead to substantial time lags

[24] The length of the window must be reflective of the extent of changes as indicated by the investment strategy.
[25] The Kalman filter is "…conditional on information up to time t and thus more appropriate for predictions…" while "…the smoother is conditional on the entire sample and hence more suited for descriptive purposes" (Swinkels & Van der Sluis, 2006:530).

before classifications are made public, thus leaving investors with outdated information when making investment decisions (Pattarin *et al.* 2004:354).

Similar to the study conducted by Bailey and Arnott (1986) and Brown and Goetzmann (1997), Pattarin *et al.* (2004) firstly, focused on cluster analysis to determine the inherent categories within the unit trust sample by means of genetic algorithm[26,27]. Secondly, Sharpe-based style analysis was conducted on the individual funds to confirm overall classification and drivers of returns.[28]

Swinkels (2003:134) elaborated on the use of the Kalman filter and Kalman smoother when using rolling periods to capture the dynamics of changes in style factors.[29] Similar to Swinkels (2003:136), Ter Horst *et al.* (2004) also used the semi-strong style analysis approach. The researchers emphasised that with quadratic programming[30] confidence intervals are not easily obtained as is the case with ordinary least squared.[31]

Ter Horst *et al.* (2004) conceded that estimations of portfolio holdings may differ from that of actual holdings but "…if the aim is to predict future fund returns, factors exposure seem to be more relevant than actual portfolio holdings, and return-style based style analysis performs better than holding-based style analysis".

Ter Horst *et al.* (2004:30) distinguished between portfolio holdings and estimated style exposures and conceded that estimated factor exposures may differ from actual portfolio holdings. The researchers hence concluded that RBSA is less suitable for predicting future holdings but is superior when attempting to predict future returns.

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[26] "Genetic algorithms are stochastic search heuristics that explore the search space by evolving simultaneously candidate solutions of the optimisation problem through operations inspired by natural selection and gene inheritance mechanisms" (Pattarin *et al.,* 2004:359).
[27] This does not give information as to asset allocation.
[28] The use of genetic algorithms falls outside the scope of the research.
[29] The method falls outside the scope of the research.
[30] A variation on a linear programming methodology when constraints are imposed.
[31] Lobosco and DiBartolomeo (1997) did attempt to solve this problem.

Lau (2007) applied the strong form of style analysis to determine the style bias of Malaysian equity unit trusts while applying the weak form of style analysis to measure risk-adjusted performance. Lau (2007:137) found that the inclusion of asset classes with negative factor loadings enhanced the return of funds during the sample period (February 1996 to January 2001, thus including the 1997-1998 Asian crisis period).

To determine style consistency, Lau (2007:131) opted to divide the sample period into two sub-periods of 30 months each (i.e. January 1997 to June 1999 and July 1999 to December 2001) and individually conduct a style regression. The results demonstrate considerable differences in style changes for the two sub-periods. Arguments offered by the researcher for these results, include firstly, rebalancing due to economic shifts; secondly, affecting capital controls beginning September 1998, and thirdly, subsequent slight relaxing of these requirements in 1999 and 2000 (Lau, 2007:137). Such an analysis within this research can only be done with sufficient historical information be available.

Vestergren and Redin (2009) applied Sharpe's (1992) RBSA to Swedish mutual funds. The application of the model was to determine the so-called policy portfolio without having any information with regard to actual holdings. They established that approximately 92% of the variation in return over time is explained by the asset allocation decision. A further research question related to the extent of the average allocation, standard deviation and various percentiles reported on asset class group level. Vestergren and Redin (2009:19) found a large variation in the policy weights amongst the funds.

Vestergren and Redin (2009:6) stressed that the Sharpe (1992) model assumed sensitivities adding to one and non-negative factors weights. The researchers thus concluded that the model would not be suitable for hedge funds. This view supports Agarwal and Naik (2000:94) in applying generalised style analysis[32] to hedge funds. Given the objectives and more lenient investment constraints for hedge funds (i.e. holding large cash positions and taking short positions), the researchers relaxed the

[32] Style analysis that relaxes the restrictive assumptions of the Sharpe 1992 style analysis method.

assumption of style weights being non-negative as well the requirement that style weights have to add to one (as they can hold a significant component of cash). Agarwal and Naik (2000:94) acknowledged that the result from RBSA applied to hedge funds will not yield the same high level of explanatory power as it does when applied to mutual funds (i.e. funds that restrict short positions and employ more traditional strategies). Not only did the researchers apply the RBSA methodology (with relaxed assumptions) but they also applied the methodology employed by Lobosco and DiBartolomeo (1997) in determining the confidence intervals related to the style weights. Agarwal and Naik (2000:103) concluded that strategies that are deemed to be similar do not show the same exposure to asset classes.

Momentum Investment Consulting (2007:8) based the classification it conducted on standard deviation and annual return as to be indicative of three broad sub-categories; following suit with regard to a previous study conducted by SP^2 Advisory Service. The researchers concluded that the 'behaviours' of the funds were unchanged. In this study, no RBSA or holdings-based analysis was conducted to evaluate the asset class exposures. Thus it may be proposed that although similar in return and risk attributes; the drivers thereof may be very different for individual funds. The groupings proposed allude to funds with a standard deviation close to 2%, 4 to 7% and standard deviation in excess of 8%. A similar study was conducted on new funds with only a 12-month track record to gauge the behaviour of such funds.

In summary, Table 3.5 includes the authoritative research on the topic of or related to return-based style analysis discussed in this chapter. Although the research relates to a lesser or greater extent to the research problem and objectives, it creates a framework for understanding return-based style analysis, the potential application thereof and is thought-provoking as to related research going forward.

Holdings-based analysis features prominently in the literature review as an alternative to return-based style analysis or in addition to RBSA. Thus the next section compares the two methods, highlighting the advantages and disadvantages of each.

Table 3.5: Authoritative research

Author	Year	Topic
Sharpe	1988	Determining a fund's effective asset mix
Sharpe	1992	Asset allocation: Management style and performance measurement
Lucas & Riepe	1996	The role of returns-based style analysis: understanding, implementing and interpreting the technique
Lobosco & DiBartolomeo	1997	Approximating the confidence intervals for Sharpe style weights
Fung & Hsieh	1997	Empirical characteristics of dynamic trading strategies: the case of hedge funds
DiBartolomeo & Witkowski	1997	Mutual fund misclassification: Evidence based on style analysis
Brown & Goetzmann	1997	Mutual fund styles
Gallo & Lockwood	1999	Fund management changes and equity style shifts
Robertson, Firer & Bradfield	2000	Identifying and correcting misclassified South African equity unit trusts using style analysis
Agarwal & Naik	2000	Generalised style analysis of hedge funds
Buetow & Rutner	2000	The dangers in using return-based style analysis in asset allocation
Kim, Shukla & Tomas	2000	Mutual fund objective misclassification
Sáez & Izquierdo	2000	Style analysis and performance evaluation of Spanish mutual funds
Annaert & Van Campenhout	2002	Style breaks in return-based style analysis
Swinkels	2003	Empirical analysis of investment strategies for institutional investors
Ter Horst, Nijman & De Roon	2004	Evaluating style analysis
Pattarin, Paterlini & Minerva	2004	Clustering financial time series: an application to mutual funds style analysis
Ahmed & Nanda	2005	Performance of enhanced index and quantitative equity funds
Scher & Muller	2005	Equity style and performance persistence in South African unit trusts
Swinkels & Van der Sluis	2006	Return-based style analysis with time-varying exposure
Lau	2007	An integrated framework for style analysis: how is it useful to Malaysian equity trust investors?
Momentum Investment Consulting	2007	A review of targeted absolute and real return funds
Vestergren & Redin	2009	Asset allocation within Swedish mutual funds

3.7 RBSA VERSUS FUNDAMENTAL/HOLDINGS-BASED ANALYSIS

Ter Horst *et al.* (2004:48) argue that holdings-based style analysis is still useful when predicting style versus RBSA, which the researchers claim is more useful when predicting returns.

Table 3.6: Advantages of return-based style analysis versus fundamental style analysis

Ease of obtaining data required
Information is timely available, identical and impartial
Less costly

Source: Lucas and Riepe (1996:8)

A way to confirm the validity of the results of a RBSA study would be to compare the results of the RBSA and a fundamental approach, which is in essence holdings- and transaction-based (Lucas & Riepe, 1996:11).

RBSA is still an estimate (Lucas & Riepe, 1996:33), which is not based on actual holdings of a fund or portfolio. Lucas and Riepe (1996:8) explain the preference for RBSA instead of fundamental style analysis. They emphasise that RBSA only requires return data, which is easily obtained, while fundamental analysis requires holdings data. This is not as easily accessible (Sharpe, 1992:10). As motivation, the researchers examined the October 1995 version of the software program, Value Line's Fund Analyser™. They concluded that for mutual fund portfolios tracked, the software did not capture holdings data for more than half of the funds. Furthermore, the information required for return-based analysis is more timely available, identical and impartial. In addition, RBSA is less costly to conduct than fundamental analysis (Pattarin *et al.,* 2004:354).

Research such as Buetow and Rutner (2000) still prefers holdings-based analysis to return-based analysis while others fervently support the use of RBSA (Vestergren & Redin, 2009). The preference and justification thereof are in essence captured in the shortcomings of RBSA and the requirements to maintain validity and reliability. The chapter concludes with evidence from the literature, which is essential in developing the research methodology (Chapter 4).

3.8 STRENGTHS AND WEAKNESSES OF RETURN-BASED STYLE ANALYSIS

Lau (2007) offers support for the use of Sharpe's style analysis in pursuit of more comprehensive, suitable and useful performance information. The technique not only supports better 'true' peer comparison but also the discovery of funds that exhibit discrepancies between the fund objectives and inherent self-defined investment style of the manager.

One of the strengths of RBSA is the fact that only return data[33] is required versus holding data[34], which is not always readily available; hence the analysis can be conducted without access to data internal to the company (proprietary information) as the data can be obtained from external sources (Vestergren & Redin, 2009:11; Sharpe, 1992:10; Lucas & Riepe, 1996:8). Further benefits include the fact that return-based style analysis is less costly and can be conducted quicker as it is based on more timely information (Lucas & Riepe, 1996:8).

RBSA poses a number of problems: firstly, concerns relate to the asset classes chosen, which include the composition of indices and the correlation between indices/asset classes (i.e. the extent of multicollinearity[35], discussed in more detail further on). Pattarin *et al.* (2004:362) emphasise the inherent risks of the chosen asset classes: should the indices used in the style analysis be highly correlated, the resulting factor loadings will be inconsistent and the significance of any results questionable. Christopherson (1995) further disputes the use of correlation analysis for manager classification as historical relationships do not tend to be indicative of future behaviour (also see Lucas & Riepe, 1996:8). Christopherson (1995) claims the possibility of noise within the data set may further distort results, which may be much more prevalent than anticipated.

[33] Actual returns per period (often monthly data for return-based style analysis).
[34] Actual portfolio holdings (i.e. actual percentage investment holdings per asset class).
[35] Discussed in more detail later in this section.

Secondly, the coefficient limitations placed on the RBSA raise concerns[36]. Thirdly, the assumption that style exposures stay constant, namely that the result obtained from the RBSA is indicative of an 'average' asset allocation over the sample period (whether over a whole sample period or sub-period thereof), is problematic as this is not the case in practice (Annaert & Van Campenhout, 2007:634; Annaert & Van Campenhout, 2002:3,8; Lobosco & DiBartolomeo, 1997; Sharpe, 1992; Lucas & Riepe, 1996:12). Lastly, challenges in determining confidence intervals of factor exposures exist (Annaert & Van Campenhout, 2007:634; Annaert & Van Campenhout, 2002:3, Lobosco & DiBartolomeo, 1997)[37].

Lucas and Riepe (1996:8) further concede that RBSA may not be indicative of future return drivers as it is based on historical information. Depending on the time period used for the analysis (long versus short time period), the results can also differ (Sharpe, 1992).

Trzcinka (1995) justifies the use of RBSA based on the simplicity thereof, which surpasses any shortcomings. Christopherson (1995:41) is of the same view stating that in circumstances where the manager's style is stable and clear, RBSA analysis may be useful.

Vestergren and Redin (2009:11) further state that using RBSA to determine fund classification rather than assuming correct classification can counter many problems regarding peer comparison in terms of classification systems, which do not regard the possibility of misclassification to start with (DiBartolomeo & Witkowski,, 1997; Kim *et al.,* 2000).

Buetow and Rutner (2000) conclude that RBSA is not a good technique to determine the actual holdings of a portfolio. Atkinson, Averill and Hardy (n.d.) offer a rebuttal to the research done by Buetow and Rutner (2000). Atkinson *et al.* (n.d.) claim that much of the fundamental data used by Buetow and Rutner (2000) was incorrect. The

[36] The two potential limitations are 1) all factor exposures must be non-negative and 2) the sum of the factor coefficients must sum to 1.
[37] Outside the scope of the study.

researchers analysed the same six funds as in the Buetow and Rutner study and emphasised the mistakes made with each fund's analysis. The major flaws in the application of RBSA are due to poor index selection and not using a proper optimisation model (i.e. R-square rather than adjusted R-square[38]).

A shortcoming of the use of style analysis to determine misclassification and classification of funds is evident in the DiBartolomeo and Witkowski (1997) study, namely the use of an arbitrary cut-off point of 75% to be indicative of a misclassified fund. If a factor lower than 75% with regard to the style benchmark was found, the fund was deemed to be misclassified. In addition, the research of DiBartolomeo and Witkowski (1997), Robertson *et al.* (2000) as well as Sáez and Izquierdo (2000) is lacking with regard to calculating the statistical significance of the constraint regressions coefficients dealt with by Lobosco and DiBartolomeo (1997) later in this study.[39]

Buetow, Johnson and Runkle (in Buetow & Rutner 2000:27) emphasise that the results of RBSA can be very volatile for particular types of mutual funds while also acknowledging the risks of multicollinearity.

Brown and Goetzmann (1997:395) concede that style analysis is based on the assumption of *linear relationships*. Misclassification may occur due to the nature of the investment strategies thereof, namely non-linearity[40]. The issue of non-linearity is resolved substantially in applying RBSA to hedge funds, which falls outside the scope of the study (see Agarwal & Naik, 2000). Table 3.7 summarises the strengths and weaknesses discussed above.

[38] A modification of R-square. The adjusted R-square adjust for the number of independent variables used in the regression that is; the more independent variables, the greater the potential adjustment (lowering of) the explanatory power.
[39] Discussed in Section 3.6, and emphasised that determining statistical significance is challenging.
[40] Not constant and directly proportional as is the case with linearity.

Table 3.7: Strengths and weaknesses of RBSA

Strengths	Weaknesses
Discovery of funds that exhibit discrepancies in style	Extent of multicollinearity
Only requires return data	Consistency in matching the investment strategy of the fund with the limitations imposed on coefficients
Data is easily accessible	Assumption that style exposures stay constant over time
Less costly	Based on historical information
Less time consuming	Impact of the length of the sample period
Simplistic	Assumption of linear relationship in the regression analysis

To conclude the section, the issue regarding predictability of regression results was mentioned. Elton, Gruber and Blake (1996) emphasises that this characteristic is greatly influenced by survivorship bias in the data[41]. If survivorship bias is not sufficiently accounted for, the consequence may be the appearance of predictability when in actual fact none exists.

The importance of the time period, asset class section and extent of multicollinearity, and finally the nature of return data are referred to by multiple independent researchers. In Sections 3.8.1 to 3.8.3, each of these important aspects is discussed in detail.

3.8.1 Time period of analysis and time-varying portfolio exposures

Vestergren and Redin (2009:10), in choosing the appropriate time period for the research, reiterate that a balance must be struck between a long enough time versus a sufficiently large sample for meaningful results. A longer time period would often result in a very small sample of funds to be analysed (Vestergren & Redin, 2009:13). The researchers impose the limitation that a fund must have been in existence for the full 60-month period. Sharpe (1992) also acknowledges that RBSA results are sensitive to the

[41] Survivorship bias in sample data would result if only surviving funds' data were included in the analysis thus excluding the data of funds that closed down or amalgamated during the analysis period.

sample period (long versus short time period). Kim *et al.* (2000:312) used funds that have been in existence for at least three years.

Lucas and Riepe (1996:10) emphasise the advantages of conducting RBSA over a whole business cycle thus resulting in information with a wider application than when only a portion of a business cycle fall within the time period analysed.

Lau (2007:126) states that style analysis requires at least 60 consecutive monthly returns yet researchers have used varying time periods to conduct RBSA ranging from 24 months (Brown & Goetzmann, 1997) to 60 months (DiBartolomeo & Witkowski, 1997). Swinkels (2003:134) acknowledges a window of anything between 24 to 60 months to be the norm.

Should one wish to further analyse potential changes in the style of the fund and/or manager, Sharpe suggests conducting RBSA over rolling periods. Thus, a fixed amount of monthly data will be used to conduct RBSA. The sample period is moved one month forward, and once again the model is regressed against the fixed number of monthly data. In Sharpe's research, each sub-sample had 48 months of data in common with its predecessor (Sharpe 1992). Using rolling time periods highlights consistency in style of a particular fund over time (Lucas & Riepe, 1996:14).

Should the sample period be divided into sub-periods, Lau (2007) proposes using the Chow test to determine the significance of the style consistency between the two sub-periods as was the case in Gallo and Lockwood (1999). However, Gallo and Lockwood focused on determining shift in style subsequent to a change in manager.

Chow test:

$$F=\frac{(SSE_R - SSE_U)/J}{SSE_U/(T-K)}$$

Where:

SSE_R = the restricted sum of squared errors;

SSE_U = the unrestricted sum of squared errors, of which $SSE_U = SSE_1 + SSE_2$;

SSE_1 = the sum of squared residuals from the estimation of sub-period 1;

SSE_2 = the sum of squared residuals from the estimation of sub-period 2;

T = total number of the sample;

J = degree of freedom of the numerator; and

T-K = degree of freedom of denominator where K=2J.

Should inconsistencies in style be evident when using rolling periods, Lucas and Riepe (1996:16) attribute this to one of four possible sources: 1) fund management, which is changes in the style of the fund or active management decisions due to timing or sector rotation, which could be the result of a change in the style of the portfolio, or of a change in manager; 2) changes in the character of underlying securities; 3) noisy data (i.e. incorrectly calculated returns for fund) and 4) ineffectually selected indices.

3.8.2 Asset classes and multicollinearity

For the analysis to have any statistical validity and practical informational value, Sharpe (1992), as well as Lucas and Riepe (1996:5), proposes that the asset classes or style factors chosen should have the following *attributes*:

- mutually exclusive: a security should not be included in more than one asset class factor;
- exhaustive: as many securities as possible should be included in the appropriate asset classes;
- returns of asset classes should have low correlations as not to cause multicollinearity or, in circumstances where the correlation is meaningfully high, standard deviations of asset classes should be significantly different as this would indicate different risk drivers.

Lucas and Riepe (1996:5) add the following criteria focused on the characteristics of what constitutes a good benchmark, namely the index must be specified in advance; must be investable; should be a passive index that is exhaustive; and must be easy to construct. In addition, both Sharpe (1992) and Lucas and Riepe (1996:5) emphasise the characteristic of it being a true passive index with low cost – that is no active returns captured by the index or high cost that may indicate some active component (Sharpe, 1992:8; Lucas & Riepe, 1996:5).

Vestergren and Redin (2009:13) define *multicollinearity* as the state where "…one or more explanatory variables are highly correlated in a multiple regression model, potentially biases the result of the regression" (also see Lucas & Riepe, 1996:12). They reason that this does not necessarily influence the explanatory power of the regression model overall but the individual factor exposures as the regression model cannot distinguish which explanatory variable contributed to the overall return.

Lau (2007:127) evaluated the correlations between the proposed indices representing the asset classes within the regression. In terms of guidelines proposed by Sharpe (1992) for the selection of asset classes, should two indices exhibit a *high correlation*, it is subsequently necessary to evaluate the standard deviations of the indices. If the *standard deviation is at different levels*, inclusion of both indices will not distort the result of the regression analysis, which was the case in the Lau study.

The chosen indices must have proper explanatory power for any substantive conclusions to be drawn from the analysis (Vestergren & Redin, 2009:12). The researchers justified the use of two indices with high correlations by stating that both of the asset classes are important in terms of the investment objectives of the funds and that attempting to use other indices may result in a different problem, namely data mining[42]. In analysing the bivariate correlations[43] between the indices of the Vestergren and Redin (2009:12)

[42] Searching at length through data for statistically significant patterns. This implies searching until there is some or other finding that seems to be statistically significant.
[43] The correlation between every index and each and every other index in the analysis (i.e. starting with index 1: the correlation between index 1 and 2, index 1 and 3, and so forth; thereafter the correlation between index 2 and 3, index 2 and 4, and so forth).

study, it is clear that there is indeed a high correlation for some of the indices although none exhibits perfect linearity and that it is not high enough to validate exclusion.

To *appraise the level of multicollinearity*, Vestergren and Redin (2009:14) computed the variance inflation factor (VIF), which assesses the extent of multicollinearity. VIF entails running a regression where each of the explanatory variables of the proposed RBSA, one by one, is used as the dependent variable and regressed against the rest of the indices (also called asset classes or independent variables). A high correlation between two variables is indicative of multicollinearity and thus the variable should be dismissed.

The VIF factor:
$VIF = 1 / (1-R^2)$

Which threshold for a VIF factor validates an index being dropped, is still debated in the research. In a study by Vestergren and Redin (2009:15), an index originally considered, namely private equity, was dropped due to the high VIF compared with that of the other explanatory variables (7,02 compared with the closest value of 3,92). They acknowledge that there still exists a debate as to the cut-off value for a VIF, with the number varying from four or five, to seven or even as high as 10 (Vestergren & Redin, 2009:15).

Lobosco and DiBartolomeo (1997:83) emphasise the importance of limiting the *number of indices* used as this may increase the extent of higher correlations between indices that influence the volatility of the active return of each index. Lau (2007:127), in comparison with Sharpe's (1992) use of 12, only includes six asset classes in the RBSA, namely large capitalisation stocks, medium capitalisation stocks, cash, government bonds, corporate bonds and international bonds.

The asset classes considered by Vestergren and Redin (2009:10) include the following: cash, bonds, domestic equity, foreign equity, absolute return and private equity. As highlighted in the analysis of the Sharpe (1992) model, the indices used in the

regression analysis must be indicative of the investable universe or investment objectives of the fund or category. For this reason, different indices were applied to different categories, representing the investable universe of the category. For the so-called classic category, only the first four indices in the analysis were used, while, for the category with hedge fund investments, an absolute return index that is, HFRI Fund of Funds Composite Index (converted from USD to SEK), was used to fully capture the characteristics of the sub-categories. The asset classes chosen were included due to the fact that they were familiar and were suggested by practitioners (Vestergren & Redin, 2009:11). The study also deviated from a study by Agarwal and Naik (2000) in that the indices chosen were not biased towards instruments with a particular style such as growth and small-cap, but it was focused on broad asset classes.

Pattarin *et al.* (2004:362) also emphasise the inherent risks of the chosen asset classes: should the indices used in the style analysis be highly correlated, the resulting factor loadings will be inconsistent and the significance of any results questionable. Buetow *et al.* in Buetow and Rutner (2000:27) specify that one has to use portfolio-specific benchmarks to correct for problems of multicollinearity. Given that the particular study focuses on a category that includes all asset classes and attempt to determine a sub-categorisation, this may not be such a big concern in this research.

3.8.3 Return data characteristics

Vestergren and Redin (2009:12) conclude that one concern with regard to RBSA analysis as applied over a single sample period, is the assumption that policy asset allocation, namely factor sensitivity, is not dynamic (Swinkels & Van der Sluis, 2006:21).

RBSA is also based on historical returns, which introduce a bias towards historical behaviour (Kim *et al.,* 2000:312). The analysis may also be influenced by sporadic data or exposure periods that are too long (Lucas & Riepe, 1996:13; Vestergren & Redin, 2009:3) and not reliable (Vestergren & Redin, 2009:3).

3.9 SUMMARY

The chapter conducts an in-depth literature review of RBSA. The importance of asset allocation, which contributes as much as 93,6% to the variation in returns (Brinson *et al.,* 1986:43), is highlighted. This supports the notion that RBSA with asset classes as independent variables can be used to determine the style of a fund (Sharpe, 1988; 1992). The application of RBSA goes beyond only an application to determine style but is also used, among others, to determine misclassification of funds, performance measurement and benchmark construction.

Researchers have identified three forms of RBSA, namely weak, semi-strong and strong, where the strength of the analysis is a factor of the limitations imposed on the coefficients of the asset classes. Although researchers acknowledge the limitations and weaknesses of RBSA, there is also great emphasis on the advantages thereof.

As Chapter 3 created an understanding of RBSA, the application thereof and inherent limitations; Chapter 4 describes the research methodology; taking cognisance of the lessons learnt from prior research.

CHAPTER 4: RESEARCH METHODOLOGY

4.1 INTRODUCTION

The research methodology presented in this chapter is the blue print to deal with the research objectives. The objectives of the research are to identify heterogeneous style sub-categories within the Domestic, Asset Allocation, Targeted Absolute and Real Return category (D-AA-TARR[1]) based on the results of return-based style analysis (RBSA).

The research is conducted on an ex post facto basis, as no control is exercised over the variables (i.e. returns of funds), and secondly, based on historical data. Further, the study is descriptive, exploratory and constitutes primary research. According to the literature review (Chapter 3), South African research regarding the TARR category is scarce and none regarding the application of RBSA on TARR funds was encountered.

The chapter is structured as follows: Section 4.2 describes the sample design including the target population, sampling method and size as well as sample period. It is followed by a motivation for the semi-strong form of RBSA to apply to the sample data. Subsequently, an argument for the proposed indices (independent variables) for the regression model is included. Then asset class and fund return data is explained along with the data collection method. Section 4.8 describes the process that will be followed in interpreting the results of the RBSA. Lastly, the chapter ends by discussing the assumptions, limitations and aspects regarding validity applicable to the research.

4.2 SAMPLING DESIGN

4.2.1 Target population

The target population only includes funds that were classified as Domestic, Asset Allocation, Targeted Absolute and Real Return funds (called TARR) for any portion of the sample period. The sample period is from 1 October 2003 to 31 December 2009.[2]

[1] Referred to only as TARR from this point onwards.
[2] The TARR category was implemented from October 2003 and did not exist prior to this date.

4.2.2 Sampling method and size

Subjective non-probability sampling is employed. Contrary to probability sampling in which subjects are selected randomly to lessen sampling bias (Cooper & Schindler, 1998:243), this study employs judgemental sampling. The criteria for inclusion of a fund are firstly, that the fund is classified as retail (thus excluding all institutional funds), and secondly, that the fund must be within the category for at least 24 months that is, any 24-month period within the window of 1 October 2003 to 31 December 2009.

The inclusion of retail funds only is justified as, due to the wholesale nature of the institutional business, return information regarding the latter funds is difficult to obtain and not gathered by data providers. As accurate and timely information is of greater concern to the study, institutional funds were excluded. Secondly, institutional funds for the quarter ending December 2009 accounted for only 35% of funds within the category (31,7% of asset under management); retail funds should thus sufficiently capture the characteristics of the category. The exclusion of institutional funds does result in the sample suffering from sample selections bias (i.e. only including retail funds).

The second criterion requires that each fund must be in the category for at least 24 months to be included in the sample. This was a natural requirement given the statistical techniques employed in analysing the sample data. Cognisance is taken of the fact that a particular fund may be included in only one 24-month period, which offers little informational value as rolling period analysis will be conducted[3]. For each 24-month period, the number of funds included, will consequently vary.

A period of 24 months is chosen because the total sample period is relatively short compared with other studies. This is again due to the fact that the category was only started as such in October 2003. It is noted that regression analysis is more successful with larger numbers of data points.

[3] Further elaborated on in subsequent sections.

The sample will thus not suffer from survivorship bias[4] as all retail funds, which meet the 24-month data requirement, will be in at least one measurement period. Due to the fact that no inferences about the category as a whole is made but about individual styles and consequently heterogeneous sub-categories of funds, this will not significantly influence the validity of the study. Any non-survival in the sample could have been due to either reclassification, amalgamation of funds, closure of funds or closure of an asset management company.

In the case of reclassification of funds, funds will have historical return data prior to the date of inclusion in the TARR category. This previous history is excluded as returns were not earned while within the TARR category. Regarding new funds, although funds may be registered with the FSB and subsequently classified in the TARR category, this does not imply that the funds are immediately offered to the market, resulting in no return data although the funds were already reported as part of the TARR category. Reclassification and registration of funds take place any time during a quarter. To be consistent regarding inclusion and exclusion of funds, a fund is included from the first full quarter for which it has return data and excluded from the first quarter for which it does not have three months of data. This impacts on the sample as some funds may subsequently be excluded from the study due to this criteria. Table 4.1 includes a summary of the criteria applied to the TARR category.

Table 4.1: Criteria for sample selection

Criteria for sample selection	Requirement
Category classification	Domestic, Asset Allocation, Targeted and Absolute Return funds (TARR)
Retail versus institutional	Retail
Data requirement	At least 24 months of data

[4] Survivorship bias in sample data would result if only surviving funds' data are included in the analysis thus excluding the data of funds that closed down or amalgamated during the analysis period.

Lastly, there is no minimum requirement for the sample size, as the whole population of TARR funds[5] is initially considered and only excluded should it not conform to the requirements set in this section.

4.2.3 Sample period

The sample period consists of two components: firstly the overall sample period, and secondly, within the overall period, the number of rolling periods (24 months each).

- Overall sample period

As the TARR category was implemented from October 2003, the starting date for the category is from (and includes) 1 October 2003 to 31 December 2009 (75 months). The Association of Savings and Investment SA (ASISA) reports quarterly statistics for the market and not monthly (e.g. fund reclassification, new funds).

Momentum Investment Consulting (2007:3) acknowledges that, at the time, namely 2007, funds in the category had only experienced a bull market. This was cited as a reason for the difficulties in analysing the TARR category. Due to the credit crisis of 2007/2008, the overall sample period captures a full business cycle (i.e. bull and bear market). This may add to the robustness of the inferences drawn regarding policy asset allocations and thus style analysis.

- Rolling periods

Conducting an analysis over the whole 75-month period, implicitly assumes that the style of a fund was consistent during the 75-month period. Employing rolling time periods captures the dynamic that fund styles change (whether tactical or strategic of nature) as the factor exposures are not 'averaged' over a long horizon but a shorter time period. However, it does implicitly assume, rightly or wrongly that, over the shorter rolling period (24 months in this case), the fund exposures stay constant (Swinkels & Van der Sluis, 2006:533; Annaert & Van Campenhout, 2007:634; Annaert & Van

[5] Funds are reported and indentified based on the name it was known as on 31 December 2009.

Campenhout, 2002:3,8; Lobosco & DiBartolomeo, 1997; Sharpe, 1992; Lucas & Riepe, 1996:12). The results of RBSA that use rolling periods create the opportunity to infer tactical asset allocations over time and should be indicative of overall policy or strategic asset allocation ranges if they cover sufficient return data of a particular fund.

Subsequently, there are potentially 52 rolling periods: 1 October 2003 to 30 September 2005 (referred to as Period 1), 1 November 2003 to 31 October 2005 (Period 2) and so forth.

4.3 RETURN-BASED STYLE ANALYSIS MODEL SELECTION

The return-based style analysis (RBSA) model proposed by Sharpe (1992) applied the following restrictions to the coefficients of the regression analysis:

1) The sum of the coefficients should equal one; and
2) All coefficients must be non-negative.

Due to the above restrictions, the appropriate statistical technique to capture and accurately reflect the results of the return analysis is quadratic programming[6].

Ter Horst *et al.* (2004:30) later defined three forms of RBSA, namely *weak, semi-strong and strong* style analysis.

- *Weak style analysis:* no constraints are imposed on factor sensitivities (also called coefficients, style weights).
- *Semi-strong style analysis:* the analysis employs only the constraint of factor weights adding to 1. Swinkels and Van der Sluis (2006:532) add that this restriction does not imply that short sales in general are restricted, but only that are not allowed in style categories.
- *Strong style analysis:* the analysis refers to the model proposed by Sharpe (1992) as described in Section 3.5, which applies both constraints, namely the portfolio constraint (i.e. weights adding to 1) and style weights being non-negative (Lobosco & DiBartolomeo, 1997; Sharpe, 1992; DiBartolomeo & Witkowski, 1997; Robertson *et al.,* 2000).

[6] Regression analysis whereby b is constrained in that the sum of all coefficients has to equal 1.

As illustrated by Sharpe (1992), should the only restriction be the sum of the coefficients equal to 1, constraint regression analysis is appropriate, while unconstraint regression does not impose either of the above restrictions. The foundation though for selecting the appropriate regression methodology is the investment objectives and constraints of the fund or category being analysed. In the case of the TARR category, leverage[7] is prohibited but short positions not[8]. It is also noted that the funds may not be net short. For this study thus, constraint regression analysis (regression analysis in which the sum of all coefficients had to equal 1, that is the semi-strong form of RBSA) is applied to each and every fund and to each and every 24-month period for which the fund is included in the analysis.

The constraint regression model applied is indicated below:

$$\tilde{R}_i = \left[b_{i1}\tilde{F}_1 + b_{i2}\tilde{F}_2 + \ldots + b_{in}\tilde{F}_n\right] + \tilde{e}_i$$

Where:

R_i = the return on asset i

F_{i1} = value of factor 1 (i.e. return on an asset class)

e_i = the non-factor component of return on i (i.e. error term)

b_{i1} = the sensitivity of R_i to factors F_{i1} to F_{in}

As explained in the literature review, the adjusted R-square is preferable to assess the explanatory power of a regression analysis with rather than the R-square.[9]

The explanatory power of the regression model is an indication of how much of the behaviour of the return of the independent variable is captured by the regression model (Lucas & Riepe 1996:4). Strong RBSA leads to a higher R-square (i.e. greater

[7] Use of leverage entails borrowing a portion of the funds to be invested.
[8] A short position can be achieved by means of a short position in a futures contract. This is not to be confused with short selling (selling a share or position that the investor does not own, with the intent to buy it back at a later date).
[9] A modification of R-square. The adjusted R-square adjust for the number of independent variables used in the regression that is; the more independent variables, the greater the potential adjustment (lowering of) the explanatory power.

explanatory power) and lower confidence intervals for the weights (Ter Horst *et al.,* 2004). A low R-square may be the result of investment in non-traditional securities (i.e. derivatives) which can be verified by examining the fund mandate (Lucas & Riepe, 1996:24); security selection, which will be evident in high portfolio turnover (Lucas & Riepe, 1996:22); or significant changes in exposures, which will not be evident when analysing regression results over a single sample period (i.e. not using rolling periods, as the dynamics of the changes will be 'averaged out').

Vestergren and Redin (2009:16) calculated both the R-square as well as the adjusted R-square and in both cases got irrefutable evidence of the importance of the asset allocation decision and strength of the regression analysis. The researchers offer reasons for a potentially low R-square, which may be the result of the attributes of the model, namely existence of multicollinearity and inadequate indices (also supported by Lucas & Riepe, 1996) or extensive active trading by portfolio managers resulting in substantial shifts in the asset allocation during the sample period. Most of the funds had a very high R-square indicative of high explanatory power of the regression analysis. A few funds in the study exhibited a significantly lower R-square values. Vestergren and Redin (2009:17) emphasised that this may be due to either multicollinearity or (possibly) inadequate indices used in the regression. As these issues were acknowledged, they postulated that the result may be due to a highly active investment strategy employed by the fund managers of such funds. Thus the reasons for low explanatory power can be extensive and not necessarily conclusive.

The model further requires that the independent variables or factors (i.e. asset classes) according to the model be selected with care. This is discussed in the subsequent section.

4.4 INDICES (ASSET CLASS) FACTORS

Choosing valid indices representative of the asset classes for RBSA consists primarily of three important components: firstly, appropriate indices to represent each asset class should be chosen; secondly, the extent of multicollinearity between asset classes should be assessed to determine mutual exclusivity, and thirdly, the asset class factors selected

should be considered in combination with other factors, which, in combination, may influence the validity of the regression analysis (e.g. the sample period).

Sharpe (1992:8) proposes that the asset classes should be:

- mutually exclusive: a security should not be included in more than one asset class factor;
- exhaustive: as many securities as possible should be included in the appropriate asset classes and;
- asset classes with returns that have low correlations, or in circumstances where the correlation is meaningfully high, should exhibit different standard deviations.

As the whole investable universe of the category should be included in the asset class factors, it is suggested that value-weighted (market-weighted) indices should be used.[10]

Thus any index is measured against the following criteria (Lau 2007:127):

1) Are the chosen asset class indices mutually exclusive?
2) Do the indices, in combination, include the total investable universe for the TARR category?
3) Do the indices exhibit appropriate low correlations and thus low levels of multicollinearity and?
4) In cases where there exists high correlation, are the standard deviations at different levels?

As multicollinearity is a grave concern, the variance inflation factor (VIF) for each index in each rolling period should be calculated to determine the level of multicollinearity that may exist.[11]

[10] An index of which the constitutions (i.e. shares) are weighted according to the market capitalisation (total outstanding shares) of each share in the index.

[11] To *appraise the level of multicollinearity*, Vestergren and Redin (2009:14) computed the variance inflation factor (VIF), which assesses the extent of multicollinearity. VIF entails running a regression where each of the independent variables is used, one by one, with the rest of the indices as dependent variables. A high correlation between two variables is indicative of multicollinearity and thus the variable should be dismissed.

As the definition of the TARR category is not prescriptive regarding any style bias, the indices suggested should focus on capturing the investable asset classes of the category, while maintaining the validity [12]of the statistical tool employed.

A balance must thus be struck between capturing the investable universe of the category and refraining from including too many indices (i.e. independent variables) as this, given the short time horizon of 24 months, will reduce the explanatory power of the model.

As a starting point, the ACI Fund Classification publication (ACI 2008a) specifies benchmarks for certain categories of the unit trust overall classification system. Table 4.2 indicates each category for which an index is specified. These indices are initially proposed as a starting point to be proxies for the different asset classes.

Table 4.2: ACI specified benchmark

First-tier classification	Second-tier classification	Third-tier classification	Benchmark
Domestic	Equity	General	FTSE/JSE All Share Index (J203)
		Growth	FTSE/JSE Style All Share Growth (J331)
		Value	FTSE/JSE Style All Share Value (J330)
		Large-cap	FTSE/JSE Top 40 Index (J200)
		Smaller companies	FTSE/JSE Mid Cap Index (J201)
		Mining & resources	FTSE/JSE RESI 20 (J210)
		Financial	FTSE/JSE Financials Index (J580)
		Industrial	FTSE/JSE Industrial (J257)
	Fixed interest	Bond	BEASSA All Bond Index
		Income	BEASSA All Bond 1 to 3 year split index
		Money market	Alexander Forbes Index
	Real estate	General	FTSE/JSE SA Listed Property Index (J253)
Worldwide	Equity	General	Morgan Stanley Capital World Index
Foreign	Equity	General	Morgan Stanley Capital World Index
		Value	Morgan Stanley Capital Value Index

Source: ACI (2008a)

[12] Validity of research depends on whether the results of the research are indeed true. This is discussed further in the chapter.

As the ACI does not suggest a benchmark for the foreign, fixed interest, bond category, the fund fact sheets of the funds within the category as on 31 December 2009 were consulted and collaborated as indicated in Table 4.3.

Table 4.3: Benchmarks of sample funds within the Foreign-Fixed Interest Bond category

Fund	Benchmark
Absa Global Bond Fund	Citigroup World Government Bond 3-7 years
Coris Capital International Bond Feeder Fund	JP Morgan Government Bond Index Global
Investment Solutions Global Fixed Income Feeder Fund	Barclays Capital Global Aggregate Index
Old Mutual Global Bond Feeder Fund	85% JP Morgan Global Traded Index & 15% STeFI Index
Prudential Global High Yield Bond Fund of Funds	Barclays Capital Global Aggregate Bond Index
RMB International Bond Fund	JP Morgan Government Bond Index
Sanlam International Bond Fund of Funds	JP Morgan Global Government Bond Index
Stanlib US Dollar Bond Fund of Funds	CITI Eurodollar Bond Index (USD) 90%; Alexander Forbes Money Market Index 10%

Lastly it is critical to assess the overall explanatory power of the style regression results after choosing appropriate indices while also being wary of data mining[13]. In his study, Sharpe (1992) used 12 indices representing the investable asset classes. However, the time period of the style analysis in the Sharpe study was 60 months. In contrast, the 24-month rolling periods suggested in the research (relatively short for regression analysis) coupled with too many factor exposures, would be to the detriment of the explanatory power of the study. This should be balanced with sufficient indices that capture the investable universe of the TARR category. Table 4.4 presents a list of the indices proposed for the study.

[13] Searching at length through data for statistically significant patterns. This implies searching until there is some or other finding that seems to be statistically significant.

Table 4.4: Proposed indices

Asset Class	Index
Domestic Indices	
Bills	*Alexander Forbes 3- month (STeFI) Index*
Bonds	*BEASSA All Bond Index (ALBI)*
Equities	*FTSE/JSE Africa All Share Index (ALSI)*
Property	*FTSE/JSE Listed Property Index (Property)*
International Indices	
Bonds	*JP Morgan Global Government Bond Index (JPM)*
Equities	*Morgan Stanley Capital World Index (Global)*

The indices all satisfy the criteria of being market-weighted while the index levels for both of the international indices are reported in USD. As the unit trust fund returns are reported in ZAR, the international index return data is converted to ZAR returns.

4.5 ASSET CLASS RETURN DATA

Asset class returns are based on the monthly return calculated as:

$$\text{Monthly index return} = \frac{\text{Ending index value - beginning index value}}{\text{Beginning index value}}$$

As mentioned before, for the international indices, the index value is converted to a ZAR basis and thus the exchange rate exposure captured.

4.6 FUND RETURN DATA

The analysis is conducted using monthly returns, which include dividends but do not deduct any costs (including management fees).

In some cases, funds may bring their pre-existing historical returns to the category as they have been in existence prior to the reclassification of the TARR category. Any

prior historical returns will not be considered as they were earned while classified as a TARR fund.

4.7 DATA COLLECTION

Both fund return data as well as index data is *secondar*y data, provided by Profile Media and Bloomberg respectively. Both are respected data providers in the industry.

4.8 PROCESS

The process proposed focuses on the results and interpretation of the return-based style analysis and assumes that the investment objectives/style of the funds stay constant over time. As in the study of Kim *et al.* (2000) and DiBartolomeo and Witkowski (1997); it is initially assumed that funds are correctly classified (do note that these particular studies subsequently focus on determining whether in actual fact misclassification exists).

Phase 1: Selection of indices (factor exposure) representative of asset classes

Assess appropriateness of indices (i.e. factor exposures) chosen for regression analysis by means of statistical analysis (i.e. VIF factors). Take corrective actions where required. The indices proposed are presented in Table 4.4.

Phase 2: RBSA of Group 1 funds

Apply return-based style analysis to nine funds (Group 1), which cover the full measurement period (75 months) and subsequently follow each of the steps below:

Step 1: Evaluate STeFI (domestic short-term) asset allocation.

Step 2: Evaluate ALBI (domestic fixed-income) asset allocation.

Step 3: Evaluate ALSI (domestic equity) asset allocation.

Step 4: Evaluate the remaining three asset class allocations namely, Global, JPM and Property (i.e. global equity, global fixed-income and domestic property).

Step 5: Evaluate explanatory power of regression analysis.

Step 6: Interpret annualised return and standard deviation.

This would constitute an initial screening, which may be revisited as based on results of the regression analysis.

Phase 3: Sub-categorisation framework to be applied to Group 2 funds

Phase 2 forms the backdrop for developing a framework for sub-categorisation of the remaining 45 funds (Group 2 funds) primarily based on maximum asset allocations exhibited by the funds in comparison with the framework inferred from Group 1 funds. This does not imply that the particular nine funds within Group 1 should be expected to be representative of all possible sub-categorisations, but, given the fact that only nine cover the full measurement period, Group 1 funds should be most reliable to make inferences from.

The approach would require judgement in creating the framework. The maximum asset allocations as applied in the framework are deemed to be indicative of policy/strategic asset allocation decisions.

Phase 4: Applying the sub-categorisation framework to Group 2 funds

The framework is used to classify each remaining fund (45 in total) to a sub-category.

Should a fund exhibit an asset allocation below a particular threshold (i.e. level specified in the framework), extra care must be taken in interpreting the results as the results may be due to: 1) poor explanatory power of the model and thus make the results invalid and 2) short time period that the particular fund covers.

Finally assess the explanatory power of the model as applied to each period and note any inconsistencies.

4.9 ASSUMPTIONS

The research is based on the following set of assumptions:

- all funds in the sample are assumed to be correctly classified as TARR funds;
- any historical information prior to 1 October 2003 is not included in the research as the category was officially only started on 1 October 2003;
- retail funds are representative of the category;
- funds are only included for the period while it was in the TARR category.

4.10 LIMITATIONS

Limitations applicable to the research and the possible effects thereof on the interpretation of the RBSA results are:

- The TARR category has not been in existence for a long period resulting in fewer historical data points.
- The use of only 24 data points for regression analysis is acknowledged to have its limitations regarding inference drawn from the results.
- One regression model is proposed to be applied to each and every fund and capture the return drivers thereof. Based on the explanatory power of the regression, it may indicate that the general model proposed is not the most suitable for a particular fund.
- As the asset allocations vary over time, the explanatory power of the model will subsequently be influenced.
- Caution when interpreting the RBSA results must be taken for funds with fewer data points. For such funds, it is also challenging to test for style shifts and/or consistency of style over time.
- The threshold will be the maximum and/or minimum asset allocation for each asset class based on the results of the Group 1 funds and judgement.
- VIF of 10 was selected. A lower VIF may yield superior results (i.e. better explanatory power).

4.11 VALIDITY

The validity of research depends on whether the results of the research are indeed true and capture two components, namely internal validity and external validity.

4.11.1 Internal validity

Internal validity attempts to conclude whether the experimental relationships are indeed causal relationships (i.e. the result or effect was brought about by the cause) (Cooper & Schindler, 1998:387). Internal validity would be critical for studies that measure state of affairs before and after an intervention, for example. Given the descriptive and exploratory nature of study, internal validity is not relevant.

4.11.2 External validity

External validity questions whether the so-called causal relationship identified in a study holds true in general (Cooper & Schindler, 1998:387). As an RBSA model must mirror the investment style of the sample data, such a particular model cannot be applied to a population that is not 100% homogeneous or subsequently applied as is to out-of-sample data as each regression model is unique.

4.11.3 Validity

Although Sharpe's RBSA is accepted, the validity of results depends on:

- correctly specifying benchmarks: benchmarks should be chosen in such a way that they are representative of the asset class/style component they are supposed to measure. Dor *et al.* (2003:107) in this context emphasise the possibility of multicollinearity that may arise. Multicollinearity arises when two or more of the independent variables are correlated with one another (DeFusco *et al.,* 2004:454,473). In this instance, the result of the regression model becomes problematic and may lead to wrongfully rejecting the null hypothesis (Type I error). Benchmarks chosen within each asset class should be done with care.

- number of asset classes/benchmarks: the more asset classes/benchmarks added, the more explanatory power it should add to the regression. However, it may though simply increase noise[14].
- style consistency: the assumption is that the style of a fund should be consistent over time given the pre-existing classification of a fund and assuming no formal change in strategy. This is one of the assumptions of Sharpe (1992). Practice suggests though that this may not be the case. Dor *et al.* (2003:101) suggest regression analysis on various periods over time to evaluate consistency of results.

4.12 SUMMARY

This chapter deals with the research methodology of the study. It started with a description of the sample design. The criteria applied were two-fold, namely all funds must be retail funds, with a minimum of 24 months' data. The sample period was from inception of the category (1 October 2003) to 31 December 2009. The regression analysis was applied to 24-month rolling periods within the overall sample period. It was followed by a motivation for the semi-strong form of RBSA to apply to the sample data. The semi-strong form requires that the factor exposures should add to 1. The second restriction imposed by Sharpe, namely that all factor exposures must be non-negative, is not appropriate for the TARR category. Subsequently an argument for the proposed indices (independent variables) for the regression model was included. The asset class and fund return data were explained along with the data collection method, while the process that should be followed in the interpretation of the results, was addressed.

A four-phase process was proposed to analyse the regression results. It commenced with an analysis of the appropriateness of the indices selected for the regression analysis. It was followed by an analysis of the Group 1 funds (funds with 75 data points). From the inferences drawn, a categorisation framework was proposed, which was subsequently applied to the Group 2 funds.

[14] Weak or irrelevant data included in the data analysis.

The chapter concluded by discussing the assumptions, limitations and aspects regarding validity applicable to the research.

CHAPTER 5: EMPIRICAL FINDINGS

5.1 INTRODUCTION

Chapter 4 proposed the research methodology to be followed in analysing the Targeted Absolute and Real Return unit trust category in pursuit of sub-categorisation. It commenced with picking the appropriate sample data as well as selecting and testing the factor exposures used in the regression analysis.

The regression analysis is in Chapter 5 applied to two distinctive groups within the sample data: funds that have data points for the full measurement period (referred to as Group 1) and funds that have less than 75 data points (Group 2). The outcomes of the Group 1 funds result in the sub-categorisation framework, which is consequently applied to the Group 2 funds. As the Group 2 funds do not cover the full sample period, the proposed categorisation is more extensively scrutinised.

The findings in this chapter, lead to Chapter 6 which includes suggestions going forward based on these findings. The chapter will thus proceed in the next section with the sample design.

5.2 SAMPLING DESIGN

The criteria for the sample selection are applied to the Domestic Targeted Absolute and Real Return (TARR) category for the period from 1 October 2003 to 31 December 2009. The criteria for inclusion as discussed in Chapter 4 entails that the fund must be classified as a retail fund and have a minimum number of 24 data points (i.e. two years of data); resulting in a sample size of 54 funds.

The analysis for each fund is conducted on 24-month rolling periods and the results thereof are indicative of maximum and minimum asset allocations during the window for which the fund is included in the analysis.

5.3 SELECTION OF APPROPRIATE REGRESSION MODEL AND STATISTICAL SIGNIFICANCE THEREOF

The semi-strong form of return-based style analysis (RBSA) is applied consistently to each fund and every 24-month period. The only constraint applied to the model is that the sensitivity factors must sum to 1.

The constraint regression model applied is:

$$\tilde{R}_i = \left[b_{i1}\tilde{F}_1 + b_{i2}\tilde{F}_2 + \ldots + b_{in}\tilde{F}_n\right] + \tilde{e}_i$$

Where:

R_i = the return on asset i

F_{i1} = value of factor 1 (i.e. return on an asset class)

e_i = the non-factor component of return on i (i.e. error term)

b_{i1} = the sensitivity of R_i to factors F_{i1} to F_{in}

It is acknowledged that the funds may have very different strategies, which all fall within the scope of the TARR category classification, but that the appropriateness of the regression model was based on the category definition, thus the explanatory power of the funds (as indicated by R-square) will vary.

It is worth noting that on 1 December 2010, proposed changes to the classification system of unit trust funds, particularly the TARR category, were being discussed by the Association of Savings and Investment SA (ASISA), the Financial Services Board (FSB) and industry participants (Mulder, 2010).

5.4 APPLICATION OF DATA ANALYSIS PROCESS AND FINDINGS

The process proposed for the analysis was subsequently applied to the sample data. This includes Phases 1 to 4, namely Phase 1: selection of appropriate indices/factor exposures as representatives of asset classes within the category; Phase 2: evaluating the results of return-based style analysis of Group 1 funds; Phase 3: developing the sub-categorisation framework to be applied to Group 2 funds, and lastly, Phase 4: applying the framework to the Group 2 funds for sub-category.

In the subsequent sections, each phase and the findings thereof are discussed commencing with the selection of appropriate indices for the regression analysis (Phase 1), followed by an analysis of the Group 1 funds (Phase 2). Phase 3 and 4 are dealt with thereafter.

5.5 PHASE 1: SELECTION OF INDICES (FACTOR EXPOSURES) REPRESENTATIVE OF ASSET CLASSES

The appropriate set of indices for the regression analysis must be reflective of the investment strategy of the category and also exhibit sufficiently low levels of multicollinearity. The test for multicollinearity is conducted by means of the variance inflation factor (VIF)[1]. The indices suggested for the analysis (and discussed in Chapter 4) are again included in Table 5.1.

[1] VIF entails running a regression where each of the independent variables is used, one by one, with the rest of the indices as dependent variables. A high correlation between two variables is indicative of multicollinearity and thus the variable should be dismissed.

Table 5.1: Indices for regression analysis

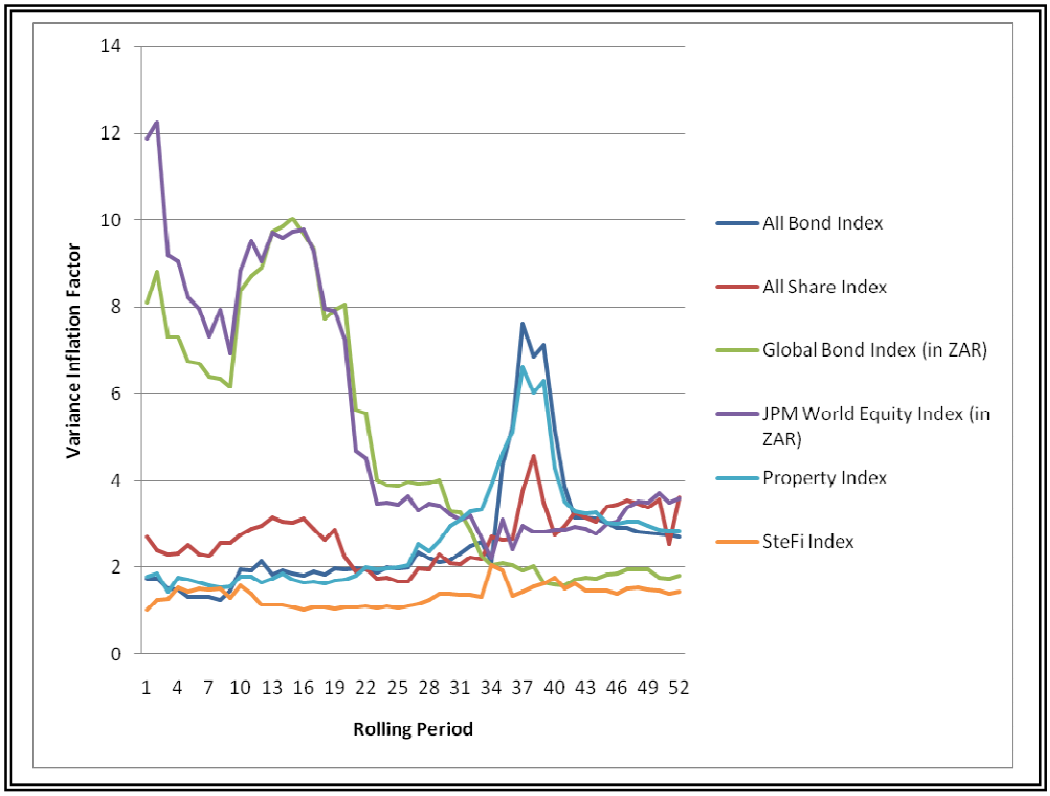
Asset Class	Index
Domestic Indices	
Bills	*Alexander Forbes 3- month (STeFI) Index*
Bonds	*BEASSA All Bond Index (ALBI)*
Equities	*FTSE/JSE Africa All Share Index (ALSI)*
Property	*FTSE/JSE Listed Property Index(Property)*
International Indices	
Bonds	*JP Morgan Global Government Bond Index (JPM)*
Equities	*Morgan Stanley Capital World Index (Global)*

As the regression analysis is conducted for 52 rolling periods, the VIF for each index was calculated for each rolling period. The literature review suggests multiple yet conflicting views regarding which VIF value constitutes multicollinearity (and necessitates an index being dropped). Vestergren and Redin (2009:15) found values varying from four or five, to seven or even as high as 10. Other researchers suggest that 10 is viewed as a signal of multicollinearity (Chatterjee & Hadi, 2006:236; Pardoe, 2006:176; Mendenhall & Sincich, 2003:349). Montgomery and Peck (1982:300) suggest that firstly, one or more large VIF factors indicate multicollinearity, and/or secondly, if any VIF is greater than five or 10, it suggests multicollinearity; while Miles and Shevlin (2001:130) suggest a cut-off of four. Given conflicting opinions by researchers and the exploratory nature of the study, a value of 10^2 is chosen to be indicative of multicollinearity and is the benchmark used.

The results of VIFs for the suggested indices (Table 5.1), for each 24 month rolling period, are shown in Figure 5.1.

[2] Higher levels of potential multicollinearity are accepted due to the exploratory nature of the study.

Figure 5.1: VIF for each index during sample period



The majority of the VIF factors in actual fact fall below four. The international indices (in South African rand) exhibit higher VIF factors, which suggest multicollinearity. Yet if a VIF factor of 10 in terms of the research is the benchmark, only the international indices (Global Bond Index and JPM World Index), and for very few rolling periods at the beginning of the time frame, are a concern. Although this is acknowledged, practically the indices are still the most appropriate (i.e. reflective of investment strategy of the TARR category). It should also be acknowledged that the regression periods are short (only 24 months for each rolling period) and that the short time period could influence the VIF factors. The property and bond indices also exhibit higher VIF factors, be it below 10, in Periods 34 to 40.

Given the restrictions of the study (i.e. short time periods and limitation on number of indices), coupled with an attempt to apply the same regression model to each fund and rolling period; the proposed indices are accepted to be used in the analysis as the factor exposures and thus be representative of the investable asset classes.

Subsequently, as the factor exposures satisfy the requirement for validity, these are used in the analysis for Phase 2 to 4 going forward.

5.6 PHASE 2: RETURN-BASED STYLE ANALYSIS OF GROUP 1 FUNDS

Phase 2 applies return-based style analysis to the nine funds that have 75 data points (i.e. data for the full measurement period). The results of the return-based style analysis are interpreted for each fund. It must be emphasised that these funds are chosen primarily because of availability of information and not because of a belief that they are representative of all potential sub-categories of TARR funds. Table 5.2 includes a list of the Group 1 funds.

Table 5.2: Group 1 Fund codes and names

Fund Code	Fund Name
ABIB	Absa Inflation Beater Fund
AGOF	Allan Gray Optimal Fund
CCPF	Coronation Capital Plus Fund
DYFF	Old Mutual Dynamic Floor Fund
INAB	Investec Absolute Balanced Fund
NHCF	Nedgroup Investments Optimal Income Fund
PRIP	Prudential Inflation Plus Fund
RMFA	RMB Absolute Focus Fund
SMXF	SIM Inflation Plus Fund

Table 5.3 again includes the classification definition of the TARR category in terms of the ACI classification. The volatility characteristic described as “below average short-term volatility” should be noted. Due to the above requirement, the initial methodology suggested to interpret the implied asset allocation, was to start by comparing the minimum and maximum asset allocation for the STeFI index, thereafter the ALBI and subsequently the ALSI. As the category has a domestic bias, these three domestic indices may be most significant in determining the style of a fund based on asset allocation.

Table 5.3: ACI classification and description of domestic asset allocation categories

CATEGORY / *CHARACTERISTIC*	Prudential low equity	Prudential medium equity	Prudential high equity	Prudential variable equity	Flexible	TARR
Volatility:	Reduced short-term volatility	Average volatility	Higher probability of short-term volatility	Higher probability of short-term volatility	Not explicitly defined	Below average short-term volatility
Aim:	Long-term capital growth	Medium- to long-term capital growth	Maximises long-term growth	Maximises long-term growth	Not explicitly defined	Managed towards a predetermined, explicit benchmark
Equity Exposure (incl. international):	Below 40%	40%-65%	Above 60%	0%-75%	No requirement	No requirement
Investment in derivatives:	Max. 2,5%	Max. 2,5%	Max. 2,5%	Max. 2,5%	Yes	Yes
Regulation 28 Compliant:	Yes	Yes	Yes	Yes	Depends on mandate of fund	Depends on mandate of fund
Variation in risk and return objectives of individual funds:	Yes	Yes	Yes	Yes	Yes	Yes
Other information:					May be aggressively managed with shifts in market and/or asset class exposure	Does not necessarily offer capital or performance guarantees

Source: ACI (2008a:14)

The first level of analysis compares maximum and minimum asset allocations over the full measurement period for which the fund is included. It is acknowledged that this does not compare whether funds imitate shifts in asset allocations by comparing specific rolling periods. As an example, do determine asset allocation shifts of fund A during the analysis period, the domestic equity asset allocation for fund A in rolling Period 2, namely from 1 November 2003 to 31 October 2005, is compared with Period 1. This change in asset allocation is not compared with the changes in asset allocation of fund B for the two periods. This should not influence the validity of the results as different managers, based on skill and their view of the market, may make different tactical asset allocation decisions. This does not lessen the validity of the implied strategic asset allocation (i.e. ranges for each asset class according to regression analysis) over time. In particular, the data for the Group 1 funds included bull and bear market conditions and a large number of data points, thus evaluating the maximum and minimum allocations are less questionable.

In evaluating the regression analysis, the decision was explicitly made not to review the mandates and fund fact sheets[1] to ensure unbiased interpretation based solely on the results of the regression analysis. Another point again worth emphasising is that the regression model proposed is based on the investable asset classes in terms of the category definition, thus it explicitly excludes any fund-specific bounds imposed on any asset class (i.e. Regulation 28 or fund-specific).

In the regression analysis, each 24-month sub-period is identified by a number. The first period, represented by number "1", thus represents the sub-period, namely 1 October 2003 to 30 September 2004 (24-month period). A list of the numbers representing each sub-period is included in Appendix B.

[1] A fund fact sheet is a document that conveys basic information on the fund such as inception date, distribution dates, assets under management and portfolio manager. It is usually updated monthly.

The methodology proposed in Chapter 4 was to analyse each fund in Group 1 by means of the following steps:

Step 1: Evaluate STeFI (domestic short-term interest) asset allocation.

Step 2: Evaluate ALBI (domestic fixed-income) asset allocation.

Step 3: Evaluate ALSI (domestic equity) asset allocation.

Step 4: Evaluate the remaining asset allocations, namely Global, JPM and Property (i.e. global equity, global fixed-income and domestic property).

Step 5: Evaluate explanatory power of regression analysis[2].

Step 6: Interpret annualised return and standard deviation.

The findings are structured in the following manner: Section 5.6.1 compares asset allocations of the Group 1 funds in 1 to 3 and results in an initial sub-categorisation, while Section 5.6.2 compares the funds within each sub-category (steps 4 to 6). Following in Section 5.6.3 is a summary of the findings for the Group 1 funds.

5.6.1 Regression results of Group 1 funds: Steps 1 to 3

Phase 2 requires a comparison and interpretation of the regression results of Group 1 funds. This section focuses on the asset allocation to STeFI, ALBI and ALSI (Step 1 to 3).

Table 5.4: Maximum and minimum asset allocations: STeFI factor exposure

Fund Name	Old Mutual Dynamic Floor Fund	Prudential Inflation Plus Fund	RMB Absolute Focus Fund	Investec Absolute Balanced Fund	Allan Gray Optimal Fund	SIM Inflation Plus Fund	Nedgroup Investments Optimal Income Fund	Absa Inflation Beater Fund	Coronation Capital Plus Fund
Fund Code	(DYFF)	(PRIP)	(RMFA)	(INAB)	(AGOF)	(SMXF)	(NHCF)	(ABIB)	(CCPF)
Maximum Allocation	74%	55%	106%	106%	124%	102%	112%	119%	70%
Minimum Allocation	21%	30%	82%	81%	74%	50%	78%	63%	18%

[2] The explanatory power of the regression analysis in this chapter, refers to the adjusted R-square unless explicitly mentioned that it refers to the R-square.

In Table 5.4, the maximum and minimum asset allocations of the funds to the STeFI index are indicated. The following inferences can be drawn from the analysis:

- Three of the funds exhibit a maximum asset allocation to STeFI below 100%, namely the Old Mutual Dynamic Floor Fund (DYFF), Prudential Inflation Plus Fund (PRIP) and the Coronation Capital Plus Fund (CCPF). The highest minimum asset allocation for the three funds is the PRIP fund with a minimum asset allocation of 30% to STeFI.
- The remaining six funds all exhibit at some time a maximum asset allocation above 100% and high lower bounds for the minimum asset allocation. The lowest minimum allocation to STeFI is the SIM Inflation Plus Fund (SMXF) with an allocation of 50%.

This suggests that the DYFF, PRIP and CCPF funds are not homogeneous to the rest of the funds in the group based on the allocation to STeFI. The guideline going forward is set to evaluate all other funds based on whether the maximum asset allocation to STeFI is at or above 75% (see Table 5.5).

Table 5.5: Homogeneous sub-categories based on asset allocation to STeFI factor exposure (Step 1)*†

Fund Name	Old Mutual Dynamic Floor Fund	Prudential Inflation Plus Fund	RMB Absolute Focus Fund	Investec Absolute Balanced Fund	Allan Gray Optimal Fund	SIM Inflation Plus Fund	Nedgroup Investments Optimal Income Fund	Absa Inflation Beater Fund	Coronation Capital Plus Fund
Fund Code	**(DYFF)**	**(PRIP)**	(RMFA)	(INAB)	(AGOF)	(SMXF)	(NHCF)	(ABIB)	**(CCPF)**
Maximum Allocation	**74%**	**55%**	106%	106%	124%	102%	112%	119%	**70%**
Minimum Allocation	**21%**	**30%**	82%	81%	74%	50%	78%	63%	**18%**

* Homogeneous sub-category indicated by colour.
†Criteria: Maximum asset allocation to STeFI at or above 75%.

Step 2 was proposed to evaluate the asset allocation to ALBI according to the research methodology explained in Chapter 4. It was stated that the process may require slight adjustments when the regression results are of such a nature that they are deemed

appropriate. As such, the regression output data is more clearly differentiated for ALSI than for ALBI. For category sub classification, ALSI would then seem to exhibit more information value than ALBI due to greater variation in ALSI asset allocations. As such, the methodology was subsequently adapted to firstly, evaluate STeFI, secondly, ALSI and subsequently, ALBI exposures (i.e. Steps 2 and 3 switch). Although initially, it was thought that the order in which the asset allocation is evaluated would be critical, it is clearly not the case for Steps 1 to 3.

Table 5.6: Maximum and minimum asset allocations: ALSI factor exposure*

Fund Name	**Old Mutual Dynamic Floor Fund**	**Prudential Inflation Plus Fund**	**Coronation Capital Plus Fund**	RMB Absolute Focus Fund	Investec Absolute Balanced Fund	Allan Gray Optimal Fund	SIM Inflation Plus Fund	Nedgroup Investments Optimal Income Fund	Absa Inflation Beater Fund
Fund Code	**(DYFF)**	**(PRIP)**	**(CCPF)**	(RMFA)	(INAB)	(AGOF)	(SMXF)	(NHCF)	(ABIB)
Maximum Allocation	**41%**	**29%**	**30%**	5%	13%	10%	16%	9%	7%
Minimum Allocation	**15%**	**21%**	**8%**	-8%	0%	-12%	5%	-5%	-8%

*Homogeneous sub-category suggested by STeFI allocation indicated by colour.

Thus Step 2 evaluates the asset allocation to ALSI (Table 5.6). As guidance, the equity exposure bounds of the prudential funds (presented in Table 5.7) are initially consulted. Given the already established high allocations of the Group 1 funds to STeFI and considering the low volatility requirement of STeFI, makes it highly improbable that these funds can exhibit such high asset allocations to the domestic equity asset class as is the case for the prudential funds.

Table 5.7: Equity exposure of prudential categories

CATEGORY / *CHARACTERISTIC*	Prudential low equity	Prudential medium equity	Prudential high equity	Prudential variable equity
Equity Exposure (incl. international):	Below 40%	40%-65%	Above 60%	0%-75%

As some of the group funds clearly exhibit a higher allocation to equity, based on both the minimum and maximum asset allocations, the arbitrary percentage for the maximum asset allocation at or above 25% is selected to distinguish different sub-categories. Given the exploratory nature of the study and the range of possible investment approaches, there is no magic number in the literature or practice. Applying the criteria of a maximum asset allocation at or above 25% does not induce any further sub-category changes from those established to date as presented in Table 5.8.

Table 5.8: Homogeneous sub-categories based on asset allocation to STeFI and ALSI factor exposures (Steps 1 and 2)*†

Fund Name	Old Mutual Dynamic Floor Fund	Prudential Inflation Plus Fund	Coronation Capital Plus Fund	RMB Absolute Focus Fund	Investec Absolute Balanced Fund	Allan Gray Optimal Fund	SIM Inflation Plus Fund	Nedgroup Investments Optimal Income Fund	Absa Inflation Beater Fund
Fund Code	**(DYFF)**	**(PRIP)**	**(CCPF)**	(RMFA)	(INAB)	(AGOF)	(SMXF)	(NHCF)	(ABIB)
Maximum Allocation (ALSI)	**41%**	**29%**	**30%**	5%	13%	10%	16%	9%	7%
Minimum Allocation (ALSI)	**15%**	**21%**	**8%**	-8%	0%	-12%	5%	-5%	-8%

*Homogeneous sub-category suggested by STeFI and ALSI allocations indicated by colour.
†Criteria: Maximum asset allocation to STeFI at or above 75%; maximum asset allocation to ALSI at or above 25%.

This is followed by a comparison of the asset allocation of funds to ALBI presented in Table 5.9 (step 3). Again for prudence, the ACI classification system (ACI 2008a) was consulted, in particular the classification for the fixed-interest category.

Table 5.9: Maximum and minimum asset allocations: ALBI factor exposure*

Fund Name	Old Mutual Dynamic Floor Fund	Prudential Inflation Plus Fund	Coronation Capital Plus Fund	RMB Absolute Focus Fund	Investec Absolute Balanced Fund	Allan Gray Optimal Fund	SIM Inflation Plus Fund	Nedgroup Investments Optimal Income Fund	Absa Inflation Beater Fund
Fund Code	**(DYFF)**	**(PRIP)**	**(CCPF)**	(RMFA)	(INAB)	(AGOF)	(SMXF)	(NHCF)	(ABIB)
Maximum Allocation	**45%**	**29%**	**31%**	16%	12%	19%	27%	6%	30%
Minimum Allocation	**0%**	**7%**	**-18%**	-7%	-13%	-22%	-28%	-16%	-18%

*Homogeneous sub-category suggested by STeFI and ALSI allocations indicated by colour.

Given the nature of the category and asset class (i.e. fixed-income) though, the ACI guidelines are based on the duration of the funds, duration is not comparative to the results of the regression analysis. Again neither the literature nor practice can provide a magic number as to appropriate asset allocation. Considering the high asset allocation to STeFI and the results of the regression model, the arbitrary percentage for the maximum asset allocation at or above 25% is selected to distinguish different sub-categories (see Table 5.10).

Table 5.10: Homogeneous sub-categories based on asset allocation to STeFI, ALSI and ALBI factor exposures (Steps 1, 2 and 3)*†

Fund Name	Old Mutual Dynamic Floor Fund	Prudential Inflation Plus Fund	Coronation Capital Plus Fund	RMB Absolute Focus Fund	Investec Absolute Balanced Fund	Allan Gray Optimal Fund	SIM Inflation Plus Fund	Nedgroup Investments Optimal Income Fund	Absa Inflation Beater Fund
Fund Code	**(DYFF)**	**(PRIP)**	**(CCPF)**	(RMFA)	(INAB)	(AGOF)	**(SMXF)**	(NHCF)	**(ABIB)**
Maximum Allocation (ALBI)	**45%**	**29%**	**31%**	16%	12%	19%	**27%**	6%	**30%**
Minimum Allocation (ALBI)	**0%**	**7%**	**-18%**	-7%	-13%	-22%	**-28%**	-16%	**-18%**

*Homogeneous sub-category suggested by STeFI, ALSI and ALBI allocations indicated by colour.
†Criteria: Maximum asset allocation to STeFI at or above 75%; maximum asset allocation to ALSI and ALBI at or above 25%.

Applying step 1 to 3 to Group 1, results in eight potential sub-categories of which the Group 1 funds fall within three thereof as presented in Table 5.11. The table includes the criteria for each sub-category and the Group 1 funds that fall within each category (if any). It is important to note that due to the low volatility nature of the category, some of the so-called sub-categories identified to this point, may never be plausible for a fund within the TARR category. So although the analysis suggests eight sub-categories at this stage, they may indeed only be three (i.e. categories that do include funds) as these may be the only viable asset allocation strategies for a fund within the TARR category. A reasonable conclusion can only be drawn after the rest of the TARR category funds have been examined.

Table 5.11: Homogeneous sub-categories based on asset allocation to STeFI, ALSI and ALBI factor exposures (Steps 1, 2 and 3)

	Criteria: Steps 1 to 3							
Step 1: STeFI	Maximum allocation at or above 75%				Maximum allocation below 75%			
Step 2: ALSI	Maximum allocation at or above 25%		Maximum allocation below 25%		Maximum allocation at or above 25%		Maximum allocation below 25%	
Step 3: ALBI	Maximum allocation at or above 25%	Maximum allocation below 25%	Maximum allocation at or above 25%	Maximum allocation below 25%	Maximum allocation at or above 25%	Maximum allocation below 25%	Maximum allocation at or above 25%	Maximum allocation below 25%
Resulting sub-categories								
Categories	**Category 1 STeFI ≥75% ALSI ≥25% ALBI ≥25%**	**Category 2 STeFI ≥75% ALSI ≥25% ALBI <25%**	**Category 3 STeFI ≥75% ALSI <25% ALBI ≥25%**	**Category 4 STeFI ≥75% ALSI <25% ALBI <25%**	**Category 5 STeFI <75% ALSI ≥25% ALBI≥25%**	**Category 6 STeFI <75% ALSI ≥25% ALBI<25%**	**Category 7 STeFI <75% ALSI <25% ALBI≥25%**	**Category 8 STeFI <75% ALSI <25% ALBI<25%**
Funds			SMXF ABIB	AGOF INAB NHCF RMFA	CCPF DYFF PRIP			

This concludes steps 1 to 3 of the analysis. The following section thus deals with steps 4 to 6, which include an evaluation of the remaining three indices, namely Global, JPM and Property (i.e. global equity, global fixed-income and domestic property); an analysis of the explanatory power of the regression analysis[1] and a review of the annualised return and standard deviation of each fund. This may either lead to reinforce the sub-categorisation from Steps 1 to 3 or a modification thereof.

5.6.2 Regression results of Group 1 funds: Steps 4 to 6

In the previous section, eight sub-categories were inferred from the asset allocations to STeFI, ALSI and ALBI for Group 1. Steps 4 to 6 include the analysis of the remaining three indices as well as a review of the explanatory power, and lastly, annualised return and standard deviation. This analysis is conducted per sub-category to assess whether it reinforces or conflicts with the analysis to date.

As such, each succeeding section deals with a sub-category (i.e. 3 to 5) and an application of Steps 4 to 6 thereto.

5.6.2.1 Category 3: Steps 4 to 6 analysis

Category 3 funds exhibit the following asset allocation:

- STeFI $\geq$ 75%
- ALSI < 25%
- ALBI $\geq$ 25%

The two funds included in the category are the SIM Inflation Plus Fund (SMXF) and the Absa Inflation Beater Fund (ABIB). Figure 5.2 includes the regression specifics of the two funds.

[1] The explanatory power of the regression analysis in this chapter refers to the adjusted R-square unless explicitly mentioned that it refers to the R-square.

Table 5.12: Minimum and maximum asset allocation to Global, JPM and Property for Category 3: ABIB and SMXF funds

Asset class/Fund name	Global equity (Global)		Global fixed-income (JPM)		Domestic property (Property)	
	Maximum Allocation	Minimum Allocation	Maximum Allocation	Minimum Allocation	Maximum Allocation	Minimum Allocation
Absa Inflation Beater Fund (ABIB)	**3%**	**-8%**	**11%**	**-5%**	**14%**	**-1%**
SIM Inflation Plus Fund (SMXF)	**-1%**	**-24%**	**22%**	**7%**	**15%**	**2%**

- **Step 4**

The asset allocation to the Property index is quite similar for ABIB and SMXF (see Table 5.12). The asset allocation to the two global indices (i.e. Global and JPM), representing the global equity and global fixed-income asset classes, is very different with the SMXF fund seemingly more exposed to global markets.

- **Step 5**

The ABIB fund exhibits a low explanatory power of the regression analysis at times, sometimes as low as 55% (adjusted R-square). However, at times it is greater than 80% (Figure 5.12).

The SMXF fund exhibits an adjusted R-square for the majority of sub-periods above 85% as presented in Figure 5.2. However, it drops significantly for the more recent sub-periods. The explanatory power though is never below 50%.

The ABIB fund's adjusted R-square varies much more over the analysis period than is the case for the SMXF fund. It is acknowledged that the two funds do not exhibit the same level of explanatory power for the same time periods.

- **Step 6**

The SMXF fund offers at best a return of 20, 40% (ABIB: 12,35%) and at worst 0,69% (ABIB: 5,78%). The standard deviation is at a maximum of 5,84% (ABIB: 3,46%) and minimum of 3,89% (ABIB: 1,45%). Although a component of this may be due to manager skill, the large difference coupled with large differences in asset allocation supports the notion that the two funds are not homogeneous.

With the above information considered, the two funds are not homogeneous as the risk and return characteristics vary and the exposure to global markets differs substantially. Statistically, determining the *level of significance* is not part of the study. It is safe to say though that the two funds are representative of two different sub-categories.

Figure 5.2: Category 3 regression results (ABIB and SMXF)

Absa Inflation Beater Fund (ABIB)

Graph 1: Suggested asset allocation as per sub-period

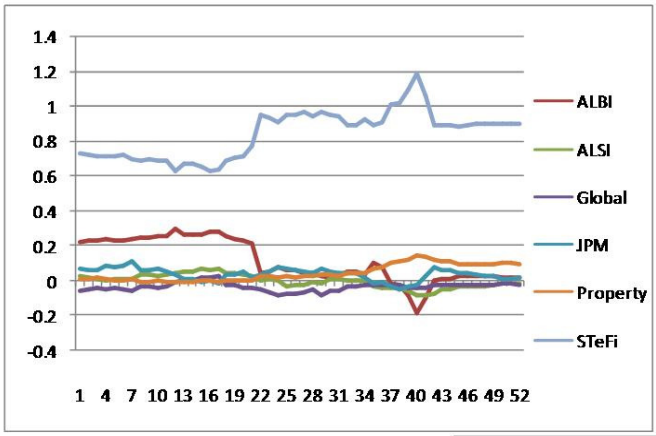
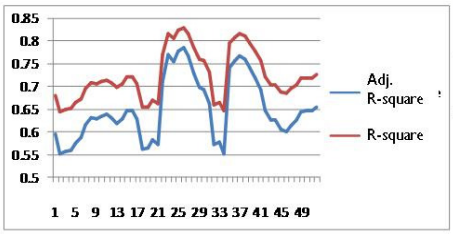


Table 1: Maximum and minimum asset allocation ranges during 52 sub-periods

	Max	Min
ALBI	0.29693	-0.18230
ALSI	0.07219	-0.08249
Global	0.02895	-0.08015
JPM	0.10795	-0.05057
Property	0.14636	-0.00652
SteFi	1.18546	0.63123

Graph 2: Explanatory power of regression analysis as per R-square and adjusted R-square



	Annualised Return		Annualised Standard Deviation		Coefficient of Variation	
Max	12.35%	Period 7	3.46%	Period 32	5.28	Period 23
Min	5.78%	Period 32	1.45%	Period 27	2.23	Period 42

GENERAL FACTS:
SUB-PERIODS IN ANALYSIS: 52
PERIODS: 1-52
DATE RANGE: 1 OCT 2003—31 DEC 2009

SIM Inflation Plus Fund (SMXF)

Graph 1: Suggested asset allocation as per sub-period

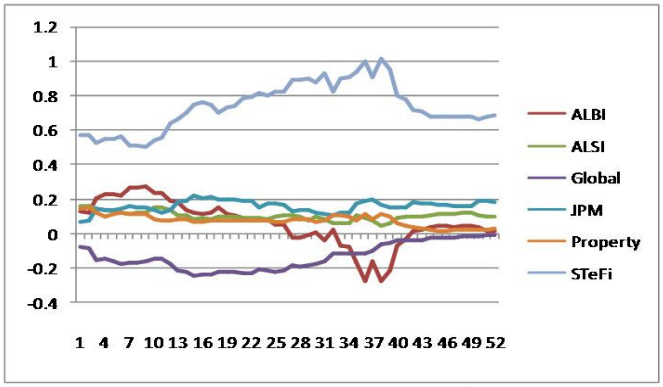
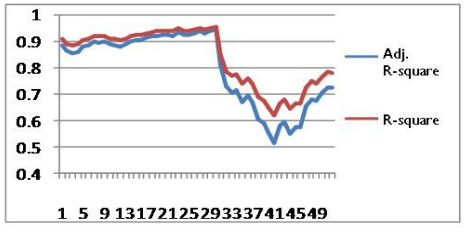


Table 1: Maximum and minimum asset allocation ranges during 52 sub-periods

	Max	Min
ALBI	0.27082	-0.27531
ALSI	0.16095	0.04664
Global	-0.00587	-0.24486
JPM	0.21731	0.06706
Property	0.15171	0.01734
SteFi	1.0177	0.5034

Graph 2: Explanatory power of regression analysis as per R-square and adjusted R-square



	Annualized Return		Annualized Standard Deviation		Coefficient of Variation	
Max	20.40%	Period 7	5.84%	Period 48	4.72	Period 7
Min	0.69%	Period 44	3.89%	Period 23	0.13	Period 44

GENERAL FACTS:
SUB-PERIODS IN ANALYSIS: 52
PERIODS: 1-52
DATE RANGE: 1 OCT 2003—31 DEC 2009

5.6.2.2 Category 4: Steps 4 to 6 analysis

Category 4 funds exhibit the following asset allocation:

- STeFI ≥ 75%
- ALSI < 25%
- ALBI < 25%

The four funds included in the category are the Allan Gray Optimal Fund (AGOF), Investec Absolute Balanced Fund (INAB), Nedgroup Investments Optimal Income Fund (NHCF) and RMB Absolute Focus Fund (RMFA). Figures 5.3 and 5.4 include the regression specifics of the four funds.

Table 5.13: Minimum and maximum asset allocation to Global, JPM and Property for Category 4: AGOF, INAB, NHCF and RMFA funds

Asset class/Fund name	Global equity (Global)		Global fixed-income (JPM)		Domestic property (Property)	
	Maximum Allocation	Minimum Allocation	Maximum Allocation	Minimum Allocation	Maximum Allocation	Minimum Allocation
Allan Gray Optimal Fund (AGOF)	9%	-3%	7%	-8%	9%	-9%
Investec Absolute Balanced Fund (INAB)	9%	-6%	6%	-16%	6%	-1%
Nedgroup Investments Optimal Income Fund (NHCF)	3%	-15%	16%	-8%	17%	-1%
RMB Absolute Focus Fund (RMFA)	5%	-11%	10%	-5%	4%	-2%

Figure 5.3: Category 4 regression results (AGOF and INAB)

Allan Gray Optimal Fund (AGOF)

Graph 1: Suggested asset allocation as per sub-period

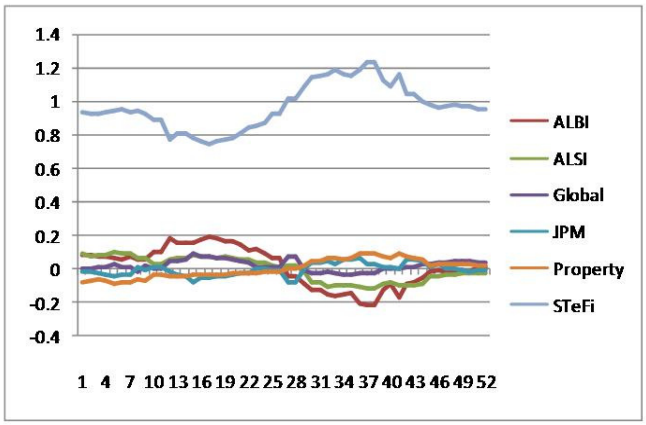
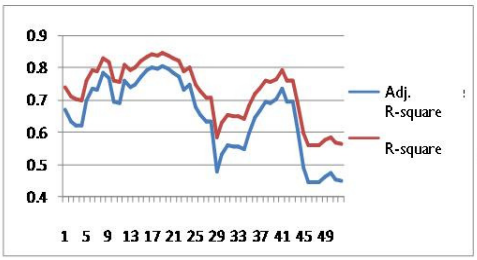


Table 1: Maximum and minimum asset allocation ranges during 52 sub-periods

	Max	Min
ALBI	0.19075	-0.21955
ALSI	0.09928	-0.11742
Global	0.08838	-0.03301
JPM	0.06595	-0.07655
Property	0.08946	-0.08729
SteFi	1.23674	0.74481

Graph 2: Explanatory power of regression analysis as per R-square and adjusted R-square



	Annualised Return		Annualised Standard Deviation		Coefficient of Variation	
Max	11.83%	Period 41	3.38%	Period 47	6.73	Period 20
Min	6.62%	Period 4	1.36%	Period 24	2.98	Period 52

GENERAL FACTS:
SUB-PERIODS IN ANALYSIS: 52
PERIODS: 1-52
DATE RANGE: 1 OCT 2003—31 DEC 2009

Investec Absolute Balanced Fund (INAB)

Graph 1: Suggested asset allocation as per sub-period

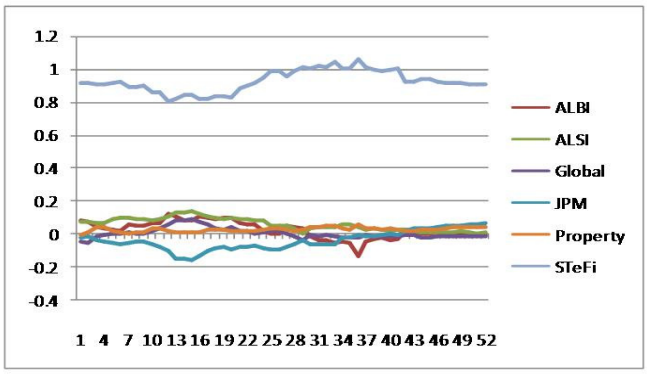
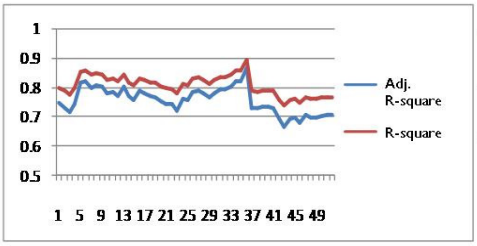


Table 1: Maximum and minimum asset allocation ranges during 52 sub-periods

	Max	Min
ALBI	0.11843	-0.13452
ALSI	0.13486	0.00426
Global	0.09127	-0.05672
JPM	0.0623	-0.15829
Property	0.06154	-0.00515
SteFi	1.05769	0.80745

Graph 2: Explanatory power of regression analysis as per R-square and adjusted R-square



	Annualised Return		Annualised Standard Deviation		Coefficient of Variation	
Max	10.32%	Period 37	2.49%	Period 13	5.74	Period 1
Min	6.74%	Period 29	1.75%	Period 41	2.99	Period 44

GENERAL FACTS:
SUB-PERIODS IN ANALYSIS: 52
PERIODS: 1-52
DATE RANGE: 1 OCT 2003—31 DEC 2009

Figure 5.4: Category 4 regression results (NHCF and RMFA)

Nedgroup Investments Optimal Income Fund (NHCF)

Graph 1: Suggested asset allocation as per sub-period

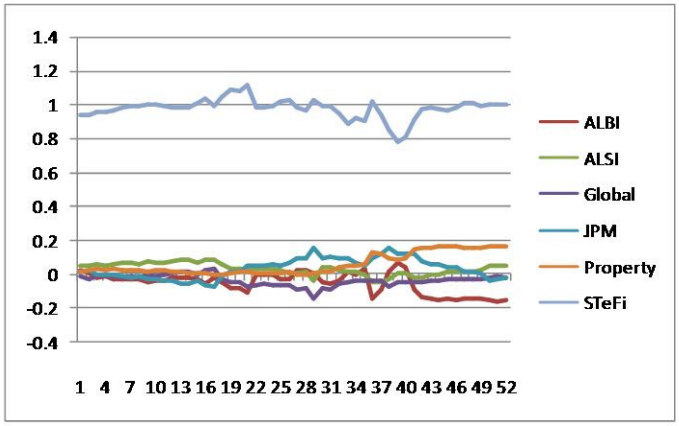
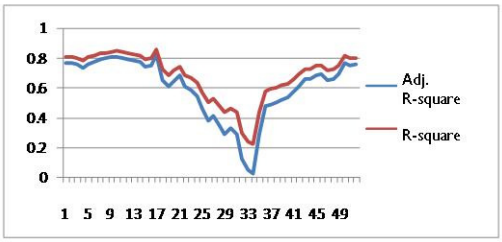


Table 1: Maximum and minimum asset allocation ranges during 52 sub-periods

	Max	Min
ALBI	0.06448	-0.16095
ALSI	0.0869	-0.05154
Global	0.03347	-0.14571
JPM	0.15586	-0.07971
Property	0.16507	-0.00818
SteFi	1.11575	0.77685

Graph 2: Explanatory power of regression analysis as per R-square and adjusted R-square



	Annualised Return		Annualised Standard Deviation		Coefficient of Variation	
Max	8.55%	Period 52	4.05%	Period 41	5.04	Period 1
Min	3.98%	Period 29	1.39%	Period 17	1.18	Period 38

GENERAL FACTS:
SUB-PERIODS IN ANALYSIS: 52
PERIODS: 1-52
DATE RANGE: 1 OCT 2003—31 DEC 2009

RMB Absolute Focus Fund (RMFA)

Graph 1: Suggested asset allocation as per sub-period

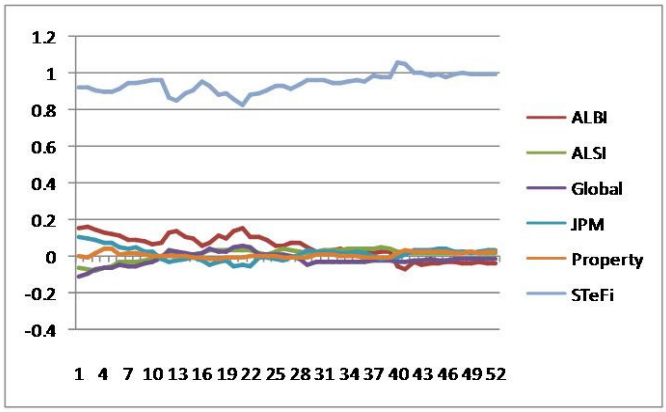
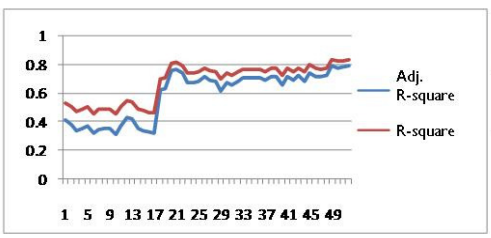


Table 1: Maximum and minimum asset allocation ranges during 52 sub-periods

	Max	Min
ALBI	0.16312	-0.07105
ALSI	0.04518	-0.07862
Global	0.0538	-0.11181
JPM	0.10278	-0.05475
Property	0.0395	-0.01746
SteFi	1.05532	0.82189

Graph 2: Explanatory power of regression analysis as per R-square and adjusted R-square



	Annualised Return		Annualised Standard Deviation		Coefficient of Variation	
Max	7.84%	Period 34	2.45%	Period 1	6.23	Period 25
Min	5.57%	Period 17	1.18%	Period 28	2.65	Period 3

GENERAL FACTS:
SUB-PERIODS IN ANALYSIS: 52
PERIODS: 1-52
DATE RANGE: 1 OCT 2003—31 DEC 2009

- **Step 4**

Table 5.13 includes the asset allocation of the four funds to the global equity (Global), global fixed-income (JPM) and domestic property (Property) indices. The following is evident: both AGOF and INAB exhibit a higher allocation to global equity (Global) compared with the other funds yet both reveal lower allocation to global fixed-income (JPM). The total potential global exposure (equity and fixed-income) though for the four funds are: AGOF at 16%, INAB at 15%, NCHF at 19% and RMFA at 15%. This suggests that the NCHF fund may be slightly more biased towards global exposure than the other three funds in the category.

- **Step 5**

For the AGOF fund, the following is evident regarding the explanatory power of the regression: As the asset allocation is substantial to the domestic short-term interest and fixed-income asset classes (i.e. STeFI and ALBI), this may explain the low explanatory power of the regression at times, at approximately 45% (adjusted R-square). This may suggest that the regression analysis includes asset classes (i.e. domestic equity and global), which may be inappropriate given the investment strategy of the Allan Gray Optimal Fund.

The explanatory power of the regression analysis of the INAB fund is, when at its poorest, in the high 60%, and, in general, better than the AGOF fund.

The explanatory power of the regression analysis for the NHCF fund is at its best in the mid-80s. A cause of concern though is the power of the regression dropping to almost zero in certain periods, causing doubt as to the appropriateness of the regression model applied to fund NHCF.

The RMFA fund at times exhibits a very low R-square (below 40%). This is though not consistent over time as the explanatory power, for some periods, is as high as 80%.

- **Step 6**

Table 5.14 compares the annualised return and annualised standard deviation of the Category 4 funds. Although the AGOF fund was the best performer with a maximum return of 11,83%, the NHCF fund exhibited the highest annualised standard deviation. The fund that offered the lowest annualised return was the RMFA fund with 7,84% (4% lower than AGOF). The minimum annualised return though was only approximately 1% lower than the AGOF fund. The only comparisons that are clearly dissimilar among the funds are firstly, the low minimum annualised return of the NHCF fund at 3,98% compared with the other three funds for which the returns are all above 5,5%. Secondly, the NHCF fund also had the highest annualised standard deviation at 4,05%.

Table 5.14: Category 4 funds: Annualised return and standard deviation

Asset class/Fund name	Annualised return		Annualised standard deviation	
	Maximum	Minimum	Maximum	Minimum
Allan Gray Optimal Fund (AGOF)	11.83%	6.62%	3.38%	1.36%
Investec Absolute Balanced Fund (INAB)	10.32%	6.74%	2.49%	1.75%
Nedgroup Investments Optimal Income Fund (NHCF)	8.55%	3.98%	4.05%	1.39%
RMB Absolute Focus Fund (RMFA)	7.84%	5.57%	2.45%	1.18%

With the above analysis considered, it would be incorrect to view the four funds as homogeneous as the risk and return characteristic and global exposure of the NHCF fund seems divergent from the rest. Despite acknowledging the concerns regarding consistency in the explanatory power of the regression model and its application to individual funds, due primarily to the level of the global asset allocation of the NHCF fund, it would seem that this fund represents a different sub-category.

5.6.2.3 Category 5: Steps 4 to 6 analysis

Category 5 funds exhibit the following asset allocation:

- STeFI < 75%
- ALSI ≥ 25%
- ALBI≥ 25%

The three funds included in the category are the Coronation Capital Plus Fund (CCPF), Old Mutual Dynamic Floor Fund (DYFF) and Prudential Inflation Plus Fund (PRIP). Figures 5.5 and 5.6 include the regression specifics of the three funds.

- **Step 4**

From Table 5.15, it is clear that the CCPF fund has a significantly greater acceptable maximum level for investment in global markets (Global at 10% and JPM at 30%). This is in contrast to DYFF (Global at -1% and JPM at 14%) and PRIP (Global at 4% and JPM at 7%). The DYFF fund exhibits very low minimum allocations for these asset classes (-21% for Global and -14% for JPM) compared with specifically the PRIP fund.

Regarding the exposure to the domestic property asset class (Property), the CCPF fund clearly distinguishes itself from the other two funds within the sub-category (maximum allocation of 27% and minimum of 11%).

- **Step 5**

The explanatory power of the regression analysis for the CCPF fund is at its lowest in the high 60s and its highest, approximately 95%. For the DYFF fund, the explanatory power of the regression analysis is never below 80%. The PRIP fund though, never exhibits an adjusted R-square value of below 95%, the best fit of all funds.

Table 5.15: Minimum and maximum asset allocation to Global, JPM and Property for Category 5: CCPF, DYFF and PRIP funds

Asset class/Fund name	Global equity (Global)		Global fixed-income (JPM)		Domestic property (Property)	
	Maximum Allocation	Minimum Allocation	Maximum Allocation	Minimum Allocation	Maximum Allocation	Minimum Allocation
Coronation Capital Plus Fund (CCPF)	10%	-15%	30%	-3%	27%	11%
Old Mutual Dynamic Floor Fund (DYFF)	-1%	-21%	14%	-14%	16%	4%
Prudential Inflation Plus Fund (PRIP)	4%	-6%	7%	-1%	18%	6%

Figure 5.5: Category 5 regression results (PRIP)

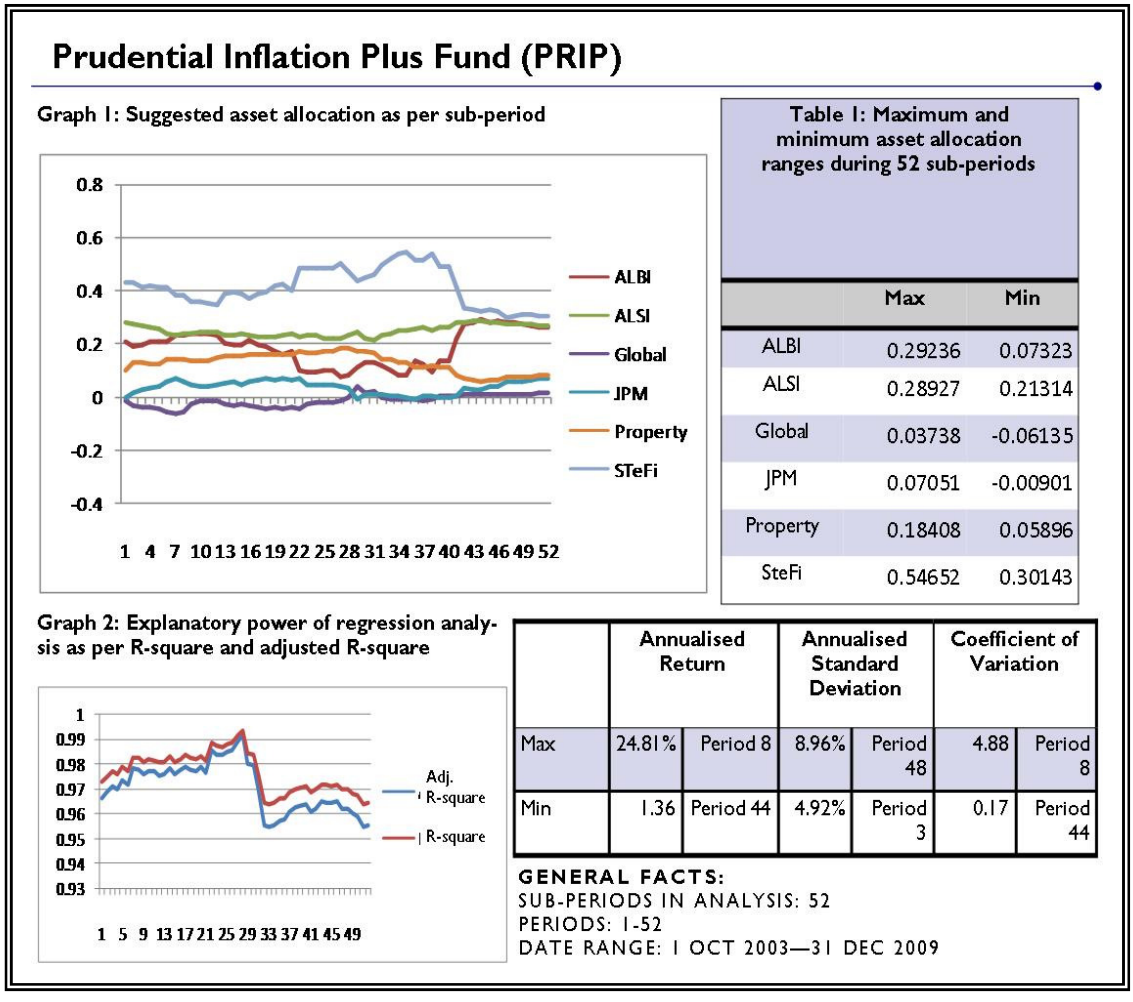


Figure 5.6: Category 5 regression results (CCPF and DYFF)

Coronation Capital Plus Fund (CCPF)

Graph 1: Suggested asset allocation as per sub-period

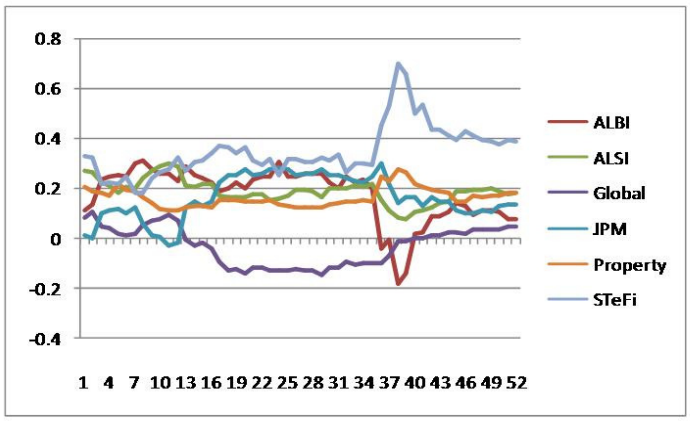
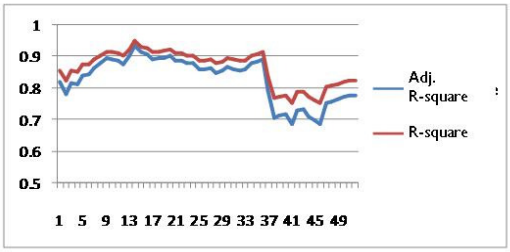


Table 1: Maximum and minimum asset allocation ranges during 52 sub-periods

	Max	Min
ALBI	0.31278	-0.18343
ALSI	0.29758	0.07588
Global	0.10199	-0.14855
JPM	0.29973	-0.02976
Property	0.27474	0.10984
SteFi	0.7007	0.17887

Graph 2: Explanatory power of regression analysis as per R-square and adjusted R-square



	Annualised Return		Annualised Standard Deviation		Coefficient of Variation	
Max	27.10%	Period 20	9.22%	Period 44	5.21	Period 20
Min	-0.26%	Period 44	5.01%	Period 21	-0.03	Period 44

GENERAL FACTS:
SUB-PERIODS IN ANALYSIS: 52
PERIODS: 1-52
DATE RANGE: 1 OCT 2003—31 DEC 2009

Old Mutual Dynamic Floor Fund (DYFF)

Graph 1: Suggested asset allocation as per sub-period

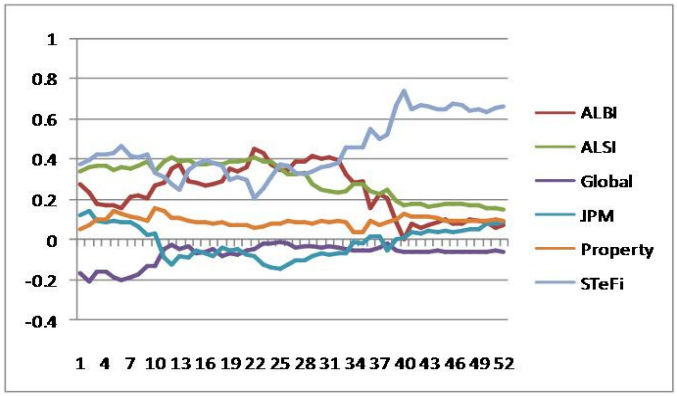
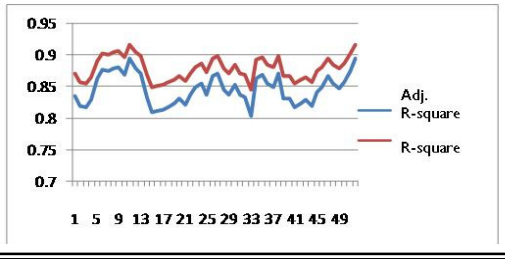


Table 1: Maximum and minimum asset allocation ranges during 52 sub-periods

	Max	Min
ALBI	0.45181	0.00243
ALSI	0.41296	0.14774
Global	-0.01312	-0.20963
JPM	0.14388	-0.14466
Property	0.15816	0.03775
SteFi	0.74225	0.20757

Graph 2: Explanatory power of regression analysis as per R-square and adjusted R-square



	Annualised Return		Annualised Standard Deviation		Coefficient of Variation	
Max	25.79%	Period 8	9.58%	Period 10	3.25	Period 1
Min	0.77%	Period 44	5.80%	Period 34	0.12	Period 44

GENERAL FACTS:
SUB-PERIODS IN ANALYSIS: 52
PERIODS: 1-52
DATE RANGE: 1 OCT 2003—31 DEC 2009

- **Step 6**

The funds in the category are similar regarding risk and return characteristics.

Table 5.16: Category 5 funds: Annualised return and standard deviation

Asset class/Fund name	Annualised return		Annualised standard deviation	
	Maximum	Minimum	Maximum	Minimum
Coronation Capital Plus Fund (CCPF)	27.10%	0.26%	9.22%	5.01%
Old Mutual Dynamic Floor Fund (DYFF)	25.79%	0.77%	9.58%	5.80%
Prudential Inflation Plus Fund (PRIP)	24.81%	1.36%	8.96%	4.92%

With the above analysis considered (Table 5.16), it would be incorrect to view the three funds as homogeneous as the global and domestic property exposures of the CCPF fund are different from those of the other two funds. This is the category with the best explanatory power.

5.6.3 Summary of Group 1 regression analysis

Steps 1 to 3 (Section 5.6.1) revealed sub-categories of funds as presented in Table 5.17. Sub-categories 3 to 5 were the only categories to which Group 1 funds were allocated and thus Steps 4 to 6 were only applied thereto.

Table 5.17: Homogeneous sub-categories based on asset allocation to STeFI, ALSI and ALBI factor exposures (Steps 1, 2 and 3)

	Criteria: Steps 1 to 3							
Step 1: STeFI	Maximum allocation at or above 75%				Maximum allocation below 75%			
Step 2: ALSI	Maximum allocation at or above 25%		Maximum allocation below 25%		Maximum allocation at or above 25%		Maximum allocation below 25%	
Step 3: ALBI	Maximum allocation at or above 25%	Maximum allocation below 25%	Maximum allocation at or above 25%	Maximum allocation below 25%	Maximum allocation at or above 25%	Maximum allocation below 25%	Maximum allocation at or above 25%	Maximum allocation below 25%
Resulting sub-categories								
Categories	**Category 1 STeFI ≥75% ALSI ≥25% ALBI ≥25%**	**Category 2 STeFI ≥75% ALSI ≥25% ALBI <25%**	**Category 3 STeFI ≥75% ALSI <25% ALBI ≥25%**	**Category 4 STeFI ≥75% ALSI <25% ALBI <25%**	**Category 5 STeFI <75% ALSI ≥25% ALBI≥25%**	**Category 6 STeFI <75% ALSI ≥25% ALBI<25%**	**Category 7 STeFI <75% ALSI <25% ALBI≥25%**	**Category 8 STeFI <75% ALSI <25% ALBI<25%**
Funds			SMXF ABIB	AGOF INAB NHCF RMFA	CCPF DYFF PRIP			

Table 5.18 includes further sub-categorisation primarily based on global and property asset allocation.

Table 5.18: Homogeneous sub-categories based on further analysis: Steps 4 to 6

	Criteria: Steps 4 to 6 Qualitative assessment Step 4: Global, JPM and Property exposure (no definite guidelines, comparative analysis) Step 5: Explanatory power Step 6: Annualised return and standard deviation					
Categories in terms of Step 1 to 3 with allocated funds:	**Category 3 STeFI ≥75% ALSI <25% ALBI ≥25%**		**Category 4 STeFI ≥75% ALSI <25% ALBI <25%**		**Category 5 STeFI <75% ALSI ≥25% ALBI≥25%**	
Funds	SMXF ABIB		AGOF INAB NHCF RMFA		CCPF DYFF PRIP	
Category split in terms of Steps 4 to 6:	Category 3A	Category 3B Greater global exposure, higher risk and return characteristic relative to other funds	Category 4A	Category 4B Greater global exposure	Category 5A	Category 5B Greater global and domestic property exposure
Funds	ABIB	SMXF	AGOF INAB RMFA	NHCF	DYFF PRIP	CCPF

The evaluation of each of the Group 1 funds in Phase 2 naturally leads to the initial framework (criteria presented in Table 5.18) for further evaluation of the remaining 45 funds. The value of Steps 1 to 4 is certain for sub-categorisation. Step 5 is important for future research as it varies significantly for funds individually and for the group as a

whole. This is not statistically or otherwise dealt with further at this stage. The framework is shortly summarised in Section 5.7 after which it is applied in Section 5.8 to all Group 2 funds. Step 6 should be considered with caution as manager alpha (i.e. excess return) is included in the annualised total return.

5.7 PHASE 3: SUB-CATEGORISATION FRAMEWORK TO BE APPLIED TO GROUP 2 FUNDS

The criteria for the sub-categories are a result of an analysis of the Group 1 funds (i.e. funds with 75 data points). The analysis yielded a potential eight sub-categories based on exposure to STeFI, ALSI and ALBI (Steps 1 to 3; importantly, in that order) after which further analysis (Steps 4 to 6) was required. Of the latter three steps, the most worthwhile step was Step 4 which establishes and compares the extent of global (Global and JPM) and domestic property (Property) asset allocations.

Table 5.19: Framework for Group 2 analysis

	First level							
Categories	**Category 1**	**Category 2**	**Category 3**	**Category 4**	**Category 5**	**Category 6**	**Category 7**	**Category 8**
Step 1 to 3 criteria:	STeFI ≥75% ALSI ≥25% ALBI ≥25%	STeFI ≥75% ALSI ≥25% ALBI <25%	STeFI ≥75% ALSI <25% ALBI ≥25%	STeFI ≥75% ALSI <25% ALBI <25%	STeFI <75% ALSI ≥25% ALBI≥25%	STeFI <75% ALSI ≥25% ALBI<25%	STeFI <75% ALSI <25% ALBI≥25%	STeFI <75% ALSI <25% ALBI<25%
	Second level							
	For each Group 2 fund that exhibits an asset allocation below threshold for any asset class: Compare with maximum-minimum asset allocation to Group 1 funds for the appropriate sample window							

Although Steps 1 to 3 resulted in eight categories, funds were only allocated to three categories. This may persist in the Group 2 analysis, but will only be definitive after the fact. As previously mentioned, some of the categories may thus be deemed redundant.

As the thresholds (first-level analysis) were determined based on the maximum-minimum asset allocations for the Group 1 funds (which cover the full 75-month sample

period) and the funds in Group 2 do not cover all 75 months, the funds in Group 2 are also evaluated on a second level. The second and subsequent evaluations compare the maximum-minimum asset allocation of each Group 2 sample fund with the maximum-minimum asset allocation of the Group 1 funds within the category for that particular sample window (Table 5.19).

The second-level evaluation is only required should a fund exhibit an allocation below any threshold as this may simply be a function of fewer data points rather than being indicative of investment style. As an example: Stanlib Managed Flexible Fund - A (STMF) was included in the analysis for the window from Periods 4 to 52. The minimum-maximum asset allocation of the fund will thus be compared with the first-level criteria and subsequently also with the minimum-maximum asset allocations of the Group 1 funds within the category for sub-periods 4 to 52. Any such funds will be identified and dealt with appropriately in Section 5.8. For example, fund STMF only has data for 72 data points. Not only is the fund's asset allocation compared with the threshold of 75% for STeFI, but also with the maximum-minimum asset allocation of the Group 1 funds during the window of periods 4 to 52. The motivation for the added level of comparison, is thus two-fold: Due to a shorter time period than the overall analysis period, and secondly, based on the fact that many of the Group 2 funds include more 'bear market' data points within the overall sample period, which is characterised by a flight to safety and subsequently less risky tactical asset allocations. The tactical asset allocation that is thus evident and exhibited in the regression results may not be indicative of strategic asset allocation.

Strategic asset allocation is important for sub-categorisation (not tactical), as it is deemed to be indicative of style. If the threshold of 75% is imposed without considering the window for which a fund was included, it would distort the results. As an example, the Group 1 fund, namely SIM Inflation Plus Fund (SMXF), exhibited an allocation above 75% to STeFI (for the Periods 1 to 52 window). However, this is violated for the following windows: Periods 49-52, 50-52, 51-52 and 1-6. Clearly, these are windows with fewer data points. But were SMXF's classification based on data for those

particular windows, it would fall within a different category than where it was indeed classified.

5.8 PHASE 4: APPLYING THE SUB-CATEGORISATION FRAMEWORK TO GROUP 2 FUNDS

The framework discussed in Section 5.7 is subsequently applied to all Group 2 funds (Appendix C includes a list of funds with fund names and fund codes). Again it is emphasised that these funds do not cover the full measurement period and the results are indeed exploratory in nature.[1]

The following is presented further in this section: Section 5.8.1 applies Steps 1 to 3 criteria to the group (remaining 45 funds within the sample) while Section 5.8.2 applies a judgemental analysis of global and domestic property asset allocation (step 4). Section 5.8.3 evaluates potential errors in the analysis (including an assessment of the explanatory power of the regression analysis as applied to each and every fund) while the section concludes with a summary of the Group 2 findings (Section 5.8.4).

5.8.1 Steps 1 to 3: Results of analysis framework for Group 2

The Group 1 funds were classified based on the thresholds per asset class as stipulated below:

- firstly, STeFI at or above 75% versus below 75%;
- secondly, ALSI at or above 25% versus below 25% and
- lastly, ALBI at or above 25% versus below 25%.

It is important to note that the order in which the criteria are applied, is not important as for Steps 1 to 3, because the resulting eight sub-categories are all mutually exclusive. Table 5.20 includes a list of all the Group 2 funds including the data window and number of rolling periods for which they are included in the analysis.

[1] For future research, a comparative study with more data points may affirm or contradict results in this research for each fund.

Table 5.20: Group 2 funds

Data points	Periods	Group 2 fund code
72	4-52	STMF
69	7-52	KTFP SCPF SDFF
67	9-52	MDAB1 METP
63	13-52	ISRR
57	19-52	SMRA
55	21-52	CPEP PAWP
53	23-52	UBRU
52	24-52	MNTR
51	25-52	MISG
48	28-52	M4iA
47	29-52	CCIP
46	30-52	CCEL MSAP
45	31-52	MDWO PEIA1 PEPA1 PIPA1
43	33-52	FRIA NPRA
	21-40	MSMP
42	34-52	MDCF
40	7-23	MBVA
39	37-52	MJBR
38	38-52	SBSA SLSA SPSA STIBFA
37	39-52	ABAF
36	28-40	SBAA
35	41-52	CODA MDWR MLAR
35	17-28	MAMI
33	31-40	MIDA MNBF MNSI MNWC
29	1-6	MILB
27	49-52	MBAB
26	50-52	SARBA
25	51-52	DARF

Table 5.21 presents the results of the Steps 1 to 3 analysis. The sub-categorisation is based on applying the threshold criteria to each and every fund. This only includes the first-level analysis (i.e. comparing funds with the thresholds for each asset class determined by an analysis of the overall window).

Table 5.21: Categorisation results of Group 2 funds

Step 1: STeFI	Max. allocation ≥ 75%								Max. allocation < 75%			
	MNTR	STMF	NPRA	MICA					MISG		SLSA	
	UBRU	SDFF	MDCF	MNSI					KTFP		STIFBA	
	PAWP	M4iA	MJBR	MNWC					MDWO		MBVA	
	CPEP	CCIP	SPSA	MDWR					PEIA1		SBAA	
	SMRA	CCEL	MSMP	MLAR					PEPA1		CODA	
	ISRR	MSAP	MILB	SARBA					PIPA1		MBAB	
	METP	FRIA	MAMI	DARF					SBSA		SCPF	
	MDAB1	MNBF	ABAF									
Step 2: ALSI	Max. allocation ≥ 25%					Max. allocation < 25%			Max. allocation ≥ 25%		Max. allocation < 25%	
	MNTR	MJBR	STMF			MILB	FRIA	MNSI	SCPF	SBSA	MISG	
	UBRU	NPRA	CCIP			MAMI	MDCF	MDWR	KTFP	SLSA	PIPA1	
	MDAB1	MSMP	CCEL			PAWP	SPSA	MLAR	MDWO	STIFBA	CODA	
	M4IA	MNWC	CPEP			SDFF	MNBF	SARBA	PEIA1	MBVA	MBAB	
	ISRR	METP	MSAP			ABAF	MICA	DARF	PEPA1	SBAA		
			SMRA									
Step 3: ALBI	Max. allocation ≥ 25%		Max. allocation < 25%			Max. allocation ≥ 25%		Max. allocation < 25%		Max. allocation ≥25%		Max. allocation < 25%
	CPEP		ISRR			PAWP		FRIA	MICA	SCPF	MDWO	MISG	CODA
	MNTR		M4IA			SDFF		NPRA	MNSI	KTFP	PEIA1	PIPA1	MBAB
	UBRU		METP					MDCF	MDWR	STIFBA	PEPA1		
	MDAB1		MJBR					SPSA	MLAR	MBVA	SBSA		
	STMF		MSMP					MILB	ABAF	SBAA	SLSA		
	CCIP		MSAP					MAMI	SARBA				
	CCEL		MNWC					MNBF	DARF				
			SMRA										

After evaluation of Step 4, namely the global exposure of the funds, a more in-depth analysis of asset allocation will be conducted (i.e. comparing asset allocations of funds with the asset allocations of Group 1 funds for the period that each Group 2 fund was included in the sample data).

Table 5.22: Homogeneous sub-categories based on asset allocation to STeFI, ALSI and ALBI factor exposures (Steps 1, 2 and 3)

	Criteria: Steps 1 to 3							
	Resulting sub-categories							
Categories	**Category 1** **STeFI ≥75%** **ALSI ≥25%** **ALBI ≥25%**	**Category 2** **STeFI ≥75%** **ALSI ≥25%** **ALBI <25%**	**Category 3** **STeFI ≥75%** **ALSI <25%** **ALBI ≥25%**	**Category 4** **STeFI ≥75%** **ALSI <25%** **ALBI <25%**	**Category 5** **STeFI <75%** **ALSI ≥25%** **ALBI≥25%**	**Category 6** **STeFI <75%** **ALSI ≥25%** **ALBI<25%**	**Category 7** **STeFI <75%** **ALSI <25%** **ALBI≥25%**	**Category 8** **STeFI <75%** **ALSI <25%** **ALBI<25%**
Group 1 Funds			SMXF ABIB	AGOF INAB NHCF RMFA	CCPF DYFF PRIP			
Group 2 Funds	CPEP MNTR UBRU MDAB1 STMF CCIP CCEL	ISRR M4IA METP MJBR MSMP MSAP MNWC SMRA	PAWP SDFF	FRIA NPRA MDCF SPSA MILB MAMI MNBF MICA MNSI MDWR MLAR ABAF SARBA DARF	SCPF KTFP STIFBA MBVA SBAA	MDWO PEIA1 PEPA1 SBSA SLSA	MISG PIPA1	CODA MBAB

Table 5.22 presents the sub-categorisation for both Group 1 and Group 2 and will be referred to going forward with the analysis. The next step entails an analysis of the global asset allocation as well as the domestic property asset allocation for each Group 2 fund.

5.8.2 Step 4: Results of analysis framework for Group 2: Global and domestic property asset allocation

Table 5.22 presents the sub-categorisation for both Group 1 and Group 2 and will be referred to going forward with the analysis. However, this step is significantly limited. In the analysis of the Group 1 funds, global and domestic property exposure was compared with peers within the same sub-category. This is significantly constrained for the Group 2 funds as the time periods for which each fund was included in the sample period are different. Secondly, from the regression analysis, it is clear that the explanatory power of the regression analysis for some funds is at times very low.

Given the data restrictions and running the risk of uncontrolled data mining, further sub-categorisation are not deemed valuable and sound enough to attempt. Further, the purpose of the sub-categorisation is to better peer comparison. Should a sub-categorisation be too narrowly defined, it would not be valuable as too broad a definition (as was clear from the category definition) is also not valuable.

As such, Step 4 of the analysis is deemed inappropriate and too risky (i.e. uncontrolled data mining) for the Group 2 funds. The sub-categorisation which seems most feasible and reasonable is to focus on asset allocations only to STeFI, ALSI and ALBI (Steps 1 to 3).

This concludes the first-level analysis that was proposed in the framework. Subsequently, the second-level analysis will be conducted.

5.8.3 Second-level analysis of Group 2 funds

As described previously, the thresholds (first-level analysis) for each asset class were determined based on the maximum-minimum asset allocations for the Group 1 funds (which cover the full 75-month sample period) while the funds in Group 2 do not. For this reason, the funds in Group 2 are also evaluated on a second level. The second and subsequent evaluation compares the maximum-minimum asset allocation of each Group 2 sample fund which exhibits an asset allocation below a particular threshold with the maximum-minimum asset allocation of the Group 1 funds that (for the overall sample

period), exhibited an allocation above the threshold. Bear in mind that the Group 2 funds will inevitably have an analysis window shorter than the total 75 months. The minimum and maximum asset allocations for the Group 1 funds should thus be the window similar to that of the Group 2 fund. Any Group 2 fund that exhibits an asset allocation below a particular threshold is in essence potentially misclassified simply because of the data window (i.e. excludes a rolling period in which a Group 1 fund exhibited an asset allocation above the threshold).

Table 5.23: Group 2 funds exhibiting asset allocations below the thresholds

Step 1: STeFI						Max. allocation < 75%		
						MISG††	SLSA†††	
						PIPA1††	STIFBA†††	
						PEIA1†††	MBVA†††	
						PEPA1†††	SBAA†††	
						SBSA†††	SCPF†††	
						CODA†	KTFP†††	
						MBAB†	MDWO‡	
Step 2: ALSI			Max. allocation < 25%				Max. allocation < 25%	
			MILB**	FRIA**	MNSI**		MISG††	
			MAMI**	MDCF**	MDWR**		PIPA1††	
			PAWP***	SPSA**	MLAR**		CODA†	
			SDFF***	MNBF**	SARBA**		MBAB†	
			ABAF**	MICA**	DARF**			
Step 3: ALBI		Max. allocation < 25%*		Max. allocation < 25%			Max. allocation < 25%*	Max. allocation < 25%
		ISRR*		FRIA**	MICA**		MDWO‡	CODA†
		M4IA*		NPRA*	MNSI**		PEIA1*	MBAB†
		METP*		MDCF**	MDWR**		PEPA1*	
		MJBR*		SPSA**	MLAR**		SBSA*	
		MSMP*		MILB**	ABAF**		SLSA*	
		MSAP*		MAMI**	SARBA**			
		MNWC*		MNBF**	DARF**			
		SMRA*						

Notes:
†Evaluate STeFI, ALSI and ALBI allocation (Group 2A).
††Evaluate STeFI and ALSI allocation (Group 2B).
††† Evaluate STeFI allocation (Group 2C).
*Evaluate only ALBI allocation (Group 2D).
**Evaluate ALSI and ALBI allocation (Group 2E).
***Evaluate only ALSI allocation (Group 2F).
‡ Evaluate SteFI and ALBI allocation (Group 2G).

Table 5.23 presents the sub-categorisation of the Group 2 funds that require further analysis (i.e. any funds that exhibit an allocation below a set threshold). As an example, fund MBAB exhibits an asset allocation below 75% for STeFI, below 25% for ALSI and below 25% for ALBI. This may simply be because of the data window of the fund. Thus, the asset allocation of MBAB to STeFI, ALSI and ALBI will be compared with Group 1 funds that exhibited asset allocations above the thresholds but with one difference: the window for comparison of the Group 1 funds will resemble the window of the Group 2 fund. Thus, should the Group 1 funds for the window in question, also violate the threshold criteria (i.e. exhibit an asset allocation of below the threshold), the asset allocation exhibited by the Group 2 fund may simply be due to tactical asset allocation and not strategic asset allocation and subsequently, incorrectly classified.

The section that following evaluates the results of each group (i.e. Group 2A), as presented in Table 5.23.

5.8.3.1 Group 2A analysis

Group 2A includes funds that exhibit an asset allocation below 75%, below 25% and again below 25% to STeFI, ALSI and ALBI respectively. The funds are thus compared with Group 1 funds that originally exhibited an asset allocation to the three asset classes above the threshold. However, the Group 2A funds are compared with the asset allocations of the Group 1 funds for their particular data window (not the whole sample period). Table 5.24 includes a list of the Group 2A funds while Tables 5.25 to 5.27 presents the Group 1 funds with their particular asset allocations for the data windows relevant to the analysis.

Table 5.24: Group 2A funds

Data points	Periods	Group 2 fund code
35	41 to 52	CODA
27	49 to 52	MBAB

The CODA fund exhibits an adjusted R-square of above 70% in all periods except Period 59 while the MBAB fund is above 80% for all periods.

Firstly, the STeFI asset allocation of the CODA and MBAB funds are compared with the asset allocation of the Group 1 funds that exhibit an allocation to STeFI at or above 75%.

Table 5.25: Maximum STeFI allocation for specified period: Fund SMXF, ABIB, AGOF, INAB, NHCF and RMFA

Fund	Periods 41 to 52	Periods 49 to 52
SMXF	78%	68%
ABIB	106%	90%
AGOF	116%	97%
INAB	100%	91%
NHCF	101%	101%
RMFA	105%	100%

The Group 1 funds maintain a potential maximum asset allocation at or above 75%, irrespective of the window, except the SMXF fund for the window covering Periods 49 to 52 (window for fund MBAB). Thus it can be concluded that the CODA fund is definitely correctly classified based on its STeFI allocation but the MBAB fund may indeed belong to a different category (see Table 5.25).

Table 5.26: Maximum ALSI allocation for specified period: Fund CCPF, DYFF and PRIP

Fund	Periods 41 to 52	Periods 49 to 52
CCPF	20%	20%
DYFF	18%	17%
PRIP	29%	27%

Secondly, the ALSI asset allocations of the funds are scrutinised. For the windows as indicated in Table 5.26, two of the three Group 1 funds that originally exhibited an equity exposure above 25%, were lower than the threshold for the applicable windows. Again, the classification based on ALSI may be challenged.

Subsequently, the ALBI asset allocation of the CODA and MBAB funds is compared with the asset allocation of the Group 1 funds that exhibit an allocation to ALBI at or above 25% in terms of the initial categorisation; 80% of the Group 1 funds exhibit an allocation to ALBI below the 25% threshold for the particular windows. This makes it plausible that the MBAB and CODA funds could be incorrectly classified simply due to the analysis window (see Table 5.27).

Table 5.27: Maximum ALBI allocation for specified period: Fund SMXF, ABIB, CCPF, DYFF and PRIP

Fund	Periods 41 to 52	Periods 49 to 52
SMXF	4%	4%
ABIB	3%	3%
CCPF	14%	11%
DYFF	10%	10%
PRIP	29%	28%

5.8.3.2 Group 2B analysis

As presented in Table 5.28, the MISG fund exhibits an adjusted R-square of above 80% in all periods except 35-43. In this window (i.e. 35-43), the R-square never drops below 65%. For the PIPA1 fund, the explanatory power is above 70% for most periods, falling only below in periods 36 to 38.

Table 5.28: Group 2B funds

Data points	Periods	Group 2 fund code
51	25 to 52	MISG
45	31 to 52	PIPA1

The ALSI asset allocation of the above two funds are compared with the asset allocation of the Group 1 funds that exhibit an allocation to ALSI of at or above 25% (see Table 5.29). The fact that the CCPF fund, in both windows, exhibits an asset allocation of below 25% does make it plausible that fund MISG and PIPA1 may be incorrectly classified simply because of the data window.

Table 5.29: Maximum ALSI allocation for specified period: Fund CCPF, DYFF and PRIP

Fund	Periods 25 to 52	Periods 31 to 52
CCPF	21%	21%
DYFF	35%	28%
PRIP	29%	29%

Table 5.30: Maximum STeFI allocation for specified period: Fund SMXF, ABIB, AGOF, INAB, NHCF and RMFA

Fund	Periods 25 to 52	Periods 31 to 52
SMXF	102%	102%
ABIB	119%	119%
AGOF	124%	124%
INAB	106%	106%
NHCF	103%	102%
RMFA	106%	106%

The STeFI asset allocation of the MISG and PIPA1 funds is compared with the asset allocation of the Group 1 funds that exhibit an allocation to STeFI at or above 75% (presented in Table 5.30). As all the Group 1 funds maintain a potential maximum asset allocation at or above 75%, irrespective of the window, the categorisation of the MISG and PIPA1 fund based on STeFI allocation, is consistent and correct. Were it not so, one or more of the Group 1 funds should have exhibited an allocation to STeFI (during Periods 25 to 52 or 31 to 52) of below 75%, which is not the case.

5.8.3.3 Group 2C analysis

Table 5.31 presents the Group 2 funds for which the STeFI asset allocation validates further scrutiny. Firstly, the explanatory power of the regression analysis as applied to each and every fund is evaluated. From the table, the following information is noteworthy: the regression results of funds SLSA, STIFBA and potentially SBAA and SBSA could be questionable. All other funds exhibit high adjusted R-square values.

Table 5.31: Group 2C funds

Data points	Periods	Group 2 fund code	Explanatory power
28	38 to 52	SLSA	Most periods above 65%. Periods 45-48 below 65% but never lower than 50%.
28	28 to 52	STIFBA	Below 65% in periods 31, 36-38, 44-47 (32% of the window). At times in the 50s.
40	7 to 23	MBVA	Always above 85%.
36	28 to 40	SBAA	Above 70% for most (below only for 23% of the periods).
69	7 to 52	SCPF	Always above 80%.
69	7 to 52	KTFP	Always above 90%.
45	31 to 52	PEIA1	Always above 80%.
45	31 to 52	PEPA1	Always above 90%.
28	38 to 52	SBSA	Always above 80% except Periods 49-52 (lowest in Period 52 at 57%).

The STeFI asset allocation of the Group 2 funds presented in Table 5.31 is compared with the asset allocation of the Group 1 funds that exhibit an allocation to STeFI at or above 75% (see Table 5.32). The Group 1 funds maintain a potential maximum asset allocation of at or above 75%, irrespective of the window. Thus it can be concluded that all the Group 2 funds presented in Table 5.31 are indeed correctly classified.

Table 5.32: Maximum STeFI allocation for specified period: Fund SMXF, ABIB, AGOF, INAB, NHCF and RMFA

Fund	Periods 7 to 52	Periods 28 to 52	Periods 31 to 52	Periods 38 to 52	Periods 7-23	Periods 28 to 40
SMXF	102%	102%	102%	102%	82%	102%
ABIB	119%	119%	119%	119%	95%	119%
AGOF	124%	124%	124%	123%	94%	124%
INAB	106%	106%	106%	100%	91%	106%
NHCF	112%	103%	102%	101%	112%	103%
RMFA	106%	106%	106%	106%	96%	106%

5.8.3.4 Group 2D analysis

Group 2D includes funds that exhibit an asset allocation of below 25% to ALBI. The funds are thus compared with Group 1 funds that originally exhibited an asset allocation to ALBI of at or above 25%. Table 5.33 includes a list of the Group 2D funds with the strength of the regression analysis, while Table 5.34 presents the Group 1 funds with their particular asset allocations for the relevant data windows. Do note the poor explanatory power of the regression analysis as applied to fund MNWC.

Table 5.33: Group 2D funds

Data points	Periods	Group 2 fund code	Explanatory power
67	9 to 52	METP	All above 70% except periods 49-52 (64-70%).
63	13 to 52	ISRR	Above 90% in periods 13-36. Above 72% in 37-52.
57	19 to 52	SMRA	All above 72%.
48	28 to 52	M4IA	Above 72%. Below 73% in 38-48 (as low as 35%).
46	30 to 52	MSAP	Above 68% in all periods.
43	38 to 52	SLSA	At or above 94% (periods 38-44). Between 52 and 69% in periods 45-52.
43	21 to 40	MSMP	All above 90%.
43	33 to 52	NPRA	Periods 33-42 (54-58%). Periods 43-52 (above 72%).
43	31 to 52	PEPA1	All above 90%.
43	31 to 52	PEIA1	All above 81%.
43	28 to 52	SBSA	All above 75%. (Periods 49-52 below 76%, lowest 57%).
39	37 to 52	MJBR	All above 88%, except 37-39 (53-69%).
33	31 to 40	MNWC	All below 40%.

Table 5.34: Maximum ALBI allocation for specified period: Fund SMXF, ABIB, CCPF, DYFF and PRIP

Fund	Periods 9 to 52	Periods 13 to 52	Periods 19 to 52	Periods 28 to 52	Periods 30 to 52	Periods 31 to 52
SMXF	27%	18%	12%	5%	5%	5%
ABIB	30%	28%	24%	11%	11%	11%
CCPF	31%	31%	31%	26%	24%	24%
DYFF	45%	45%	45%	42%	41%	41%
PRIP	29%	29%	29%	29%	29%	29%

	Periods 33 to 52	Periods 37 to 52	Periods 38 to 52	Periods 31 to 40	Periods 21 to 40
SMXF	5%	5%	5%	2%	5%
ABIB	11%	3%	3%	11%	3%
CCPF	23%	14%	14%	24%	14%
DYFF	32%	23%	21%	41%	10%
PRIP	29%	29%	29%	14%	29%

As seen in Table 5.34, the only window for which all six Group 1 funds maintain an asset allocation to ALBI of above 25% is Periods 9-52, the window applicable to Group 2 fund, METP. In all other periods, either one or even the entire Group 1 funds, violate the criteria (i.e. asset allocation at or above 25%).

5.8.3.5 Group 2E analysis

Based on the low explanatory power (which is most probably due to the few data points of the funds), no valuable inferences can be made regarding funds DARF, SARBA, MILB, MNBF and these funds are excluded from further analysis. All other funds offer acceptable levels of explanatory power given the limitations (funds and strength fo explanatory results presented in Table 5.35).

Table 5.35: Group 2E funds

Data points	Periods	Group 2 fund code	Explanatory power
43	33 to 52	FRIA	All periods above 68% except Period 46 (at 62%).
42	34 to 52	MDCF	All periods above 65% except periods 34-35 (51% and 54% respectively).
38	38 to 52	SPSA	All periods at or above 69% except periods 49-52 (ranges between 45% and 62%).
37	39 to 52	ABAF	All periods at or above 95% except Period 52 (93%).
35	41 to 52	MDWR	Above 82% for all periods except periods 49-52 (lowest at 72%).
35	41 to 52	MLAR	Above 80% except periods 49-52 (lowest at 72%).
35	17 to 28	MAMI	All above 87%.
33	31 to 40	MICA	All above 84%.
33	31 to 40	MNBF	All below 50%.
33	31 to 40	MNSI	All periods above 79%.
29	1 to 6	MILB	All periods below 52%.
26	50 to 52	SARBA	All periods below 35%.
25	51 to 52	DARF	48% in Period 51 and 58% in Period 52.

Table 5.36: Maximum ALSI allocation for specified period: Fund CCPF, DYFF and PRIP

Fund	Periods 33 to 52	Periods 34 to 52	Periods 38 to 52	Periods 39 to 52
CCPF	21%	21%	20%	20%
DYFF	28%	28%	25%	19%
PRIP	29%	29%	29%	29%
	Periods 41 to 52	**Periods 17 to 28**	**Periods 31 to 40**	
CCPF	20%	19%	21%	
DYFF	18%	41%	28%	
PRIP	29%	24%	26%	

Again the ALSI and ALBI asset allocation of the Group 1 funds (see Tables 5.36 and 5.37) creates concern regarding sub-categorisation for the Group 2 funds as the Group 1 fund, for the windows applicable, violates the 'at or above 25%' criteria.

Table 5.37: Maximum ALBI allocation for specified period: Fund SMXF, ABIB, CCPF, DYFF and PRIP

Fund	Periods 33 to 52	Periods 34 to 52	Periods 38 to 52	Periods 39 to 52
SMXF	5%	5%	5%	5%
ABIB	11%	11%	3%	3%
CCPF	23%	23%	14%	14%
DYFF	32%	29%	21%	10%
PRIP	29%	29%	29%	29%
	Periods 41 to 52	**Periods 17 to 28**	**Periods 31 to 40**	
SMXF	5%	15%	2%	
ABIB	3%	28%	11%	
CCPF	14%	31%	24%	
DYFF	10%	45%	41%	
PRIP	29%	20%	14%	

5.8.3.6 Group 2F analysis

The PAWP fund exhibits an adjusted R-square of above 70% in all periods except 37-48 (i.e. of the 32 24-month periods, the regression analysis is below 70% in 38% of the periods). For the SDFF fund, the explanatory power is high, 85% in all periods (funds presented in Table 5.38).

Table 5.38: Group 2F funds

Data points	Periods	Group 2 fund code
55	21 to 52	PAWP
69	7 to 52	SDFF

The ALSI asset allocation of the above two funds are compared with the asset allocation of the Group 1 funds that exhibit an allocation to ALSI at or above 25%. The comparison though is subsequently conducted based on the ALSI exposure thereof for the analysis window of the above two Group 2 funds (i.e. periods 21 to 52 and 7 to 52 respectively).

Table 5.39 includes the maximum asset allocation to ALSI of the Group 1 funds. It is clear that, even with the analysis windows similar to that of the above two funds, the Group 1 funds still maintain an ALSI allocation at or above 75% (the only exception being the CCPF fund for periods 21 to 52). This does make it possible that fund PAWP (with an allocation to ALSI of below 25%) may either be in the wrong category or be similar to CCPF and still correctly classified.

Table 5.39: Maximum ALSI allocation for specified period: Fund CCPF, DYFF and PRIP

Fund	Periods 21 to 52	Periods 7 to 52
CCPF	21%	30%
DYFF	41%	41%
PRIP	29%	29%

5.8.3.7 Group 2G analysis

The MDWO fund exhibits an adjusted R-square of above 90% in all periods (Table 5.40).

Table 5.40: Group 2G fund

Data points	Periods	Group 2 fund code	Explanatory power
45	31 to 52	MDWO	Always above 90%.

As seen in Table 5.41, for the window, namely Periods 31 to 52, all six Group 1 funds did not maintain an asset allocation to ALBI of above 25%. During this period, both the DYFF and PRIP fund violated the criteria (i.e. asset allocation at or above 25%). It is thus concluded that the MDWO fund's classification based on ALBI, may be questionable.

Table 5.41: Maximum ALBI allocation for specified period: Fund SMXF, ABIB, CCPF, DYFF and PRIP

Fund	Periods 31 to 52
SMXF	5%
ABIB	11%
CCPF	24%
DYFF	41%
PRIP	29%

The STeFI asset allocation of the Group 2 fund is compared with the asset allocation of the Group 1 funds that exhibit an allocation to STeFI at or above 75% (see Table 5.42). The Group 1 funds maintain a potential maximum asset allocation of at or above 75%, irrespective of the window. Thus it can be concluded that the Group 2 fund, MDWO, is indeed correctly classified based on the SteFI allocation.

Table 5.42: Maximum STeFI allocation for specified period: Fund SMXF, ABIB, AGOF, INAB, NHCF and RMFA

Fund	Periods 31 to 52
SMXF	102%
ABIB	119%
AGOF	124%
INAB	106%
NHCF	102%
RMFA	106%

This concludes the evaluation of potential misclassification of Group 2 funds. Section 5.8.4 summarises the inferences from the further analysis.

5.8.4 Summary of Group 2 inferences

As is evident for the analysis in Section 5.8.3, the data period for which Group 2 funds is included in the analysis, is significant in influencing the categorisation and truthfulness thereof.

Although the experience of both a bull and a bear market created opportunities to categorise the funds, categorisation is straightforward when applied to the Group 1 funds but not when applied to Group 2 funds. This is primarily due to many of the Group 2 funds only capturing a small window, which leads to the asset allocation being more reflective of tactical decisions than strategic asset allocation. However, the STeFI asset allocation did seem to be consistent and definitive in its part in the classification system meaning that irrelevant of analysis period or market, funds do seem to adhere at any point in time to either an asset allocation to STeFI at or above the 75% threshold or below that. However, ALSI and ALBI allocations are not consistent and influenced by the data window and prevailing market conditions during the window.

5.9 SUMMARY

The chapter commenced by describing the sample data - that is, retail funds within the TARR category, which were within the category for at least 24 months. To apply the RBSA model to the sample data, the model requires a selection of the appropriate indices to be representative of the investable asset classes for TARR funds. Four domestic and two global indices satisfied the criteria for validity with sufficiently low multicollinearity.

RBSA was conducted on the nine funds (Group 1 funds) within the sample, which were within the category for the full 75 month sample period and subsequently classified based on the asset allocations thereof. As the full sample window included both bull and bear market conditions, it was with confidence that the resulting sub-categorisation was accepted to be true.

The RBSA conducted on the remaining 45 funds (Group 2 funds or funds with less than 75 data points), proved to be challenging: firstly, the funds were categorised based on the proposed framework inferred from the Group 1 funds. As the funds did not cover the full

sample period, it was acknowledged that the resulting categorisation could be an effect of the sub-data windows simply capturing a specific tactical asset allocation period. It was also clear that an even more refined categorisation based on global and domestic asset allocation may prove to be questionable data mining.

It was concluded that the categorisation for the Group 2 funds is most definitely correct in terms of the criteria for STeFI and that this can consistently be applied to funds irrelevant of market conditions or extent of historical data. The asset allocation to ALSI and ALBI though becomes less reliable based on the framework proposed.

The next chapter, which summarises the research specifically, includes recommendations for future research that may counter some of the challenges experienced with the Group 2 funds.

CHAPTER 6: CONCLUSION

6.1 INTRODUCTION

As the Targeted Absolute and Real Return (TARR) unit trust category has a very broad definition, which imposes no bounds on any asset class, performance evaluation and peer comparison are challenging.

Thus the main purpose of this study was to identify heterogeneous style sub-categories within the TARR category of the South African unit trust market and attempt to create a framework for sub-categorisation by means of return-based style analysis (RBSA).

The RBSA results identified the range of asset allocations of each fund over 24-month rolling periods and should be indicative of the overall strategic asset allocation[1], namely style, of the fund. With sufficient historical data, the strategic asset allocation of each fund should be evident. The proposed sub-categorisation will be based on the strategic asset allocation of the funds.

The research question in this particular study was two-fold: firstly, based on the results of return-based style analysis, can the exposure (to each asset class) over time be determined? Secondly, and this question is more exploratory, based on the return-based style analysis result, can sub-categorisation of the funds based on homogeneous asset exposures, be achieved?

Consequently the following propositions were posed and subsequently either accepted as true or false.

Proposition 1

Return-based style analysis applied to each fund identifies the asset allocation for the fund.

[1] Long-term strategic asset allocation strategy. No changes based on short-term market movements.

Proposition 2

Return-based style analysis applied to each fund is valid.

Proposition 3

The collective results of return-based style analysis applied to the funds can be used to create a framework for sub-categorisation.

This chapter thus provides a summary of the findings of the study starting with a summary of the key findings in the literature regarding return-based style analysis and style analysis in general. This is followed by a review of the research methodology for the study and subsequently the empirical findings. Next, the research question and propositions are explicitly discussed. This is followed with the limitations and contributions of the study. After that, the implications and future research suggestion are provided before the chapter concludes.

6.2 SUMMARY OF FINDINGS FROM THE LITERATURE REVIEW

The literature review was conducted for an in-depth understanding of RBSA and style analysis of funds. The importance of asset allocation, which contributes as much as 93,6% to the variation in returns was highlighted (Brinson, Hood & Beebover, 1986:43). This supports the notion that RBSA with asset classes as independent variables can be used to determine the style of a fund (Sharpe, 1988; 1992). The application of RBSA goes beyond only an application to determine style but is also used to determine misclassification of funds, performance measurement and benchmark construction.

Researchers identify three forms of RBSA, namely weak, semi-strong and strong where the strength of the analysis is a factor of the limitations imposed on the coefficients of the asset classes. Although researchers acknowledge the limitations and weaknesses of RBSA there is also great emphasis on the advantages thereof. It was clear from the literature that the form of RBSA chosen for a particular research study must mirror the investment strategy of the fund or category analysed.

However, the validity of the results explicitly depends on the following factors:

- the purpose of the RBSA such as identifying overall style, style shifts, misclassification and performance measurement;
- the extent of available historical data;
- the time frame and market conditions during the sample period;
- the use of rolling periods when appropriate;
- the validity of chosen independent variables such as reflecting of investment style and level of multicollinearity;
- too many versus too few independent variables in the regression analysis.

The literature review was fundamental in creating the research methodology to explicitly solve the research question and propositions while maintaining robustness. The literature review is summarised in the next section.

6.3 LITERATURE REVIEW EXPLAINED TO APPROPRIATE RESEARCH METHODOLOGY

The research was conducted on an ex post facto basis in other words, as no control was exercised over the variables, returns of funds, and secondly, based on historical data analysis, and lastly, longitudinal in nature as it tracks changes in fund exposures over time. Further, the study was descriptive, exploratory and constituted primary research.

The research methodology described in detail the sample design including the target population, sampling method and size as well as sample period. It was followed by a motivation for the semi-strong form of RBSA to apply to the sample data. Subsequently, an argument for the proposed asset classes (independent variables) for the regression model was included; along with information pertaining to asset class and fund return data with the data collection method. The process followed in interpreting the results of the RBSA was then provided.

The process, consisting of Phases 1 to 4, entails the following:

Phase 1: Selection of indices (factor exposures) representative of asset classes

Assess appropriateness of indices, namely factor exposures chosen for regression analysis by means of statistical analysis, in other words determine the variance inflation factors (VIFs). Take corrective actions where required.

Phase 2: RBSA of Group 1 funds

Apply return-based style analysis to nine funds (Group 1), which cover the full measurement period (75 months) and subsequently follow each of the steps below:

Step 1: Evaluate STeFI (domestic short-term) asset allocation.

Step 2: Evaluate ALBI (domestic fixed-income) asset allocation.

Step 3: Evaluate ALSI (domestic equity) asset allocation.

Step 4: Evaluate the remaining three asset class allocations, namely Global, JPM and Property, in other words global equity, global fixed-income and domestic property.

Step 5: Evaluate explanatory power of regression analysis.

Step 6: Interpret annualised return and standard deviation.

This would constitute an initial screening, which was revisited as based on the results of the regression analysis.

Phase 3: Sub-categorisation framework to be applied to Group 2 funds

Phase 2 forms the backdrop for developing a framework for sub-categorisation of the remaining 45 funds (Group 2 funds) primarily based on maximum asset allocations exhibited by the funds in comparison with the framework inferred from Group 1 funds. This does not imply that the particular nine funds within Group 1 should be expected to be representative of all possible sub-categorisations, but, given the fact that only nine cover the full measurement period Group 1 funds should be most reliable to make inferences regarding style in general.

The approach would require judgement in creating the framework. The maximum asset allocations as applied in the framework are deemed to be indicative of policy/strategic asset allocation decisions.

Phase 4: Applying the sub-categorisation framework to Group 2 funds

The framework was used to classify each remaining fund (45 in total) to a sub-category by means of the framework proposed.

In the event of a fund being in a lower band, below a specific level specified, extra care was taken in interpreting the results as the results might have been due to: 1) poor explanatory power of the model, thus making the results invalid and 2) short time period of the particular fund.

Finally, the explanatory power of the model as applied to each period was assessed and any inconsistencies noted.

6.4 FINDINGS

The four-phase process was subsequently applied to the data and is summarised in this section. Do bear in mind that two distinctive groups within the sample data were identified: funds that have data points for the full measurement period (referred to as Group 1) and funds that have less than 75 data points referred to as (Group 2).

Phase 1 required determining the validity of the independent variables, in other words indices representative of the asset classes, to be used in the regression analysis. It was concluded that the indices were representative of the investable asset classes of the category and exhibited sufficiently low levels of multicollinearity.

In *phase 2,* Group 1 funds were sub-categorised based on the asset allocations exhibited. The sub-categorisation is presented in Table 6.1 and 6.2.

Table 6.1: Homogeneous sub-categories based on asset allocation to STeFI, ALSI and ALBI factor exposures (Steps 1, 2 and 3)

	Criteria: Steps 1 to 3							
Step 1: STeFI	Maximum allocation at or above 75%				Maximum allocation below 75%			
Step 2: ALSI	Maximum allocation at or above 25%		Maximum allocation below 25%		Maximum allocation at or above 25%		Maximum allocation below 25%	
Step 3: ALBI	Maximum allocation at or above 25%	Maximum allocation below 25%	Maximum allocation at or above 25%	Maximum allocation below 25%	Maximum allocation at or above 25%	Maximum allocation below 25%	Maximum allocation at or above 25%	Maximum allocation below 25%
Resulting sub-categories								
Categories	**Category 1** **STeFI ≥75%** **ALSI ≥25%** **ALBI ≥25%**	**Category 2** **STeFI ≥75%** **ALSI ≥25%** **ALBI <25%**	**Category 3** **STeFI ≥75%** **ALSI <25%** **ALBI ≥25%**	**Category 4** **STeFI ≥75%** **ALSI <25%** **ALBI <25%**	**Category 5** **STeFI <75%** **ALSI ≥25%** **ALBI≥25%**	**Category 6** **STeFI <75%** **ALSI ≥25%** **ALBI<25%**	**Category 7** **STeFI <75%** **ALSI <25%** **ALBI≥25%**	**Category 8** **STeFI <75%** **ALSI <25%** **ALBI<25%**
Funds			SMXF ABIB	AGOF INAB NHCF RMFA	CCPF DYFF PRIP			

Table 6.1 presents the preliminary results after evaluating the STeFI, ALSI and ALBI asset allocations. Table 6.2 presents the sub-categorisation after all six steps were completed.

Table 6.2: Homogeneous sub-categories based on further analysis: Steps 4 to 6

	Criteria: Steps 4 to 6 Qualitative assessment Step 4: Global, JPM and Property exposure (no definite guidelines, comparative analysis) Step 5: Explanatory power Step 6: Annualised return and standard deviation					
Categories in terms of Steps 1 to 3 with allocated funds:	**Category 3 STeFI ≥75% ALSI <25% ALBI ≥25%**		**Category 4 STeFI ≥75% ALSI <25% ALBI <25%**		**Category 5 STeFI <75% ALSI ≥25% ALBI≥25%**	
Funds	SMXF ABIB		AGOF INAB NHCF RMFA		CCPF DYFF PRIP	
Category split in terms of Steps 4 to 6:	Category 3A	Category 3B Greater global exposure, higher risk and return characteristic relative to other funds	Category 4A	Category 4B Greater global exposure	Category 5A	Category 5B Greater global and domestic property exposure
Funds	ABIB	SMXF	AGOF INAB RMFA	NHCF	DYFF PRIP	CCPF

Phase 3, the categorisation framework applied to the Group 2 funds, which was derived from the results in phase 2, is presented in Table 6.3. The framework excluded attempts at sub-categorisation based on global and domestic property allocations justified by the following arguments:

- in the analysis of the Group 1 funds, global and domestic property exposure was compared with peers within the same sub-category. This was significantly constrained for the Group 2 funds as the time periods for which each fund was included in the sample period were different;
- from the regression analysis, it is clear that the explanatory power of the regression analysis for some Group 2 funds was at times very low.

Given the data restrictions and running the risk of uncontrolled data mining, the risk of an attempt to further sub-categorisation was not deemed valuable and sound enough to attempt.

Table 6.3: Framework for Group 2 analysis

	First level							
Categories	**Category 1**	**Category 2**	**Category 3**	**Category 4**	**Category 5**	**Category 6**	**Category 7**	**Category 8**
Steps 1 to 3 criteria:	STeFI ≥75% ALSI ≥25% ALBI ≥25%	STeFI ≥75% ALSI ≥25% ALBI <25%	STeFI ≥75% ALSI <25% ALBI ≥25%	STeFI ≥75% ALSI <25% ALBI <25%	STeFI <75% ALSI ≥25% ALBI≥25%	STeFI <75% ALSI ≥25% ALBI<25%	STeFI <75% ALSI <25% ALBI≥25%	STeFI <75% ALSI <25% ALBI<25%
	Second level							
	For each Group 2 fund that exhibits an asset allocation below threshold for any asset class: Compare with maximum-minimum asset allocation to Group 1 funds for the appropriate sample window							

However, it was enhanced by adding the second-level analysis, which compared the maximum-minimum asset allocation of each Group 2 sample fund exhibiting an asset allocation below a particular threshold with the maximum-minimum asset allocation of the Group 1 funds exhibited an allocation above the threshold for the overall sample period. The Group 2 fund will inevitably have an analysis window shorter than the total

75 months. The minimum and maximum asset allocations for the Group 1 funds should thus be the window similar to that of the Group 2 fund. Any Group 2 fund that exhibited an asset allocation below a particular threshold is in essence potentially misclassified simply because of the data window, such as excluding a rolling period in which a Group 1 fund exhibited an asset allocation above the threshold.

Phase 4 thus sub categorised the Group 2 funds based on the categorisation framework proposed in Table 6.4 which included a two-tier evaluation.

Table 6.4: Categorisation results of Group 2 funds: First-level analysis

Step 1: STeFI	Max. allocation ≥ 75%				Max. allocation < 75%	
	MNTR UBRU PAWP CPEP SMRA ISRR METP MDAB1	STMF SDFF M4iA CCIP CCEL MSAP FRIA MNBF	NPRA MDCF MJBR SPSA MSMP MILB MAMI ABAF	MICA MNSI MNWC MDWR MLAR SARBA DARF	MISG KTFP MDWO PEIA1 PEPA1 PIPA1 SBSA	SLSA STIFBA MBVA SBAA CODA MBAB SCPF

Step 2: ALSI	Max. allocation ≥ 25%			Max. allocation < 25%			Max. allocation ≥ 25%		Max. allocation < 25%	
	MNTR UBRU MDAB1 M4IA ISRR	MJBR NPRA MSMP MNWC METP	STMF CCIP CCEL CPEP MSAP SMRA	MILB MAMI PAWP SDFF ABAF	FRIA MDCF SPSA MNBF MICA	MNSI MDWR MLAR SARBA DARF	SCPF KTFP MDWO PEIA1 PEPA1	SBSA SLSA STIFBA MBVA SBAA	MISG PIPA1 CODA MBAB	

Step 3: ALBI	Max. allocation ≥ 25%	Max. allocation < 25%	Max. allocation ≥ 25%	Max. allocation < 25%		Max. allocation ≥25%	Max. allocation < 25%	Max. allocation ≥25%	Max. allocation < 25%
	CPEP MNTR UBRU MDAB1 STMF CCIP CCEL	ISRR M4IA METP MJBR MSMP MSAP MNWC SMRA	PAWP SDFF	FRIA NPRA MDCF SPSA MILB MAMI MNBF	MICA MNSI MDWR MLAR ABAF SARBA DARF	SCPF KTFP STIFBA MBVA SBAA	MDWO PEIA1 PEPA1 SBSA SLSA	MISG PIPA1	CODA MBAB

The RBSA conducted on the Group 2 funds proved to be challenging: the funds were categorised based on the proposed framework inferred from the Group 1 funds. As Group 2 does not cover the full sample period, it was acknowledged that the resulting categorisation could be an affect of the sub-data windows simply capturing a specific tactical asset allocation period. It was also clear that an even more refined categorisation based on global and domestic asset allocation may prove to be questionable data mining.

The following sections separately and finally collectively summarise the findings of the Group 1 and 2 analyses in relation to the research question and propositions.

6.4.1 Key findings of Group 1 and 2 analyses

The following sections separately and finally collectively summarise the findings of the Group 1 and 2 analyses in relation to the research.

6.4.2 Key findings of Phase 2: Group 1 fund analysis

The value of Steps 1 to 4, evaluating asset allocation for all six asset classes, is certain for a sub-categorisation framework. Step 5, which evaluates the explanatory power of the regression analysis, is important for future research. In this study, the explanatory power varies significantly for funds individually and for the group as a whole. This was not statistically or otherwise dealt with further. Step 6, evaluating annualised return and standard deviation, should be considered with caution as manager alpha, in other words excess return, is included in the annualised total return.

6.4.3 Key findings of Phase 4: Group 2 fund analysis

It was concluded that the categorisation for the Group 2 funds is most definitely correct in terms of the criteria for STeFI and that this can consistently be applied to funds irrelevant of market conditions or the extent of historical data. However, the asset allocation to ALSI and ALBI becomes less reliable based on the framework proposed.

6.5 CONCLUSIONS

The propositions posed were:

Proposition 1

Return-based style analysis applied to each fund identifies the asset allocation for the fund.

Proposition 2

Return-based style analysis applied to each fund is valid.

The above two propositions are accepted to be true in general, but it is emphasised that for specific periods, the explanatory power of the regression model may become questionable. The TARR category has no restrictions on asset allocations of any particular asset class[1], in other words, a fund manager can choose to invest 100% of assets in short-term interest-bearing instruments (STeFI). In such a scenario, including the other five indices as part of the explanatory variables could be distracting in the regression analysis. This is a problem that will be encountered consistently with the TARR category.

Proposition 3

The collective results of return-based style analysis applied to the funds can be used to create a framework for sub-categorisation.

The framework proposed was the result of nine out of a potential 54 funds. Although judgement had to be applied, the different characteristics of the funds were clearly evident. The explanatory power of the regression results was also less questionable. The proposed framework was applied to the remaining 45 funds (Group 2), but there were indeed inconsistencies in the application.

[1] The only restriction being that funds must invest 80% of funds in domestic markets.

Thus the purpose of this study was to identify heterogeneous style sub-categories within the TARR category of the South African unit trust market and by means of return-based style analysis (RBSA), create a framework for sub-categorisation.

The results were presented in Table 6.1 to 6.4. The framework created did not raise any concerns as a result of the Group 1 analysis. However, the framework was questionable when applied to the Group 2 funds in its entirety. Sub-categorisation based on only STeFI asset allocation (i.e. asset allocation of either below versus at or above 75%) was definitely a criterion that held irrelevant of which sample group it was applied to.

6.6 CONTRIBUTIONS AND IMPLICATIONS

The study facilitated a better understanding of the styles within the TARR category. The sub-categorisation framework proposed as a result of the Group 1 funds forms the basis for further investigation into style analysis of the TARR category. The Group 1 funds initially included an assessment of both the global and domestic property asset allocations. Further, given the discretion of portfolio managers in their investment strategy, it will always be challenging to find a regression model that can be consistently applied to all periods.

While the exploratory nature of this study was restricted because of to the availability of historical information, future research could be extended by repeating the study when more historical information for the TARR category is available. To further test the results of such research, such a study could be coupled with a regression analysis based on the identified sub-categories as the independent variables. The hypothesis would be that a fund that was correctly classified based on the sub-categorisation framework should exhibit the highest sensitivity to that particular sub-category, namely independent variable. It is acknowledged that given the nature of the TARR category, high levels of multicollinearity may make such a study and the result thereof questionable. Research that focuses on whether funds within the same sub-category imitate shifts in asset allocations by comparing specific rolling period results of funds, may also create a better understanding of fund manager skill, when managers make tactical shifts compared with their peers.

Future research may also focus on enhanced style analysis techniques as applied to hedge funds, which may enhance the results of sub-categorisation.

The matter of misclassification of style was often a research topic in the literature. Because many of the TARR funds were reclassified to prudential categories, in particular prudential low equity, return-based style analysis for the purpose of identifying misclassified funds within the TARR category, may yield interesting results.

The study provides insights to academia, practitioners, investors and industry alike into a category which, in its short history, has captured a large portion of the unit trust market; a category for which return drivers are not easily identifiable and peer comparison remains a challenge.

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Appendix A

Fund Name	CIS Manager	Retail (R) or Institutional (I)	Third Party (Y=Yes)
ABSA ABSOLUTE FUND	ABSA	R	
ABSA INFLATION BEATER FUND	ABSA	R	
ADVANTAGE ABSOLUTE RETURN FUND	ADVANTAGE	I	
ADVANTAGE REAL RETURN CORE FUND	ADVANTAGE	I	
ALLAN GRAY OPTIMAL FUND	ALLAN GRAY	R	
CADIZ EQUITY LADDER FUND	CADIZ	R	
CADIZ INFLATION PLUS FUND	CADIZ	R	
KAGISO PROTECTOR FUND	CORONATION	R	Y
CORONATION CAPITAL PLUS FUND	CORONATION	R	
CORONATION DYNAMIC PROTECTOR FUND	CORONATION	R	
CORONATION SA CAPITAL PLUS FUND	CORONATION	R	
DISCOVERY ABSOLUTE RETURN FUND	DISCOVERY	R	
ELEMENT REAL INCOME FUND	ELEMENT	R	
FOORD ABSOLUTE RETURN FUND	FOORD	I	
GTC CAPITAL PLUS FUND OF FUNDS	GRANT THORNTON	R	
GTC WEALTH PRESERVER FUND	GRANT THORNTON	R	
GTC WEALTH PRESERVER PLUS FUND	GRANT THORNTON	R	
INVESTEC ABSOLUTE BALANCED FUND	INVESTEC	R	
UMBONO ABSOLUTE RETURN FUND	INVESTMENT SOLUTIONS	R	Y
INVESTMENT SOLUTIONS REAL RETURN FOCUS FUND	INVESTMENT SOLUTIONS	R	
CONTEGO B2 PROTECTED INCOME FUND	METROPOLITAN	I	Y
36ONE TARGET RETURN FUND	METROPOLITAN	R	Y
4I ABSOLUTE RETURN FUND OF FUNDS	METROPOLITAN	R	Y
BASTION ABSOLUTE RETURN FUND OF FUNDS	METROPOLITAN	R	Y
CONTEGO B5 PROTECTED EQUITY FUND	METROPOLITAN	R	Y
DINAMIKA CONSERVATIVE FUND OF FUNDS	METROPOLITAN	R	Y
DYNAMIC WEALTH OPTIMAL FUND	METROPOLITAN	R	Y
DYNAMIC WEALTH REAL INCOME FUND	METROPOLITAN	R	Y
IMBUSHA REAL RETURN PORTFOLIO	METROPOLITAN	R	Y
LION OF AFRICA REAL RETURN CPI+5 FUND	METROPOLITAN	R	Y
SYGNIA ALPHA PLUS FUND	METROPOLITAN	R	Y
VERSO MULTI MANAGER SECURE GROWTH FUND OF FUNDS	METROPOLITAN	R	Y
NFP ASSERTIVE FUND OF FUNDS	NEDGROUP	I	Y
NFP BALANCED FUND OF FUNDS	NEDGROUP	I	Y
NFP ENHANCED STABLE FUND OF FUNDS	NEDGROUP	I	Y
NFP STABLE FUND OF FUNDS	NEDGROUP	I	Y
XS ACCELERATED FUND OF FUNDS	NEDGROUP	I	Y
XS CORE ACCELERATED FUND	NEDGROUP	I	Y
XS DIVERSIFIED FUND OF FUNDS	NEDGROUP	I	Y
XS ENHANCED DIVERSIFIED FUND OF FUNDS	NEDGROUP	I	Y
XS ENHANCED GUARDED FUND OF FUNDS	NEDGROUP	I	Y
XS GUARDED FUND OF FUNDS	NEDGROUP	I	Y
NEDGROUP INVESTMENTS CORE ACCELERATED FUND	NEDGROUP	R	
NEDGROUP INVESTMENTS OPTIMAL INCOME FUND	NEDGROUP	R	
NEDGROUP INVESTMENTS POSITIVE RETURN FUND	NEDGROUP	R	
PEREGRINE INFLATION PLUS 3 FUND	PEREGRINE	R	
PEREGRINE INFLATION PLUS 5 FUND	PEREGRINE	R	
PEREGRINE INFLATION PLUS 7 FUND	PEREGRINE	R	
PEREGRINE PROTECTED EQUITY FUND	PEREGRINE	R	
PEREGRINE REAL INCOME FUND	PEREGRINE	R	
ORANGE ABSOLUTE RETURN FUND	PRIME	R	Y
PRUDENTIAL INFLATION PLUS FUND	PRUDENTIAL	R	
ATLANTIC REAL INCOME FUND	PSG	R	Y
PSG ADVANCE WEALTH PRESERVER FUND OF FUNDS	PSG	R	
MOMENTUM DYNAMIC ASSET ALLOCATOR FUND OF FUNDS	RMB	I	Y
RMB PRIVATE BANK DEFENSIVE FUND OF FUNDS	RMB	I	Y
STEWART ABSOLUTE RETURN BLEND FUND OF FUNDS	RMB	R	Y
RMB ABSOLUTE FOCUS FUND	RMB	R	
RMB HIGH DIVIDEND FUND	RMB	R	
RMB PROTECTED DIVIDEND FUND	RMB	R	
SIM INFLATION PLUS FUND	SANLAM	R	Y
SMMI ABSOLUTE SOLUTION 5 FUND OF FUNDS	SANLAM	R	Y
SMMI DEFENSIVE FUND OF FUNDS	SANLAM	R	Y
SMMI LONG-TERM GROWTH SOLUTION 7 FUND OF FUNDS	SANLAM	R	Y
SMMI PROTECTION SOLUTION 3 FUND OF FUNDS	SANLAM	R	Y
SANLAM ABSA POSITIVE RETURN FUND	SANLAM	I	
SANLAM MULTI MANAGER INSTITUTIONAL POSITIVE RETURN FUND FOUR	SANLAM	I	
SANLAM MULTI MANAGER INSTITUTIONAL POSITIVE RETURN FUND ONE	SANLAM	I	
SANLAM MULTI MANAGER INSTITUTIONAL POSITIVE RETURN FUND THREE	SANLAM	I	
SANLAM MULTI MANAGER INSTITUTIONAL POSITIVE RETURN FUND TWO	SANLAM	I	
SANLAM PRIVATE CLIENT ABSOLUTE RETURN FUND	SANLAM	I	
STANLIB MEDICAL INVESTMENT FUND	STANLIB	I	
STANLIB MULTI MANAGER INFLATION + 1% FUND OF FUNDS	STANLIB	I	
STANLIB MULTI MANAGER INFLATION + 3% FUND OF FUNDS	STANLIB	I	
STANLIB MULTI MANAGER INFLATION + 5% FUND OF FUNDS	STANLIB	I	
STANLIB INFLATION PLUS 3% FUND	STANLIB	R	
STANLIB MANAGED FLEXIBLE FUND	STANLIB	R	
STANLIB MULTI MANAGER REAL RETURN FEEDER FUND	STANLIB	R	

Appendix B

Period Identifier	Period covered
1	Oct-03 - Sep-05
2	Nov-03 - Oct-05
3	Dec-03 - Nov-05
4	Jan-04 - Dec-05
5	Feb-04 - Jan-06
6	Mar-04 - Feb-06
7	Apr-04 - Mar-06
8	May-04 - Apr-06
9	Jun-04 - May-06
10	Jul-04 - Jun-06
11	Aug-04 - Jul-06
12	Sep-04 - Aug-06
13	Oct-04 - Sep-06
14	Nov-04 - Oct-06
15	Dec-04 - Nov-06
16	Jan-05 - Dec-06
17	Feb-05 - Jan-07
18	Mar-05 - Feb-07
19	Apr-05 - Mar-07
20	May-05 - Apr-07
21	Jun-05 - May-07
22	Jul-05 - Jun-07
23	Aug-05 - Jul-07
24	Sep-05 - Aug-07
25	Oct-05 - Sep-07
26	Nov-05 - Oct-07
27	Dec-05 - Nov-07
28	Jan-06 - Dec-07
29	Feb-06 - Jan-08
30	Mar-06 - Feb-08
31	Apr-06 - Mar-08
32	May-06 - Apr-08
33	Jun-06 - May-08
34	Jul-06 - Jun-08
35	Aug-06 - Jul-08
36	Sep-06 - Aug-08
37	Oct-06 - Sep-08
38	Nov-06 - Oct-08
39	Dec-06 - Nov-08
40	Jan-07 - Dec-08
41	Feb-07 - Jan-09
42	Mar-07 - Feb-09
43	Apr-07 - Mar-09
44	May-07 - Apr-09
45	Jun-07 - May-09
46	Jul-07 - Jun-09
47	Aug-07 - Jul-09
48	Sep-07 - Aug-09
49	Oct-07 - Sep-09
50	Nov-07 - Oct-09
51	Dec-07 - Nov-09
52	Jan-08 - Dec-09

Appendix C

Fund name	Fund code
36ONE Target Return Fund	MNTR
4i Absolute Return Fund of Funds	M4iA
Absa Absolute Return Fund	ABAF
Bastion Absolute Return Fund of Funds	MBAB
Cadiz Equity Ladder Fund	CCEL
CADIZ Inflation Plus Fund	CCIP
Contego B5 Protected Equity Portfolio	CPEP
Coronation Dynamic Protector Fund	CODA
Coronation SA Capital Plus Fund	SCPF
Dinamika Conservative Fund of Funds	MDCF
Discovery Absolute Return Fund	DARF
Dynamic Wealth Optimal Fund	MDWO
Dynamic Wealth Real Income Fund (A)	MDWR
Element Real Income Fund	FRIA
Investment Solutions Real Return Focus Unit Trust Fund	ISRR
JM Busha Real Return Portfolio	MJBR
Kagiso Protector Fund	KTFP
Lion of Africa Real Return CPI+5 Fund	MLAR
Matador Defensive Fund of Funds	MAMI
Metropolitan Absolute Provider Fund	METP
Metropolitan Inflation Linked Bond Fund	MILB
MiPlan Inflation Plus 3 Fund	PIPA1
MiPlan Inflation Plus 5 Fund	PEIA1
MiPlan Inflation Plus 7 Fund	PEPA1
Momentum Dynamic Asset Allocator Fund of Funds	MDAB1
Nedgroup Investments Positive Return Fund	NPRA
Noble PP Balanced Fund of Funds	MNBF
Noble PP Strategic Income Fund of Funds	MNSI
Noble PP Wealth Creative Fund of Funds	MNWC
Old Mutual Real Income Fund	MICA
PSG Konsult Preserver Fund of Funds	PAWP
Select Manager Prudential Active Fund of Funds	MSMP
SMMI Absolute Solutions 5 Fund of Funds	SBSA
SMMI Defensive Fund of Funds	SDFF
SMMI Long-term Growth Solution 7 Fund of Funds	SLSA
SMMI Protection Solution 3 Fund of Funds	SPSA
Stanlib Dynamic Return Fund	SBAA
Stanlib Inflation Plus 3% Fund	STIBFA
Stanlib Managed Flexible Fund (A)	STMF
Stanlib Multi-Manager Real Return Feeder Fund	SMRA
Stewart Absolute Return Blend Fund of Funds	SARBA
Sygnia Alpha Plus Fund	MSAP
Umbono Absolute Return Fund	UBRU
Verso Multi-Manager Secure Growth Fund of Funds	MISG
Visio Actinio Portfolio	MBVA