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Effects of free float on equity returns of shares listed on the JSE Securities Exchange

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A research report submitted to the Faculty of Commerce, Law and Management, University of the Witwatersrand, in partial fulfilment of the requirements for the degree of Master of Business Administration

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ABSTRACT

Purpose: The purpose of this research is to analyse and examine the effects of free float on equity returns for JSE-listed shares with the aim of submitting empirical evidence to support the inclusion of free float assessment to the investment decision-making processes of equity investors.

Design/Methodology/Approach: Monthly equity returns of FTSE/JSE All Share Index constituent companies were cross-sectionally regressed on the values of five firm characteristics from November 2003 through to the end of December 2015 using Ordinary Least Squares ("OLS") Cross-Sectional Regressions ("CSR").

The research followed the line of thought of and built on the work of Auret and Sinclaire (2006) by adopting a similar asset pricing research approach/methodology whilst introducing the free float as a firm attribute for explaining variations in equity returns. Four other firm characteristics already identified from the works of van Rensburg and Robertson (2003), Auret and Sinclaire (2006), Thomson and Reddy (2013), and Hodnett, Hsieh, and van Rensburg (2012) are also assessed alongside the free float.

Findings: The main finding of the study was that free float has the capacity to explain some of the variations in equity returns. The combination of free float and earnings yield ratio displayed stronger explanatory power for variations in equity returns than the van Rensburg and Robertson (2003) size-P/E returns model.

Implications: Investment decision-making processes of listed equity investors ought to consider the free float of investee companies as part of their assessment process. Not only does the free float give a truer picture of the investable universe of listed companies (Ideo, 2001), free float is also said to influence a number of important performance aspects such as share liquidity, information flow, price volatility, corporate governance, trading activity, firm valuation, and management decision-making (Alzeaideen and Al-Rawash

(2014). Consequently, failure to appraise the free float could be oblivious and detrimental to the investment objectives.

Originality/Value: The influx of empirical evidence exposing the inept of the capital asset pricing model in explain equity return variations (Hodnett et al., 2012) has triggered the evolution of a new strand in asset pricing research seeking to uncover firm-specific attributes able to generate alpha/above-market returns (Thomson & Reddy, 2013). This study contributes to this new strand in asset pricing research by submitting the free float as a candidate firm attribute for explaining variations in equity returns.

Despite the increase in studies devoted towards identifying firm-specific attributes influencing equity return variations (Thomson & Reddy, 2013), the literature review of this study discovered scant coverage of the free float in asset pricing research (Chan, Chan, & Fong, 2004). In particular to the JSE, at the time of writing, the literature review had not identified any published academic journal appraising the effects of or discussing the economic theory pertaining to free float.

Key words and phrases: Free float, equity returns, JSE Securities Exchange, asset pricing, capital markets, liquidity

DECLARATION

I, Kabelo Mokoena, declare that this research report is my own work except as indicated in the references and acknowledgements. It is submitted in partial fulfilment of the requirements for the degree of Master of Business Administration in the University of the Witwatersrand, Johannesburg. It has not been submitted before for any degree or examination in this or any other university.

Kabelo Mokoena

Signed at ……

On the …….. day of …… 20…..

DEDICATION

God is alive + well.

This paper is dedicated to all past, present and future educators who have generously imparted their knowledge and wisdom to me in this journey called ‘life’. May the Lord bless you all and keep you in His peace.

ACKNOWLEDGEMENTS

Prof. Dr. Eric Schaling, Jelle Zijlstra Chair in International Finance, your guidance and wisdom in this journey was truly inspirational. I would like to thank you greatly for staying the course with me and carrying me over the line – thank you.

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TABLE OF CONTENTS

ABSTRACT ..... **ii**

DECLARATION ..... **iv**

DEDICATION ..... **v**

ACKNOWLEDGEMENTS ..... **vi**

LIST OF TABLES ..... **x**

LIST OF FIGURES ..... **xi**

CHAPTER 1. INTRODUCTION **1**

1.1 PURPOSE OF THE STUDY 1

1.2 CONTEXT OF THE STUDY 2

1.3 PROBLEM STATEMENT 3

1.3.1 MAIN PROBLEM 3

1.3.2 SUB-PROBLEMS 4

1.4 SIGNIFICANCE OF THE STUDY 4

1.5 DELIMITATIONS OF THE STUDY 8

1.6 DEFINITION OF TERMS 9

1.7 ASSUMPTIONS 11

CHAPTER 2. LITERATURE REVIEW **13**

2.1 INTRODUCTION 13

2.2 BACKGROUND DISCUSSION 13

2.3 CAPITAL MARKETS EFFICIENCY 15

2.4 CORPORATE OWNERSHIP AND PRINCIPAL-AGENCY RISKS 18

2.5 ASSET PRICING: EMPIRICAL LITERATURE AND ECONOMIC THEORY 26

2.6 PERFORMANCE AND TRADING FRICTIONS 30

2.7 CONCLUSION OF THE LITERATURE REVIEW 33

2.7.1 RESEARCH HYPOTHESIS 1: 35

2.7.2 RESEARCH HYPOTHESIS 2: 35

2.7.3 RESEARCH HYPOTHESIS 3: 35

2.7.4 RESEARCH HYPOTHESIS 4: 35

CHAPTER 3. RESEARCH METHODOLOGY 36
3.1 RESEARCH METHODOLOGY/PARADIGM 36
3.2 RESEARCH DESIGN 38
3.3 POPULATION AND SAMPLE 43
3.3.1 POPULATION 43
3.3.2 SAMPLE AND SAMPLING METHOD 43
3.4 THE RESEARCH INSTRUMENT 46
3.5 PROCEDURE FOR DATA COLLECTION 47
3.6 DATA ANALYSIS AND INTERPRETATION 48
3.7 LIMITATIONS OF THE STUDY 52
3.8 VALIDITY AND RELIABILITY 52
3.8.1 EXTERNAL VALIDITY 53
3.8.2 INTERNAL VALIDITY 53
3.8.3 RELIABILITY 54
3.9 CHAPTER SUMMARY 55

CHAPTER 4. PRESENTATION OF RESULTS 57
4.1 INTRODUCTION 57
4.2 DATA CLEANING AND ORGANISATION 58
4.3 DESCRIPTION OF RESULTS PRESENTATIONS 59
4.3.1 ANALYSIS OF VARIANCE (ANOVA) 59
4.3.2 COEFFICIENT OF VARIATION 60
4.3.3 PARAMETER ESTIMATES 61
4.3.4 COLLINEARITY DIAGNOSTICS 61
4.3.5 TESTS OF INDEPENDENCE 63
4.4 RESULTS PRESENTATION: RESEARCH HYPOTHESIS 1 63
4.5 RESULTS PRESENTATION: RESEARCH HYPOTHESIS 2 65
4.6 RESULTS PRESENTATION: RESEARCH HYPOTHESIS 3 68
4.7 RESULTS PRESENTATION: RESEARCH HYPOTHESIS 4 71
4.8 SUMMARY OF THE RESULTS 73

CHAPTER 5. DISCUSSION OF THE RESULTS 74
5.1 INTRODUCTION 74
5.2 DISCUSSION OF RESULTS: RESEARCH HYPOTHESIS 1 75
5.3 DISCUSSION OF RESULTS: RESEARCH HYPOTHESIS 2 79
5.4 DISCUSSION OF RESULTS: RESEARCH HYPOTHESIS 3 81
5.5 DISCUSSION OF RESULTS: RESEARCH HYPOTHESIS 4 83
5.6 CONCLUSION 85

CHAPTER 6. CONCLUSIONS & RECOMMENDATIONS 86
6.1 INTRODUCTION 86
6.2 CONCLUSIONS OF THE STUDY 86
6.3 RECOMMENDATIONS 87
6.4 SUGGESTIONS FOR FURTHER RESEARCH 88

REFERENCES 90

APPENDIX A – Plots of the Independent Variables **..... 99**

LIST OF TABLES

TABLE 1: ANALYSIS OF VARIANCE – HYPOTHESIS 1
TABLE 2: COEFFICIENT OF VARIATION – HYPOTHESIS 1
TABLE 3: PARAMETER ESTIMATES – HYPOTHESIS 1
TABLE 4: COLLINEARITY DIAGNOSTICS – HYPOTHESIS 1
TABLE 5: TEST OF INDEPENDENCE – HYPOTHESIS 1
TABLE 6: ANALYSIS OF VARIANCE – HYPOTHESIS 2
TABLE 7: COEFFICIENT OF VARIATION – HYPOTHESIS 2
TABLE 8: PARAMETER ESTIMATES – HYPOTHESIS 2
TABLE 9: COLLINEARITY DIAGNOSTICS – HYPOTHESIS 2
TABLE 10: TEST OF INDEPENDENCE – HYPOTHESIS 2
TABLE 11: ANALYSIS OF VARIANCE – HYPOTHESIS 3
TABLE 12: COEFFICIENT OF VARIATION – HYPOTHESIS 3
TABLE 13: PARAMETER ESTIMATES – HYPOTHESIS 3
TABLE 14: COLLINEARITY DIAGNOSTICS – HYPOTHESIS 3
TABLE 15: TEST OF INDEPENDENCE – HYPOTHESIS 3
TABLE 16: ANALYSIS OF VARIANCE – HYPOTHESIS 4
TABLE 17: COEFFICIENT OF VARIATION – HYPOTHESIS 4
TABLE 18: PARAMETER ESTIMATES – HYPOTHESIS 4
TABLE 19: COLLINEARITY DIAGNOSTICS – HYPOTHESIS 4
TABLE 20: TEST OF INDEPENDENCE – HYPOTHESIS 4
TABLE 21: THE MEANS PROCEDURE – SUMMARY STATISTICS
TABLE 22: SUMMARY OF HYPOTHESES RESULTS

LIST OF FIGURES

FIGURE 1: FIT PLOT FOR TRETURN – HYPOTHESIS 1
FIGURE 2: RESIDUAL BY REGRESSORS FOR TRETURN - HYPOTHESIS 2
FIGURE 3: RESIDUAL BY REGRESSORS FOR TRETURN – HYPOTHESIS 3
FIGURE 4: RESIDUAL BY REGRESSORS FOR TRETURN – HYPOTHESIS 4

CHAPTER 1. INTRODUCTION

1.1 Purpose of the study

The purpose of this research is to examine the effects of free float on equity returns of companies listed on the JSE Securities Exchange ("JSE") of South Africa. Free float is generally defined as "the number of outstanding issued shares minus shares held by strategic shareholders that are predominantly restricted from trading" (Çaliskan & Kerestecioğlu, 2013, p. 165).

The primary objective of this study is to examine the effects of free float on holding period (monthly) equity returns. The study observed the explanatory power of free float on equity returns of FTSE/JSE All Share Index constituent companies over a 12-year period starting from the end of 2003 through to the end of 2015. The FTSE/JSE All Share Index is the arithmetic weighted index wherein member weights are the free float-adjusted market capitalisations of each constituent company (JSE, 2014).

To complement fundamental analysis typically undertaken by investors in deriving an investment's intrinsic value in their pursuit to forecast equity returns before committing to such an investment (Dechow, Hutton, Meulbroek, & Sloan, 2001), this study aims to highlight the importance of also evaluating a company's free float as part of the investment assessment process.

In particular, the end goal of this research is to assess the explanatory power of free float on equity returns, evaluate how the explanatory power of the free float ranks relative to other already known firm characteristics associated with equity returns, examine whether the inclusion of the free float to the size-P/E returns model improves the explanatory power of that model, and finally examine whether the combination of the free float with another firm attribute presents an alternative, more powerful equity returns explanatory proposition to the size-P/E returns model.

The chapter is arranged as follows: Firstly, Section 1.2 presents the context of the study then Sections 1.3 and Section 1.4, respectively, discusses the research problem and significance of the study. Delimitations of the study are addressed in Section 1.5 to be followed by Section 1.6, which contain the definitions of the key terms in this research. In conclusion, Section 1.7 outlines the main assumptions underlying this study.

1.2 Context of the study

An area which continues to receive increasing attention within capital markets is understanding and explaining variations in equity returns between companies and improving practitioners' ability to forecast this variability and the identification of its causes (van Rensburg, 2001).

According to van Rensburg (2001) empirical success of style variables in explaining variation in equity returns has prompted a shift in the direction of asset pricing research away from the standard Capital Asset Pricing Model (hereafter referred to as the "CAPM") to now focus on aspects such as uncovering candidate style-factors, relative ranking of the explanatory power of these predictors, validating the superiority of the various returns models, sourcing confirmatory empirical evidence across markets, and uncovering the economic rationale for empirical findings.

Stock market indices, which are principally used as benchmarks by equity investors to track the relative performance of their investments, are calculated following one of the two main conceptual approaches with the traditional approach using total outstanding issued shares while the modern approach weighs the market capitalisation of constituent companies by their free float shares as they are the truest reflection of the investable universe (Ideo, 2001).

The introduction of free float-adjusted index calculation methodology in the early 2000s by custodians of major equity indices has stimulated interest amongst the finance community on the effects of free float (Çaliskan & Kerestecioğlu, 2013). Academic literature is, however, currently lagging this interest (Chan et al., 2004).

van Rensburg (2001) states that factors such as the recent reclassification of indices in March 1999 and differences in seasonality patterns from most other northern hemisphere-based securities exchanges gives the JSE some unique features. These distinct attributes which includes limited investible universe with low liquidity levels and the dominance of natural resources stocks (Auret & Sinclaire, 2006) renders the JSE an interesting market for undertaking this research investigation. The JSE's peculiarities were also noted by Auret and Cline (2011).

With most of the asset pricing research undertaken in developed markets (Estrada, 2012), Hearn (2012, p. 698) cautions against hasty generalisation of empirical results to or from frontier markets due to the common illiquidity and segmentation of these markets, which features (illiquidity and segmentation) compromises the standard "asset market integration and information efficiency" assumptions typically embedded in statistical techniques mostly utilised in asset pricing research. An apt example here is the work of van Rensburg (2001) on the explanatory power of firm attributes within the JSE wherein he could not validate the explanatory power of some of the internationally prominent variables and the seasonality of factor-drivers noted in developed markets.

1.3 Problem statement

1.3.1 *Main problem*

Analyse and examine the effects of free float on equity returns of shares listed on the JSE of South Africa. The objective of this study is to investigate whether free float has any influence on variations in equity returns of listed shares.

The research aims to provide insights on the significance of free float in market performance of shares and the influence that it has on equity returns of listed shares using the JSE as the study's setting. In this manner, the research has as its objective to build on the growing academic literature studying asset pricing on the JSE by:

i). analysing and examining the effects of an additional firm attribute that is the free float; and

ii). dovetailing and extending the sample period of previous researchers, most of whose sample periods ended in the mid-2000s, by covering a period starting in November 2003 through to the end of 2015.

1.3.2 *Sub-problems*

The first sub-problem entails distinguishing whether the free float explanatory power enjoys relative superiority compared to the firm size (as denoted by the market capitalisation) on variations of equity returns of listed shares.

The second sub-problem involves determining if there is incremental benefit from inclusion of the free float to the size-P/E returns model.

The interest of the third sub-problem is identifying whether the combination of free float with another independent variable (price-to-earnings ratio, market capitalisation, earnings' yield ratio or closing share price) possesses stronger explanatory power than the size-P/E combination.

1.4 Significance of the study

van Rensburg and Robertson (2003, p. 7) write that as a result of the proliferation of documented inefficiencies of beta in explaining variability in equity returns as purported in the "framework of traditional asset pricing theory" put forward by the standard version of the CAPM Black (1972) developed using the works of Sharpe (1964) and Lintner (1965), "identifying a fully specified model of equity returns is currently the most pressing avenue of empirical enquiry in the field of asset pricing".

With the devastating financial impact of the recent global financial crisis still fresh in investors' minds, the risk/return profile of portfolio investments made has become a focal point with the value-add of fund managers and those charged with managing investments constantly under the spotlight (Dowd, 2009). Cox, Brammer, and Millington (2004, p. 27) note that the increased focus

on risk/return profile of portfolio investments has resulted in “an increase in shareholder activism”. From a dataset ranging from 2005 through to 2009, results from the study by Alzeaideen and Al-Rawash (2014) provided empirical evidence confirming the existence of positive statistical relationship between the composition of corporate ownership structure and the market performance of listed shares.

With the above two paragraphs as background, this study straddles two academic fields which are respectively enjoying a growing interest amongst academics, policy-makers, economists, and the wider investment community alike (van Rensburg, 2001; Hu & Izumida, 2009).

At first the study immerses one foot into the contemporary asset pricing research field pioneered by Fama and MacBeth (1973), which discipline seeks to identity firm characteristics with the strongest influence in driving the variability in equity returns of different companies (Subrahmanyam, 2010), and secondly the study develops on the ownership-performance field made popular by Berle and Means (1932), which area speaks to the principal-agency theory (interested in challenges presented by the conflict of interest between managers and shareholders) and the minority-expropriation hypothesis (which highlights concerns introduced by self-interested large/controlling shareholders) as described by Hu and Izumida (2009).

Owing to the fact that the incorporation of minimum free float as an eligibility criteria by equity index custodians only starting in the early 2000s (Çaliskan & Kerestecioğlu, 2013), free float can be regarded as a relatively new concept to the finance community with its market awareness still developing (Ideo, 2001).

Alves (2013) declares that there is no question on the importance of equity returns because of their application to a broad range of important uses such as assessing the efficiency of capital markets, appraising financial assets, guiding remuneration and incentive schemes for management, and evaluating the quality of investments.

This research helps to fill the gap in academic literature identified by Çaliskan and Kerestecioğlu (2013) of the lack of academic literature studying the effects of the free float by submitting empirical evidence with the JSE of South Africa serving as the context.

To illustrate the significance of the free float Foley and Greenwood (2010) points out that leading equity index custodians such as Standard & Poor's, Morgan Stanley ("MSCI"), Topix and FTSE prescribe a minimum free float as one of the eligibility criteria for inclusion of companies in their indices. To further demonstrate the significance of the free float, Ideo (2001) estimated an outflow of funds of approximately 400 billion Yen out of the Japanese market due to the implementation of the free float-adjustment by MSCI in the early 2000s.

Çaliskan and Kerestecioğlu (2013) note that, however, despite the drastic impact that the introduction of the free float has had and continues to exert on the investment strategies of most portfolio managers, there exists limited academic literature on the effects of the free float. With most of the investment community's attention devoted to fundamental research (Dechow et al., 2001), this study intends to add to the emergent body of knowledge on non-financial components that deserves to be considered as part of the overall decision-making processes for investment in listed equity instruments. This research hopes to highlight the significance of an important non-financial component (the free float), and the influence it has on equity returns of publicly traded companies.

The intent of this research is to help elevate the status and importance of the free float in corporate finance literature and academia with the ultimate aim being to invoke the attention of investors and other interest parties to this relatively new and important concept. The intention of the study is to provide insight on the relationship that the free float has on equity returns of companies listed of the JSE. The research intends to provide insights on and determine whether equity returns of listed companies are enhanced, suppressed, or unaffected by the level of their free float.

An improved understanding of the effects of free float and its market signals on the composition of corporate ownership structure of the targeted investee company/ies would be beneficial in painting a holistic picture around the dynamics of the targeted investment and will help expand equity investors' appreciation of an important determinant (the free float) on the equity returns of listed shares. Whilst Dechow et al. (2001) point to the existence of extensive research on formulating fair valuation of listed companies using fundamental analysis, this study aims to add to the broader understanding of the non-operational components and non-financial elements which play a role in the variation of equity returns of listed companies.

With the free float as an indicator of the composition of corporate ownership structure (Ideo, 2001), this study gives an additional perspective on whether shares with a more dispersed ownership structure (hence higher free float) generate higher returns or vice versa. As such, both individuals and institutional equity investors (trading directly or through asset managers) will benefit from insights uncovered by this study and will be better equipped to adjust their investment decision-making processes and portfolio formulation strategies accordingly. Although the results of the study may have a bearing on existing portfolio holdings of equity investors in the form of periodic mark-to-market valuations for reporting purposes, the study's results will be felt the most in an entry or exit event when the accumulated effect of holding period equity returns manifests and the theoretical mark-to-market movements ultimately crystallise and are eventually booked as they translate into cashflows.

In addition to equity investors, management teams of both listed and unlisted companies (considering an initial public offer/IPO of their companies as an avenue for future fundraisings), investor relations executives, equity research analysts in stockbroking firms, corporate finance professionals (who provide advice on IPOs, M&A structuring and fundraisings, share buy-backs, etc.), corporate treasury professionals, and pension fund trustees amongst others (Estrada, 2012), will gain from an improved understanding and appreciation of the free float provided by this study.

Following the publication of the 2001 research paper by the Goldman Sachs team (Wilson, Purushothaman, & Goldman, 2003) projecting that the aggregate growth trajectory of the economies of the major emerging countries of Brazil, Russia, India, and China (hereafter referred to as “BRIC”) will be bigger that the GDPs of the G7 countries (Japan, US, UK, France, Germany, Italy and Canada) by 2050, emerging markets have sustained the strong interest they attract from portfolio managers looking to understand equity returns patterns of these markets as portfolio managers seek yield pick-up and diversification from the more mature economies (Sehgal & Jain, 2015). Furthermore, Bhar and Nikolova (2009) highlight the fact that, with the weight of the BRICs in investment portfolios expected to rise sharply, it is very important to understand the nature of the capital markets of these countries and thus variables influencing the performance of their capital markets.

In pursuit of this quest, this research contributes to the broader understanding of firm characteristics influencing equity returns for listed companies of the JSE of South Africa (the last member of the BRICS group of countries).

1.5 Delimitations of the study

Only companies listed on the main board of the JSE were included in this study.

Only constituent companies of the FTSE/JSE All Share Index (J203) were studied as these are the only companies for which the JSE computes and publishes the free float (Hodnett et al., 2012).

A minimum 5% free float eligibility threshold as prescribed by the FTSE/JSE Advisory Committee was applied for this study.

Companies listed on the Alternative Exchange (which primarily caters for small and mid-sized listings), the Development Capital and the Venture Capital markets were not included to this study.

Only equity listings were considered in this study.

Loan stocks and convertible preference shares were excluded from the population until they are exercised and converted into equity shares.

Exchange Traded Funds and other funds which are direct derivatives of underlying holdings deemed not eligible for inclusion to the FTSE/JSE All Share Index were excluded.

Pyramid companies were also excluded from the population.

The non-South African shareholding component of inward listed companies were excluded from the free float.

The BESA (the bond exchange), SAFEX (the futures and commodities exchange), and Yield-X (for interest rate and currency instruments) were excluded from this research.

1.6 Definition of terms

The following terms were widely used throughout this research paper:

Term	Definition
Free float:	The proportion of shares tradable within the market place for a given share defined as the entire quoted equity capital of a listed company, subject to free float restrictions, normally, expressed as a ratio to total outstanding issued shares of a company (Johannesburg Securities Exchange, 2014, p. 11). Free Float Restrictions: • Shares directly owned by State, Regional, Municipal and Local governments (excluding shares held by independently managed pension schemes for governments) • Shares held by Sovereign Wealth Funds where each holding is 10% or greater. If the holding

subsequently decreases below 10%, the shares will remain restricted until the holding falls below 7%

- Shares held by directors, senior executives and managers of the company, and by their family and direct relations, and by companies with which they are affiliated
- Shares held within employee share plans
- Shares held by public companies or by non-listed subsidiaries of public companies
- Shares held by founders, promoters, former directors, founding venture capital and private equity firms, private companies and individuals (including employees) where the holding is 10% or greater. If the holding subsequently decreases below 10%, the shares will remain restricted until the holding falls below 7%
- All shares where the holder is subject to a lock-in clause (for the duration of that clause)*
- Shares held for publicly announced strategic reasons, including shares held by several holders acting in concert
- Shares that are subject to on-going contractual agreements (such as swaps) where they would ordinarily be treated as restricted

*: Free Float changes resulting from the expiry of a lock-in are implemented at the next quarterly review subsequent to there being a minimum of 20 business days between the lock-in expiry date and the Tuesday before the first Friday of the review month (Johannesburg Securities Exchange, 2014, p. 11).

JSE Johannesburg Securities Exchange of South Africa

1.7 Assumptions

The following key assumptions underlie this study:

Ceteris paribus, investors will be compensated with higher equity returns for assuming higher levels of risk and that the beta is not the sole custodian of risk influencing the variability of equity returns (Fama & French, 1993).

Statistical regressions and tests performed relied on data downloaded from I-Net BFA, which was also used in similar studies by Strugnell, Gilbert, and Kruger (2011) and Muller and Ward (2013). As such, the research accepted those data points as accurate and without error.

Amihud, Mendelson, and Pedersen (2006, p. 4) state that according to the standard consumption-based asset pricing theory capital markets are perfectly liquid as underpinned by the three fundamental assumptions of no arbitrage (perfect pricing between markets), agent optimality (optimal portfolio choice only derived where there is absence of arbitrage), and competitive equilibrium (investors' utility functions satisfied depending on their endowment) and frictionless markets with prices given and "securities traded at no cost all of the time".

Companies are legal platforms regulating the contracting relationships amongst shareholders with zero enforcement costs inducing managers to act in the best interest of shareholders (Smith & Warner, 1979).

The dividend-based share valuation model is correct and applies to the JSE. According to the theory of this model, in a perfect capital market, the share price of a company with 100% dividend pay-out represents "the present value of all expected future dividend pay-outs" (Dalgaard, 2009, p. 18).

Company share prices were accepted as the true and correct value of a corporation without being subjected to any manipulation in order to satisfy the efficient market hypothesis. Consequently, as per formula A5, opening share prices for purposes of computing equity returns were assumed to be the same as closing share prices from the previous trading period.

Capital gain receipts enjoys preferential tax treatment, thus inducing equity investors to price up high yielding securities relative to low return investments due to equity investors' preference for certainty of returns with a strong desire for immediate receipt (Litzenberger & Ramaswamy, 1980).

In return for assuming higher systematic risk (the risk attaching to an investment which risk cannot be removed through diversification), investors are compensated for the additional risk in an investment security by higher equity returns in order to satisfy investors' primary objective of profit maximisation (Thomson & Reddy, 2013).

CHAPTER 2. LITERATURE REVIEW

2.1 Introduction

This section contains a literature review on the key aspects and theoretical background to equity returns and asset pricing for listed equity instruments with particular reference to elements related to free float.

Various strands of the literature review related to the research topic are provided below commencing with a background discussion in Section 2.2. Thereafter capital markets efficiency is addressed in Section 2.3. It is then followed by Section 2.4 which reviews the historical background of the corporate ownership structure and the associated principal-agency risks (together with minority expropriation challenges). Section 2.5 is dedicated to the empirical literature and economic theory of capital markets as it relates to asset pricing.

After which, Section 2.6 offers a review of market performance aspects focusing on the causes and effects of trading frictions for transacting through stock exchanges. The chapter concludes with Section 2.7 noting the key observations and insights in this academic field.

2.2 Background discussion

Auret and Sinclaire (2006) concede that predicting stock returns is no easy task as evidenced by the enormous resources which continue to be poured to this endeavour with the lure of generating alpha equity returns (that is, earning equity returns in excess of the general market).

Wang and Xu (2003) and Çaliskan and Kerestecioğlu (2013), respectively, identify the dual influences of free float: firstly on corporate governance from a market signalling perspective of the composition of the corporate ownership structure and, secondly, on the market performance of listed equities through the free float's impact on metrics such as price volatility, trading liquidity, share

prices, investor demand, and trading activity. These authors conclude that, particularly for emerging markets, the “free float signals the quality of corporate governance which affects the firm’s future cashflows (and growth prospects) and is very useful in understanding variations in cross-sectional equity returns of different firms” (Wang & Xu, 2003, p. 19).

According to Næs (2004) the main role of equity shareholders is monitoring, with shareholders’ capabilities and incentives to undertake such monitoring function dependent on the dimension of the ownership structure to which they ascribe: i). owner type, ii). outside owners or insiders, and iii). ownership concentration/dispersion. The study undertaken by Bogdan, Bareša, and Ivanović (2012) relates free float to the latter component of the corporate ownership structure (that is, ownership concentration/dispersion), which recognises the partition between the strategic shareholders (long-term investors) and liquidity traders (short-term investors/speculators). This study also followed this approach by confining its attention to the free float in so far as it relates to ownership concentration/dispersion dimension.

Bostanci and Kilic (2010, p. 2) contend that the “free float provides shortcut information about the ownership structure of a company with low free float indicating a concentrated ownership structure and a small shallow market for shares of that company”. By measuring the proportion of a company’s outstanding issued shares available for trade without restrictions, the free float serves as an important indicator of the composition of a corporate’s ownership structure with a low free float indicating the presence of a considerable amount of strategic shareholders in the ownership structure while a high free float suggests that a company’s shares are widely held with a large number of shareholders individually holding insignificant stakes thus making the ownership structure less concentrated (Ideo, 2001). A detailed definition of the calculation of the free float as applied by the Johannesburg Securities Exchange (2014) is provided below in Section 1.6 Definition of Terms.

This study adds to a better understanding and appreciation of the free float and in the process highlight the importance of considering this variable as part of the investment decision-making processes of practitioners and investors.

2.3 Capital markets efficiency

Moerland (1995) reports that in the wake of the demise of central planning economic systems which were mostly deployed by communist countries such as the Soviet Union and most Eastern Europe countries in favour of market-based economic systems, academic and political attention has shifted away from the comparison of the various economic systems (such as comparing communism versus capitalism) to studying the benefits, workings and shortcomings of the different concepts within capitalist market-based economic systems.

According to Minović and Živković (2010) the global economy is sub-divided into three main economic clusters i). the developed markets of Western Europe, North America and Japan, ii). the emerging markets of East Asia and Latin America, and iii). the frontier markets of South Eastern Europe, South East Asia and Africa.

The 1997-1998 financial market crisis highlighted the challenges and risks associated with the current structures of the capital markets within these economic systems (Bhar & Nikolova, 2009). The damaging consequences of the Russian financial market crisis and the Asian currency crisis during 1997-1998 period increased the level of interest within academia for further understanding of the workings of capital markets and the need for broaden the knowledge base of the operating mechanics within these markets (Bhar & Nikolova, 2009).

Blitz, Pang, and Van Vliet (2013) noticed that despite the multiple crises which have hit developing markets (recent examples includes the Russian, Asian, and Mexican crises during 1998, 1997, and 1994, respectively), a combination of new share issuances and higher returns generated have seen these markets amass a substantial increase in allocation within global equity indices such as the MSCI All Countries Index - which currently has developing markets at c.15% (1988: 1%).

Bhar and Nikolova (2009) caution that while financial liberalisation and market integration contribute to economic development and brings with them the economic benefits of advanced capital markets, these factors (liberalisation and integration) also render developing countries more vulnerable to financial disruptions. Farag (2013) writes that the high volatility stemming from thin trading volumes coupled with elevated risks of these markets makes the impact of market shocks much deeper and as a result, renders these markets less efficient.

Despite some observed positives, Rhee and Wang (2009) remind us that emerging and frontier markets are generally more illiquid compared to developed markets with this illiquidity mostly to blame for the high volatility and the lack of financial market development of these markets. Notwithstanding the well documented differences between developed and emerging/developing markets, a number of similarities in capital markets behaviours between these markets have been noted by authors such as Blitz and Van Vliet (2007), who presented empirical evidence showing that the relationship between risk and return across markets follow a similar pattern, that is, strong and negative.

The combination of the rapid growth recorded by developing markets and the continued liberalisation of their financial markets means that developing markets are attracting stronger interest from both academia and practitioners with the result that these markets are now considered part of the mainstream investment universe for institutional investors with dedicated portfolio managers being assigned to look after this important asset class which was previously thought of as niche (Blitz et al., 2013). Wilson et al. (2003) recommend that the major emerging market economies of Brazil, Russia, India and China (known as BRIC) should focus on developing institutional strength and maintaining policies that support openness of foreign investments and enables the free flow of capital if they are to achieve their ambition of developing into the world's new economic growth force.

Adjustments for the free float only started gained prominence in the early 2000s with a number of industry experts arguing in favour of these adjustments in order to make performance benchmarks more appropriate to show a more

accurate picture of the practicalities of actually trading and investing in listed equities (Ideo, 2001). Bhide (1993) acknowledges the existence of the trade-off that lies between public policies in encouraging more active monitoring by shareholders to improve corporate governance, which policies are likely to cause illiquidity within equity markets (thus result in greater risks for smaller investors) and, conversely, measures aimed at improving the free float by spreading the ownership composition of corporates in order to reduce transaction costs, increase trading activity, help contain the widening bid-asked spreads, and also to incentivise market participants to devote more resources towards trading and research of listed corporates.

The proportion of a company's issued shares held by liquidity traders (that is shareholders other than strategic shareholders), is generally conveyed by the free float (Rezaei & Tahernia, 2013), which these authors define as the proportion of a company's market capitalisation less shares held by strategic shareholders (which represents shares available for market transactions and trading without restriction). Bogdan et al. (2012) confirms the calculation of the free float as excluding from the company's market capitalisation shares held by strategic shareholders. So far as the literature review of this study could establish/ascertain, there is a noticeable shortage of academic literature on the effects of the free float with the main reason put forward being challenges relating to the computation of the exact free float due to the difficulty of uncovering the true identity of ultimate beneficial shareholders in listed shares (Chan et al., 2004).

Motivated by the limited research on the JSE outside of the context of the CAPM, in 2003 van Rensburg and Robertson (2003) undertook a comprehensive 10-year study of 24 firm characteristics to assess the capacity of these variables to explain variations in equity returns of different companies and in the process developed the size-P/E optimal returns model. Three years later, using the same sample, Auret and Sinclaire (2006) extended the work of van Rensburg and Robertson (2003) by introducing the book-to-market ratio as a candidate factor to explaining equity return variations by undertaking analysis on this firm attribute (book-to-market ratio) together with the 5 most significant

variables identified by van Rensburg and Robertson (2003). Auret and Sinclaire (2006) concluded that the size-P/E-model of van Rensburg and Robertson (2003) is still superior and the book-to-market ratio they proposed did not improve the performance of the model principally due to the high correlation of the book-to-market ratio with the other attributes already contained in the model.

This research pursues the quest to identify variables to improve the van Rensburg and Robertson (2003) model by submitting the free float as a candidate variable.

2.4 Corporate ownership and principal-agency risks

Cox et al. (2004) declare that the two most prominent trends in the evolution of corporate ownership have been i). the sharp increase in shareholding by financial institutions such as development financial institutions, asset managers, banks and pension funds (and less so by individual investors) and ii). the elevated status that corporate social performance (hereafter referred to as “CSP”) enjoys in performance assessment of companies (to complement the historic accounting-focused performance assessment measures). These authors argue that institutional investors are increasingly becoming subjected to regulatory requirements enforcing compliance with CSP metrics and further remarked that the incorporation of CSP measures in investment assessment has resulted in an increased focus on achievement of long-term equity returns Cox et al. (2004).

Increased shareholding by institutional shareholders has raised academic interest in addressing the principal-agency concerns through active involvement by strategic shareholders in corporate governance structure of companies (Alzeaideen & Al-Rawash, 2014). Most companies first start their operations with management as majority investors with initial shareholding concentrated in the hands of a few investors and then over time with management’s ambitions to grow the company and expand profitability, they attract additional external

shareholders to inject additional expansion capital hence the rise in institutional interest in corporates (Bhide, 1993; Cox et al., 2004).

From their study of corporate ownership of US companies with IPO listings from 1970 to 2001, Helwege, Pirinsky, and Stulz (2007) confirmed the conclusions drawn by Buzzacchi and Colombo (1996); Bhide (1993); Cox, et al. (2004) that funding pressure presented by a company's expansive capital expenditure needs during times of low cash flows generation (which creates a funding gap) is often the main driver of equity disposals by founding members to bring in new investors and thus spread the shareholding of a company.

Alzeaideen and Al-Rawash (2014, p. 194) maintain that corporate governance is "positively related to both future operating performance of firms and instil performance discipline to management" with the result that "improvements in corporate governance is significantly linked with higher valuations and greater returns generated by firms". These authors remarked that one of the importance of corporate governance is in mitigating information asymmetry between principals (shareholders) and agents (management), which challenge is critical in improving financial resources management (Alzeaideen & Al-Rawash, 2014).

Uno and Kamiyama (2010) showed that a company's free float level plays an important role in its market performance (share price appreciation, share turnover, trading activity, and share liquidity) and also identified the investment horizon of strategic shareholders as one of the key factors influencing a firm's value. According to these authors, concentrated ownership structures with a low free float promote information asymmetry while disperse ownership structures (exhibiting higher free float and often associated with the presence of liquidity traders having shorter investment horizons) positively impacts both the firm's value and the liquidity of its shares (Uno & Kamiyama, 2010).

Uno and Kamiyama (2010) conclude that the composition of a firm's ownership structure and shareholders' investment horizon have an important bearing on its corporate governance status with more complex and concentrated ownership structures (displaying depressed free float) lowering firm valuation and suppressing market liquidity of its shares. Most importantly, these authors bring

to light the trade-off between the liquidity of a share and the level of corporate governance brought about by a corporate's ownership structure by showing that while on the one hand the presence of large strategic shareholders impose liquidity constraints on trading activity and restricts consistency in information flow, on the other hand, large shareholders dedicate more resources to monitoring management's activities thus strengthening the overall corporate governance structures, profitability, and ultimately the valuation of these companies (Uno & Kamiyama, 2010).

Næs (2004) state that economic theory and public policy in most countries also recognises the importance of composition of corporate ownership structure to the economic performance. According to Demsetz and Lehn (1985) the three most influential determinants of the composition of corporate ownership structure are value-maximisation, control potential, and amenity potential (non-profit gains mostly for the benefit to majority owners e.g. by companies in media and sports industries). Park (2009) classifies shareholders into two main groupings, i). strategic/block shareholders being those shareholders who are discernible holding sizeable equity stakes, and ii). liquidity traders, those shareholders not easily identifiable with small individual shareholdings who often have short investment holding periods. Ideo (2001) define strategic shareholders as those shareholders with a long-term investment horizon thus making their shareholding generally more restricted from short-term trading, which class of shareholders typically includes governments, parent companies, charitable organisations, management, etc.

Alzeaideen and Al-Rawash (2014) argue that by giving off market signals of the composition of corporate ownership structure, free float affects a number of key company performance aspects such as accounting profitability, firm's value, corporate governance, share price volatility, information flow, economic performance, stock liquidity, corporate policy, investment opportunities pursued etc. These authors define corporate ownership structure along two dimensions with ownership concentration/dispersion as the first dimension (depicted by the level of free float) and the nature of shareholders (private, government,

institutional, domestic, foreign, managerial, mixed, etc.) as the second dimension (Alzeaideen & Al-Rawash, 2014).

According to da Silva and Leal (2005) corporate governance is a very broad concept which has recently witnessed increased academic attention devoted towards one of its important aspects: the separation of ownership (cash flow rights) and control (voting rights) relating to the principal-agency relationship residing between management and shareholders. Alzeaideen and Al-Rawash (2014) state that this strong interest drawn to corporate governance is not only due to factors such as the recent large-scale bankruptcies filed by major corporates and the financial crisis, but also because of the direct relationship that corporate governance has on corporate power coming from the principal-agency arrangement of corporates (the separation of control from ownership with management exercising control over corporates on behalf of shareholders who are the de facto owners). Baysinger, Kosnik, and Turk (1991) are of the opinion that the separation of ownership from control within large corporates establishes an inherent potential conflict of interest in the decision-making processes between management, who may be pursuing self-interests such as personal wealth aspirations, on the one hand, and shareholders, on the other hand, who are most interested in maximising long-term profits and value creation of the company.

According to Foley and Greenwood (2010) corporate ownership structures are less concentrated in jurisdictions where minority rights are better protected and in more mature public companies. Buzzacchi and Colombo (1996) studied the corporate ownership patterns within the Italian manufacturing sectors and their findings validated the notion put forward by Bhide (1993); Foley and Greenwood (2010); Cox, et al. (2004) that property rights and agency theory professing individuals' need for wealth creation, risk sharing, and the desire to procure limited resources (including capital) were the primary reasons behind ownership dilution.

Kadlec and McConnell (1994) found that during the 1980s share prices responded positively to the widening of shareholders from public listings with the result being an improvement in the equity returns for investors (thus

increasing the company's market value). By observing the evolution of corporate ownership in 34 countries during the period running from 1995 through to 2006, Foley and Greenwood (2010) found similarly confirmatory evidence on the merits of diverse shareholding which led them to conclude that better performing shares are generally more widely held and exhibit higher liquidity features with higher free float levels.

Renneboog (2000), however, submitted a counter argument noting that block shareholdings by strategic investors improves financial performance of companies by increasing the level of discipline in management and limits the free riding phenomenon associated with minorities who normally avoid expending management monitoring costs due to the relative small benefit that accrue to them. From their study of the German market using data from 1990 through to 2002, Kaserer and Wagner (2004) reported that the introduction of new corporate governance rules and monitoring functions did not yield any noticeable improvement in the financial performance of companies in line with the underlying objectives embedded within management reward structures (thus validating the importance of active monitoring of management by large strategic shareholders).

In addition to highlighting the risks associated with the principal-agency conflict of interest, Helwege et al. (2007) pointed out that listed companies with diffused ownership structures and no major strategic shareholder/s (thus boasting a higher free float) are often characterised by governance structures with a weak construct.

Nenova (2003) attributes the prominence of principal-agency problems in academic literature to the works of Berle and Means (1932) who, while acknowledging the benefits of tightly controlled structures, pointed out that attention must not be taken away from the potential risks presented by controlling dominant shareholders who might be tempted to extract private benefits from companies for their self-enrichment at the expense of other shareholders popularly known as the minority expropriation hypothesis. According to Nenova (2003), private benefits of control are not an insignificant component of a company's valuation and vary from country to country

depending on aspects such as legal framework, development of capital markets, and the relationship enjoyed with external financing providers. Private benefits include things like access to the use of company assets, the right to appoint key company officials, and other corporate privileges conferred on company employees (Nenova, 2003).

Using time-stamped records of 918 Euronext French-listed companies from 1998 through to 2003, Ginglinger and Hamon (2012) examined the effects of corporate ownership structure on market liquidity and found that differing control enhancement methods yield varying results on a share's liquidity. From the results so this study, they concluded that the use of a 'double voting right shares' systems (wherein long-term shareholders are awarded disproportionately higher voting rights per share and there are restrictions placed on company insiders from trading their shares) was more beneficial to the market liquidity of a share than the use of opaque pyramid structures (Ginglinger & Hamon, 2012).

Becht and Röell (1999) studied the results of data provided by countries participating in an international research initiative commissioned by the European Corporate Governance Network to understand the impact of block shareholdings. Findings from these results revealed that different countries adopted different legal frameworks to separate voting powers from ownership with principal-agency conflict of interest issues faced in the U.S.A. mainly related to the separation of control between management and external shareholders whilst the main conflict issue in Europe (wherein voting power is highly concentrated) is largely centred around the friction between majority shareholders and minority shareholders (Becht & Röell, 1999).

Rhee and Wang (2009) studied the impact of foreign ownership in the Jakarta Stock Exchange from January 2002 to August 2007 during which period foreign shareholders held approximately 70% of the value of that stock market's free float which translated to c.41% of the overall market capitalisation of the stock exchange at the time. Results from their works led them to conclude that the shareholdings by foreign investors generated a negative influence to the stock market's liquidity, which outcome was consistent with conclusions reached from

other similar studies in developed markets, thus dispelling perceptions that the presence of large component of foreign investors in the ownership structures of shares in emerging markets increases their liquidity (Rhee & Wang, 2009). The introduction of foreign investors to the ownership structures of companies listed on the Jakarta Stock Exchange was expected to somewhat address the challenges of information asymmetry within this market, which hypothesis was not validated from the study of these authors (Rhee & Wang, 2009).

In a move to protect its currency and fend off currency speculators, in 1998 the Hong Kong government bought into 33 blue chip shares of the Hang Seng index, accumulating a total of 7.3% of the index or USD 5.1 billion equivalent worth shares, which move drastically drove down the free float of the acquired companies (Chan et al., 2004). However, surprisingly these authors could not identify any direct linkage between the percentage of government shareholdings and the movement in the trading price or even the decline in the liquidity of these shares when a new strategic shareholder in the form of the Hong Kong government was accumulating substantial increases in their shareholding at short spaces of time (Chan et al., 2004).

According to Çaliskan and Kerestecioğlu (2013) from the early 2000s custodians of major equity indices began changing calculation of index weights by starting to incorporate the free float to the final market capitalisation figures of index constitutes as one of their eligibility criterion. As a concept, the free float is relatively new to the investment community having gained prominence only in the early 2000s following the December 2000 announcement of a two phased implementation plan (starting November 2001 and then finally in May 2002) of free float-adjustments by Morgan Stanley Capital International (Ideo, 2001).

In March 2004 another major equity index custodian, Standard & Poor's, announced their free float adjustments plans to start weighing constituent companies on the basis of their free float (as opposed to the then norm of using total market capitalisation) to ensure a more accurate reflection of investable universe (Biktimirov, 2009). In justifying this move, these custodians argued that experiences from the East Asian financial crisis showed that factoring in the

free float into the calculation of the market capitalisation for purposes of index inclusion was critical in addressing the negative impact that low free float has on share liquidity and price distortions (Çaliskan & Kerestecioğlu, 2013).

The inclusion of free float-adjustments to equity indices had a significant impact on tracker funds/strategies of global fund managers who had to implement substantial portfolio re-balancing to mirror the new/adjusted benchmark indices, which resulted in drastic changes to equity index membership due to the exclusion of shares with low free float (less than 15%) and adjustment to index weights for a number of index constituents (Çaliskan & Kerestecioğlu, 2013). Çaliskan and Kerestecioğlu (2013) define the free float as the number of freely trading shares (not held by strategic shareholders who are often institutional investors and government) as a proportion of a company's total outstanding issued shares. The free float captures a company's shareholding component that is held outside the hands of strategic/block shareholders, meaning that a higher free float could be taken as an indication that most of the company's outstanding shares issued are held in small parcels by liquidity trades available for trading without restriction and vice versa (Biktimirov, 2009).

Typical strategic shareholders include governments, controlling shareholders, directors, investors holding more than 5% of the company's total outstanding issued shares, and treasury shares (Johannesburg Securities Exchange, 2014). To separate shares with a satisfactory investable universe from those deemed to display less desirable investable universes, scholars such as Rezaei and Tahernia (2013) use a 20% threshold as a yardstick to distinguish between shares with good free float (20% and above) and those with low free float (below 20%).

Using free floats for companies listed in Japan's Nikkei 225 from 1990 through to 2000, Ideo (2001) runs a simulation which shows that the free float-adjusted performance benchmark outperformed the equal-weighting benchmark although the study concluded that overall adjustment for the free float does not always improve return or risk/volatility.

Despite some of the noted drawbacks related to dispersed ownership structures having high free floats, it is worth noting that there is consensus amongst scholars that increased percentage of active shareholders augurs well for the governance of a company's affairs and thus the financial performance of that company (Bhide, 1993).

2.5 Asset pricing: empirical literature and economic theory

Sorayaei, Memarian, and Amiri (2013, p. 170) posit that "investing is one of the most important aspects in economic growth with the primary incentive being to maximise profits and minimise losses" as the main criteria for effective decision-making in the stock markets. According to Muller and Ward (2013, p. 1), "the holy grail of investment finance could be defined as a methodology which allows an investor to simply and persistently 'beat the market'".

Predicting equity returns in order to develop trading strategies to gaining abnormal profits is an area that continues to attract strong academic interest with the two most popular strategies being the contrarian strategy, the policy of buying past loser shares over past winners when shares are sorted based on their long term (three-five years) equity returns, and the price momentum strategy, which favours past winners when shares are ranked according to equity returns in the shorter horizon (Sehgal & Jain, 2015).

The 1960s though to the 1970s can be regarded as the glory days of the CAPM with the model widely deployed across various realms of finance and investment assessment and shaping the "intellectual structure within which contemporary research in asset pricing is conducted" (Campbell, 2014, p. 1). At its heart, the CAPM proclaims that a share's equity returns has a linear relationship to its associated risk (Blitz et al., 2013).

$$E[R_{it}] - R_{ft} = \beta_i E[R_{mt} - R_{ft}] \quad \text{....A1}$$

The above formula (A1) serves as the traditional CAPM equation for computing expected returns on an asset with R_{it}, R_{ft}, β_i, E[.], and R_{mt}, respectively, representing "the asset of interest (R_{it}), the risk free asset (R_{ft}), β_i = Cov(R_{it},

R_{mt})/Var(R_{mt}), the expectation operator (E[.]), and R_{mt} as the gross returns on the market portfolio of all assets in the economy" (Jagannathan, Schaumburg, & Zhou, 2010, p. 51).

During the 1980s through to the 1990s, shortcomings of the CAPM started emerging prompting the evolution and popularity of the Fama and French Model, hereafter referred to as the "FFM" (Campbell, 2014). Although there had been prior academic work questioning the validity and usefulness of the CAPM, the most prominent and devastating blow to the CAPM came from the ground-breaking work of Fama and French (1992) wherein these scholars found higher performing companies to carry less risk (van Rensburg, 2001). Most troubling for the CAPM was that the market betas, which are at the heart of the CAPM, were found not able to provide explanations for variations in equity returns (van Rensburg, 2001).

To some degree, the FFM could be looked at as a derivative of the CAPM with the introduction of firm attributes as return predictors (in addition to the CAPM's beta market risk factor) to capture the fact that market betas are not the primary drivers of equity returns (Fama & French, 2004).

Estrada (2012) remarks that despite the numerous academic literature published highlighting the challenges within the CAPM and consequently dispelling the primary hypothesis of this Nobel-prize winning model, it is surprising to note that the CAPM still reigns supreme in academic literature with the model still enjoying a great deal of following amongst practitioners and in academia. Fama and French (2004, p. 1) notes that despite the glaring shortcomings of the CAPM, the model's power and pleasing intuitive elements on the relation between risk measurement and equity returns have propelled it to be the "centrepiece of MBA investment courses".

Although firstly acknowledging the significant contribution the CAPM has had in shaping the way academics and practitioners think about equity returns and risk, Banz (1981) provided empirical contradiction to the CAPM by demonstration that the size of a company's equity (market capitalisation) has a significant influence in explaining the equity return (the "size effect"). This

phenomenon, which claims that companies with relatively smaller market capitalisation generally exhibits higher equity returns than companies with bigger market capitalisation (Banz, 1981), was also validated in South African through the work of Basiewicz and Auret (2009). The relative explanatory power of the firm size (denoted by market capitalisation) will be examined alongside the free float under Hypothesis 2 of this study.

In South Africa, van Rensburg (2001) is credited as the father of South African finance literature focusing on identifying firm characteristics able to explain variations in equity returns on the JSE with almost every single paper on South African asset pricing research published since his pioneering paper making reference to his work (Hodnett et al., 2012). With his research on 24 style-variables of industrial companies for the period starting 1983 through to 1999, van Rensburg (2001) identified the price-to-earnings ratio (under the value cluster), historical rolling positive returns (under the momentum cluster), and the market capitalisation (under the quality cluster) as the three firm attributes statistically significant to explain to variations in equity returns (after adjusting for risk).

Taking cue from the approach proposed by Daniel and Titman (1997) of basing the analysis on firm attributes, van Rensburg and Robertson (2003) used JSE data from 1990 through to June 2000 to progress the strand of work undertaken by van Rensburg (2001) but moved away from the portfolio-based approach adopted by van Rensburg (2001) in regressing dividend-adjusted equity returns of JSE-listed shares on the values of firm attributes. In this study by van Rensburg and Robertson (2003), the value of a share's exposure to the factor is denoted by the value of the firm attribute with the slope coefficients estimated representing the rewards accruing to each attribute in each period. From that work, these authors come up with the ground-breaking size-P/E optimal model proclaiming size (market capitalisation) and the price-to-earnings ratio as equity return explanatory variables (van Rensburg & Robertson, 2003). This model forms the primary interest of this research.

Alves (2013) adopted the Griffin (2002) approach to compare the benefits and reliability of using the FFM over the CAPM using data of 10 European monetary union country members for the period 1990 to 2003 and found that the FFM produced undoubtedly more reliable outcomes over the CAPM, after accounting for local, international, and global factors. The FFM generated even more robust results for small and high book-to-market value companies over the CAPM, leading Alves (2013) to strongly recommend the use of this model over the CAPM, especially where international factors are included in the equity returns model.

This study follows the recommendation of Alves (2013) by adopting the FFM in examining firm attributes as explanatory variables for variation in equity returns and, as recommended by Auret and Sinclaire (2006), this study also does not devote any resources to examining and assessing the validity and sufficiency of the CAPM or the influence of its brainchild the market beta. van Rensburg and Robertson (2003) also provided empirical evidence on the JSE refuting the CAPM's presumption that the market beta possess explanatory power for variations in equity returns. In addition to constructing the above-mentioned equity returns model, van Rensburg and Robertson (2003) also found evidence to dispute the CAPM proposition.

Encouraged by the success of the book-to-market ratio put forward by Fama and French (1993), Auret and Sinclaire (2006) used the same sample data used by van Rensburg and Robertson (2003) covering the period 1990 through to 2000 to test the correlations of the book-to-market ratio with equity returns on the JSE and found this ratio to play a strong role in explaining variation in equity returns. Auret and Sinclaire (2006) performed the analysis (employing univariate, bivariate and multivariate OLS CSR methodology together with the Student's t-test for evaluating slope significance) on the 5 most significant firm attributes reported by van Rensburg and Robertson (2003) with the addition of the book-to-market ratio as a potential new firm attribute. However, despite recording strong explanatory power possessed by the book-to-market ratio, Auret and Sinclaire (2006) concluded that the inclusion of the book-to-market

ratio did not improving the explanatory power of the size-P/E model as developed by van Rensburg and Robertson (2003).

In 2012 Hearn (2012) reviewed a unique sample of Sub-Saharan countries (Kenya, Namibia, Mauritius, Botswana, Nigeria, Ghana, Zambia and Cote d'Ivoire) for a period running from 2002 through to 2008 to assess the CAPM side-by-side against the fashionable attributes-augmented explanatory model (viewed as the attributes enhanced FFM), which incorporated size, liquidity, and book-to-market value. Results from his work demonstrated that shares from companies trading in Kenya and Nigeria exhibit relatively lower illiquidity behaviour whiles Botswana, Namibia and Cote d'Ivoire companies showed high illiquidity traits (Hearn, 2012). In addition to identifying critical peculiarities of these markets such as high levels of illiquidity, relatively small size of equity markets, constrained free floats, segmentation, and lack of appropriate regional benchmark indices with sufficient history within and between the markets, Hearn (2012) also submitted empirical evidence confirming that both size and liquidity factors have a significant influence in explaining equity returns while in some instances also noted a reversal of the size effect, that is, equity returns declining with increases in a firm's market capitalisation.

The second part of the conclusion drawn by Hearn (2012), which states that liquidity factors have a significant influence on equity returns, together with the notion that low free float restricts liquidity due to limited investable universe coming from suppressed investor demand (Bostanci & Kilic, 2010) gives credibility for the need to research the effects of free float on equity returns (hence this study).

2.6 Performance and trading frictions

Stock markets (security exchanges) have emerged as the principal mechanism for directing the flow of capital into corporate enterprises for purposes of facilitating the expansion of businesses in order to foster economic development in their country of operation (Moerland, 1995). However, according to Nenova (2003), the possibility of extracting private benefits of control (which

are often a significant portion of the firm's value although they may differ substantially from country to country) away from minority shareholders is often cited as one of the main deterrents to a well-functioning stock market.

By studying the influence of stock market performance on the investment policies of pension funds, Bikker, Broeders, and De Dreu (2010) came to the conclusion that, in the short-term, higher/lower pension funds equity allocations over other asset classes (bonds and other investment securities) tend to follow recent equity out-performance/under-performance due to the lagged portfolio rebalancing behaviour of pension funds while their medium-term investment allocation decision mostly track stock market cyclicality, that is, exhibits a myopic behaviour. According to Bikker et al. (2010), shocks to stock markets induce an asymmetrical reaction from pension funds with their investment policies rebalanced to be over-weight (under-weight) equities after periods of under-performance (out-performance).

Stock markets of emerging economies are generally more volatile than those of well-established markets and thus more risky, that is, more prone to shocks (Farag, 2013). With liquidity, marketability and trading costs considered as some of the primary attributes of many investment plans and financial instruments (Amihud & Mendelson, 1986), the lack of liquidity of these markets is regarded as one of the key factors for their high volatility and a significant impediment to their financial market development (Rhee & Wang, 2009). Henceforth, a major challenge facing these markets remains their low level of liquidity which most argue is one of the primary reasons that these markets continue to attract low amounts of institutional investments – which challenge should make enhancing market liquidity a key concern for policymakers in these markets in their endeavours to entice the much needed foreign capital (Minović & Živković, 2010).

Sorayaei et al. (2013) suggest that securities exchanges should consider using tools such as imposing price limits, restricting trading, and even going to the extent of temporarily closing off trading activity in instances where there is evidence of a build-up of price bubbles as these bubbles are often the result of emotional purchases or sales by investors lacking information. Polwitoon

(2011), however, is of the opinion that price limits are not as effective in limiting the damaging effects of price volatility (which could be independent of any variation in underlying fundamentals within a company) because price limits do not provide an effective means as circuit breakers for establishing a cool-off period for traders by restraining price volatility from working against the core benefits of capital markets. Kim and Rhee (1997) identified the damaging effects of price limits as one of the grave impediments to capital markets efficiency and argue that price limits can lead to volatility spill overs, delayed price discovery mechanisms and interfere with trading activity. These authors conclude that empirical evidence on the effects of price limits is mixed (Kim & Rhee, 1997).

Dalgaard (2009) defines liquidity as the ease with which shares can quickly be bought or sold in an open market without incurring significant transaction costs due to trading impact or price movements whilst Amihud (2002) reports that as a concept liquidity is related to trading aspects such as discounts offered by sellers and buyers' premium for acquiring an asset. Amihud et al. (2006, p. 2) state that liquidity is a "complex concept" with many facets which can be created by a number of factors such as "exogenous transaction costs, demand pressure and inventory risk, existence of private information on fundamentals and order flow, and the difficulty of locating a trading counterparty". According to Benić and Franić (2009, p. 478) there is currently no single universally accepted measure that captures all elements of the "multi-dimensional characteristics" of liquidity which lead Amihud (2002, p. 3) to describe liquidity as an "elusive concept, which cannot be observed directly but rather has a number of aspects that cannot be captured in a single-measure".

Chordia, Roll, and Subrahmanyam (2001) vouch that liquidity of listed shares is one of the most important factors for the investment decision-making process for equity investors in ranking the attractiveness and desirability of investment destinations and target assets. By observing monthly equity returns, the study by Brennan and Subrahmanyam (1996) showed that the required rate of return is higher for relatively illiquid shares, so higher cost of capital after adjusting for risk factors and price levels. With these principles well established, this study

provides guidance and insights on the effects that the free float has on equity returns of listed companies within an emerging market context (South Africa in this instance).

2.7 Conclusion of the Literature Review

The above literature review highlights the following key insights:

This literature review has revealed that there is limited academic literature on free float primarily due to the fact that the free float concept is relatively new to the finance world as the concept only gained prominence in the early 2000s (Ideo, 2001). According to Ideo (2001) this prominence was largely as a result of the revision of the weightings of index constituents introduced by the custodians of major equity indices (such as Morgan Stanley, Standard & Poor's, and FTSE for example) to more accurately reflect the investible universe of each company by incorporating free float-adjustments to their market capitalisation calculations.

In South Africa, the three firm attributes of size (market capitalisation), price-to-earnings ratio and book-to-market ratio have been found to possess the strongest explanatory power for explaining variations in equity returns with the book-to-market ratio being the strongest of these three (Basiewicz & Auret, 2009). The free float, as a firm attribute, has been identified as providing important factual and signalling information about the ownership structure of a listed company relating to the liquidity of shares, governance framework, price return, price volatility, trading activity etc. to the investor community (Çaliskan & Kerestecioğlu, 2013).

With the demise of the CAPM and the ascendance of the firm-specific attributes model as the academic pivot for explaining variation in equity returns, an increasing number of studies has since emerged attempting to identify firm attributes able to explain variations in equity returns (van Rensburg, 2001). These papers are motivated by the works of Fama and French (1993), who are credited as the founding fathers of the shift in academic literature away from the

CAPM towards identifying firm characteristics able to explain equity returns variations.

In the 1980s the main agency conflict was assumed to reside between shareholders and management with concentrated shareholding regarded as the solution to this agency problem as control structures afforded large shareholders more power and greater incentive to monitor management at lower costs, thus leading to improved financial performance by companies (Hu & Izumida, 2009). However, from the 1990s onwards, attention in the academic literature shifted to focus on the conflict of interest between controlling shareholders and minority investors (wherein controlling shareholders pose the threat of expropriating private benefits out of the company for self-interest away from minority investors) which has the negative effect of alienating small investors and thus escalating the cost of capital for companies and also prompting these companies to pursue inefficient investments (Hu & Izumida, 2009).

The above literature review established that there is general consensus amongst scholars on the effects of corporate ownership structure on equity returns of listed shares with regard to key elements such as share liquidity, corporate governance, share price movement (firm valuation) even though there is a recognition that information transparency on the identity of ultimate beneficial shareholders/ownership in order to capture the exact free float remains a challenge (Ideo, 2001; Park, 2009; Uno & Kamiyama, 2009).

2.7.1 *Research Hypothesis 1:*

The main hypothesis of this study is that free float bears a significant correlation with equity returns of shares listed on the JSE.

2.7.2 *Research Hypothesis 2:*

Free float has a stronger influence on equity returns than corporate size (market capitalisation).

2.7.3 *Research Hypothesis 3:*

Inclusion of free float in the van Rensburg and Robertson (2003) size-P/E model improves the explanatory power of the model.

2.7.4 *Research Hypothesis 4:*

A combination of the free float and another firm attribute generates more explanatory power than the size-P/E model.

CHAPTER 3. RESEARCH METHODOLOGY

The following chapter presents the research methodology used for statistically testing and analysing the research hypotheses put forward in the previous chapter (Chapter 2: Literature Review, 2.7.1 – 2.7.4). The chapter begins by providing an explanation of the methodology/paradigm for the study in Section 3.1 and then Section 3.2 outlines the research design afterwards.

The population, sample and the sampling methodology employed are then discussed in Section 3.3, which is followed by a discussion of the research instrument in Section 3.4 as well as the adopted procedure for data collection in Section 3.5 with an analysis and interpretation of the data presented in Section 3.6. Limitations of the study are detailed in Section 3.7 and the chapter concludes with a discussion of the reliability and validity of the study in Section 3.8.

This study followed a quantitative research approach. The existence of detailed primary data on the variables of interest (the independent variables and the equity returns of shares listed on the JSE) informed the decision to adopt a quantitative research paradigm. It is also worth noting that this paradigm has been extensively followed by other scholars in similar asset pricing studies on the JSE and in other markets internationally.

3.1 Research methodology/paradigm

Creswell (2013) recommends that those designing a proposal or plan should adopt a general framework to provide guidance about all facets of the study, ranging from assessing the general philosophical ideas behind the inquiry through to the detailed data collection and analysis procedures. In his view, using an “extant framework allows researchers to lodge their plans in ideas well-grounded in the literature and recognised by audiences that read and supports proposals for research” (Creswell, 2013, p. 3).

Out of the three main alternative strategies of inquiry (quantitative, qualitative, and mixed methods), this study applied the quantitative framework (a logical positivism paradigm as opposed to interpretivism or constructivism) with quantitative measures adopted to test hypothetical generalisations using statistical testing and analysis on data collected from predetermined instruments to seek causal determination, prediction, and generalisation of findings (Hoepfl, 1997). Johnson and Onwuegbuzie (2004, p. 18) assert that "the major characteristics of traditional quantitative research are a focus on deduction, confirmation, theory/hypothesis testing, explanation, prediction, standardised data collection and statistical analysis".

These authors are of the view that quantitative research provides benefits such as testing and validating already constructed theories about how (and to a lesser degree, why) phenomena occur, testing hypotheses that are constructed before the data are collected (as such one can generalise research findings when the data are based on random samples of sufficient size), allows predictions to be made, research results are relatively independent of the researchers (e.g. effect size, statistical significance), and most importantly, their research results tend to have higher credibility with many people in power (Johnson & Onwuegbuzie, 2004).

In addition to highlighting that by deploying quantitative research the investigator is capable of studying a phenomenon without influencing it or being influenced by it, Sale, Lohfeld, and Brazil (2002) proclaim that most mixed-method designs start off with a qualitative pilot study first which is then followed by quantitative research. In their opinion, the process of concluding qualitative research with quantitative processes promotes the view that qualitative research is only exploratory, cannot stand on its own, and must be validated by quantitative work because the latter is regarded as scientific and studies truth (Sale et al., 2002). These authors also noted that the increasingly use of computer programs specifically designed for analysing qualitative data in quantitative (counting) ways by qualitative researchers seriously violates the assumptions of the qualitative paradigm/s (Sale et al., 2002).

Based on the learnings and advantages of quantitative research noted above by the various scholars highlighting the beneficial qualities of this paradigm, this research methodology framework was deemed appropriate for the purpose of this study because research variables (equity returns, free float and the other independent variables) were tested and analysed using market data, which by its very nature require mathematical/statistical methods for testing and analysis.

3.2 Research Design

As noted above, this study followed a quantitative research methodological approach. This research principally followed the same methodological approach as that of Auret and Sinclaire (2006) in progressing the strand of work initiated by van Rensburg and Robertson (2003) who were motivated by the study undertaken by van Rensburg (2001) in using the firm-specific attributes approach advocated by Daniel and Titman (1997). In addition to the firm attributes identified by these scholars, this research submits the free float as a potential firm characteristic able to explain variations in equity returns of listed shares.

It has become standard practice in asset pricing research to test the effects of firm attributes with the Ordinary Least Squares ("OLS") Cross-Sectional Regressions ("CSR") methodology with the method extensively deployed by scholars in similar studies both internationally (Alzeaideen & Al-Rawash, 2014; Amihud & Mendelson, 1986; Banz, 1981; Bhandari, 1988; Fang, Noe, & Tice, 2009; Chan et al., 2004; Çaliskan & Kerestecioğlu, 2013) and on the JSE (Auret & Sinclaire, 2006; Strugnell et. al., 2001; Auret & Cline, 2011; Basiewics & Auret, 2009; van Rensburg & Robertson, 2003). Accordingly, a combination of univariate, bivariate and multivariate OLS CSR were executed to examine the relationship between equity returns (as the dependent variable) and a number of firm attributes as independent variables (paying particular attention to the effects of free float).

The research deployed the OLS CSR methodology which Jagannathan et al., (2010) credits Fama and MacBeth (1973) and Jensen, Black, and Scholes

(1972) for pioneering in asset pricing research which includes firm characteristics to expose misspecification errors and is thus considered an extension of an imperfect asset pricing model. Cochrane (2000, p. 228) reports that OLS CSR are widely used in asset pricing research principally because they are “historically important (by enabling the effects of changing variables to be captured) and are a useful procedure which is computationally simple to implement” that boasts strong intuitive appeal. According to this author, OLS CSR are widely depend on in asset pricing research for generating standard errors and test statistics as the technique has been found to successfully address cross-sectional correlations when testing various assets over an extended duration (Cochrane, 2000).

Primarily due to its effectiveness and completeness, the OLS CSR methodology has earned its place as the “primary tool” for asset pricing research and the method is generally regarded as being easily adaptability to a variety of uses (NIST, 2012, p. 1242). According to NIST (2012) because the theory behind OLS CSR is well-understood and the methodology is very flexible, researchers can easily provide clear answers for statistical hypotheses by adopting this methodology. Most importantly, NIST (2012) asserts that OLS CSR generates optimal estimates of the unknown parameters thus generally making very effective use of data to produce good statistical results.

OLS CSR are preferred for performing asset pricing tests because they “pick the slope to best fit all the data points to minimise the sum of squares of all the pricing errors whereas time-series regressions describes the cross-section of equity returns by drawing a line running through the origin and through the factor, ignoring all the other points” (Cochrane, 2000, p. 227). This research utilised OLS CSR as it is a particularly powerful technique yet it is a relatively simple method used in econometrics and a major technique deployed by most researchers to analyse data with its usefulness easily extendable by data transformation methods and furthermore, it is “easy to check the technique’s assumptions such as linearity, constant variance and the effect of outliers using simple graphical methods” (Moutinho & Hutcheson, 2011, p. 224).

Daniel and Titman (1997) asserts that cross-sectional equity returns are better captured by firm characteristics, thus supporting this study's decision to adopt of the characteristic-based approach wherein monthly holding period equity returns are regressed on the values of the various independent variables (including the free float) with the estimated slope coefficients denoting the yield accruing to each independent variable (representing a firm characteristic). According to Kandel and Stambaugh (1995) the cross-sectional R-Square has become a popular goodness-of-fit measure for many empirical studies because the cross-sectional R-Square is a decreasing function of the aggregate pricing-error and is more orientated towards equity returns measure thus making it a natural goodness-of-fit measure.

The research data for this study is comprised of holding period (monthly) cross-sectional equity returns of the various FTSE/JSE All Share Index constituent companies over a 12-year period (from 2003 to end 2015). Each of the 146 monthly observations were regarded as a point in time (equity returns were thus computed as movement in share prices from the beginning of the month through to the end of that same month together with other shareholders' receipts). Each of the 146 months were individually regarded as a holding period.

Firstly, the free float as an independent firm characteristic is tested on an individual basis by means of the univariate OLS CSR, formula (A2) below, for each month of the sample period with its reward as firm attribute denoted by the slopes measured in each month.

$$Ret_{i,t+1} = \beta_{o,t+1} + \beta_{1,t+1}A_t + \varepsilon_{i,t+1} \quad \ldots.(A2)$$

Equity returns (the dependent variable) on share i for month t+1 are represented on the left-hand side by $Ret_{i,t+1}$, the independent variable (free float in this instance) is denoted by A_t with $\beta_{1,t+1}$ as the cross-sectional slope coefficient to be estimated with OLS CSR, while $\beta_{o,t+1}$ and $\varepsilon_{i,t+1}$ are the estimated intercept-coefficient and the monthly error term, respectively. The regression is repeated each month of the sample period and the duration slopes

measured represents the ‘reward’ for the independent variable (the free float in this case) in each month (van Rensburg & Robertson, 2003).

The statistical significance of the firm characteristic of interest (free float here) is then assessed using the Student’s t-test (for testing significance from zero) and attention devoted to the significance of coefficient of the particular attribute (free float for example) in explaining variations in equity returns, on an individual basis and relative to other previously identified firm attributes.

The influence of the independent variable (free float) in explaining variations in equity returns is thus assessed (Hypothesis 1) and then compared to the market capitalisation (Hypothesis 2). Equity returns are then regressed on size and price-to-market ratio with the free float as an addition to this combination in a multivariate regression noting whether the free float demonstrates any ability to displace or add to the explanatory power of the size and price-to-earnings ratio model (Hypothesis 3). The next step involves combining each of the other attributes in pairs of two together with the free float into bivariate OLS CSR, formula A3 below, documenting whether any combination of the free float with any other firm attributes exhibits stronger explanatory power than the size-P/E model (Hypothesis 4).

$$Ret_{i,t+1} = \beta_{o,t+1} + \beta_{1,t+1}A_t + \beta_{2,t+1}Ø_t + \varepsilon_{i,t+1} \quad \ldots.(A3)$$

The parameters in the above equation, formula A3, are the same as in formula A2 above with the addition of each of the other four firm attributes ($Ø_t$) at time t together with its coefficient $\beta_{2,t+1}$. The study adopts a two-tailed test of significance by testing the above hypothesises for mean returns being statistically different from zero as the alternative in order to address the risk of the study being self-fulfilling and prevent any possible data mining accusations whilst also ensuring the level of significance from the study’s results is not unduly inflated (Strugnell et al., 2011).

The next step entails the process of addressing the potential multicollinearity problems by analysing the correlations amongst the candidate attribute with the free float to ensure that these are not highly correlated, otherwise the attribute combination (with the free float) is considered redundant if it is correlated and

thus removed from the study. Firm characteristics acting as independent variables are comprised of the free float and the four other firm characteristics previously identified as predictors of equity return variations, that is, size (market capitalisation), price-to-earnings ratio, closing share price, and the earnings yield ratio.

By deploying the OLS CSR on these 5 firm attributes (including free float), the study observes the cross-section of equity returns of shares listed on the JSE main board which are constituent companies of the FTSE/JSE All Share Index. The study uses primary data sourced from the JSE Securities Exchange as provided by the database administered by the service provider, I-Net BFA. OLS CSR analysis of the various firm characteristics (the independent variables) are used in conjunction with hypothesis testing to study the relationship between the dependent variable (equity returns) and the independent variables. Particular attention is devoted to observing the influence of the free float and a keen eye placed on whether the introduction of the free float improves or necessitates an adjustment to the van Rensburg and Robertson (2003) size-P/E equity returns optimal model.

As a result of the general robustness and descriptive nature of the I-Net BFA database as a source of data for JSE-listed shares, this paper uses monthly data of the shares meeting the eligibility criterion for being considered a constituent member of the FTSE/JSE All Share Index plus complying with the sort specifications of trading costs and illiquidity as prescribed by the minimum requirements for this index. To give the study some level of comparison to other previous researches (Auret & Sinclaire, 2006; Basiewicz & Auret, 2009), data analysis is sourced and analysis undertaken on a monthly basis in the same way as other prior similar studies. The population return data has been inspected to locate and correct anomalies such as share splits, companies unbundling, trading suspensions, mergers and acquisitions, etc., which are known to impact the trading price but not necessarily the firm's value (Basiewicz & Auret, 2009).

3.3 Population and sample

3.3.1 *Population*

All shares included as constituent members of the FTSE/JSE All Share Index as at end of 2015 are considered in this study. The study timeline runs for a 12-year period, which period length (more than 10-years) helps to ensure that there is sufficient data to be observed.

At the end of each month during the study period, cross-sectional data observations on the independent variables and the dependent variable are collected across all the FTSE/JSE All Share Index constituencies for purposes of running the statistical tests and analysis. Variation in equity returns of these constituent companies are assess over 146 months thus producing a longitudinal panel of cross-sectional observations comprising the various companies over 146 months to assess how equity returns of these companies vary during the study period.

In line with the study purposes, the statistical analysis is primarily focused on assessing variations in equity returns of the various constituent companies which is supposedly introduced by the independent variables (with free float being of most interest).

3.3.2 *Sample and sampling method*

The research imposes an eligibility criterion for inclusion into the study sample which requires a listed share to have been listed and actively traded on the JSE as at end of December 2015 and its free float to have been computed and published by the JSE.

Other similar studies testing the relationship between equity returns and firm attributes on the JSE have also adopted a comparable sample period of approximately 10-years, albeit most of these studies were undertaken during the 1980s through to the mid-2000s (Auret & Sinclaire, 2006; Basiewicz & Auret, 2009; Strugnell et al., (2011); van Rensburg, 2001; van Rensburg &

Robertson, 2003) whilst this study commences in the mid-2000s (November 2003) and run until the end of December 2015. This study period (12-years) is deemed appropriate as similar time-spans were adopted by scholars in other similar asset pricing studies and more importantly it dovetails (with a slight overlap) with the sample period adopted by the study of Basiewicz and Auret (2009) which ended in July 2005.

These authors noted that by including the majority of listed companies in a study period stretching 10-years or more sample attritions (due to data limitations resulting from aspects such as missing data, companies reporting in foreign currency, companies listed for a short duration and companies operating in the real estate industry) is likely to be evenly distributed throughout the sample period to alleviate any sample selection concerns (Basiewicz & Auret, 2009). Additionally, adopting such an extensive sample duration produces sufficient market data with which to estimate loadings (Basiewicz & Auret, 2009).

Auret and Sinclaire (2006) and van Rensburg and Robertson (2003) adopted a similar sample period by both running their respective studies for a 10-year period starting July 1990 and ending June 2000. With most of the JSE assets pricing studies ending in the early to mid-2000s, this study helps by providing supplementary empirical evidence to up-date the result and observations from these prior studies (in addition to introducing the free float as a firm attribute).

The BESA (the bond exchange), SAFEX (the futures and commodities exchange), and Yield-X (interest rate and currency instruments trading platform) were excluded from this research.

Additionally, for a company to be part of the final sample, it had to comply with the sort specifications of minimum trading costs and illiquidity screening as monitored and administered by the FTSE/JSE Advisory Committee as prescribed in the Ground Rules for FTSE/JSE Africa Index Series (JSE, 2014). According to these rules, which meets the IOSCO Principles for Financial Benchmarks, only shares with sufficient liquidity to be traded (defined as a minimum of 5 trading days per month) are included to the FTSE/JSE all Share

Index (JSE, 2014), which approach was also adopted in a similar recent study by Auret and Sinclaire (2006).

To improve the robustness of the analysis, this study excluded companies with more than one class of shares traded on the exchange as the existence of an additional class of shares introduces another mechanism through which control could be exercised and thus mask the true extent of the existence of strategic shareholders and free float of the company's stock (Foley & Greenwood, 2010).

To follow the view expressed by Strugnell et al. (2011) from their work on JSE from 1994 to 2007, this study did not construct portfolio sorts on beta as an inverse relationship has been observed between beta and equity returns in this market already. According to these authors, results from their study suggest that any beta risk-adjustment increases the likelihood of overstating the influence of size and firm characteristics reported (Strugnell et al., 2011).

Only shares listed on the JSE main board are studied with the exclusion of real estate investment trusts and cash shell companies (Auret & Sinclaire, 2006) while anomalies such as share splits, companies unbundling, trading suspensions, mergers and acquisitions, etc., which are known to impact the trading price but not necessarily the firm's value, are assessed and the data adjusted to account for/exclude these (Basiewicz & Auret, 2009).

In constructing the sampling method, the study made every effort to minimise the challenges posed by ex-post selection bias (the bias arising because the current database contains only those companies which are currently viable entities) by reviewing the FTSE/JSE All Share Index constituent members as at end of December 2015 to ensure that each of them were included in the sample and the look-ahead bias (the dating problem introduced by lack of data availability at the point of measurement) by lagging equity returns in line with the predictor variables as highlighted by Banz and Breen (1986).

With I-Net BFA using year-end financial statements to produce the data points of interest, thus ignoring the interim results, because of the general comprehensive nature of annual reports compared to interim reports, the resultant data lags from year-end date such that these data points of interest

are matched with the company's equity returns for the month (Auret & Sinclaire, 2006). Hodnett et al. (2012) confirm that by lagging the firm characteristics data downloaded directly from I-Net BFA (which uses published annual financial statements information) with the relevant equity returns the look-ahead bias is adequately addressed.

This lag in data is necessitated by the JSE requirement for listed companies to publish their financial results no later than 90-days from their year-end date, which goes to mean that by the end of May investors would have been in possession of the financial data included in this study for at least two months for companies with December year-end (Auret & Sinclaire, 2006). In this fashion, this research addresses the pervasive 'look ahead bias' problem in the data for research of this nature (Muller & Ward, 2013). Strugnell et al. (2011) confirms that to address the potential look-ahead bias introduced by the lead-time between the accounting date and the reporting dates, a three-month (90-days) lag is sufficient in calculating the data variables of interest by adjusting the definitions to include the implied three months' prior denominator as this is a closer reflection of investors information basket at that point in time.

3.4 The research instrument

According to Harrell (2013, p. 1-13) model choice should be "empirical, the chosen model must use data efficiently, it should model overall structure, with robust models preferred, and should have the correct mathematical structure".

In this study, a combination of the SAS® Studio 3.5 software (SAS, 2016) and mathematical model and statistical methods based off Microsoft Excel were used for calculating the variables, identifying data anomalies, running the specified regressions, testing data characteristics and analysing the results as a way of confirming or disputing the assertions posed above.

3.5 Procedure for data collection

The primary data of companies (together with their variables) studied were sourced from I-Net BFA. Statistical testing, results analysis and return computations is undertaken using a combination of the SAS® Studio version 3.5 software (SAS, 2016) and Microsoft Excel. I-Net BFA was assessed as the data platform that could efficiently provide the most reliable and consistent data feed throughout the targeted study period for the data points of interest. Hence, this service provider was used as the primary source with the other data platforms like Blomberg used on a limited basis to validate the accuracy and fill in gaps of missing information identified from this primary database.

The independent variables are defined in line with similar researches undertaken by Auret and Sinclaire (2006, p. 33), Thomson and Reddy (2013, p. 54) and Hodnett et al. (2012, p. 23) as follows:

P/E ratio (price-to-earnings ratio): share price for each company divided by the share's earning per share.

Size: The market capitalisation of the share, which is the product of the share price and the company's total outstanding shares in issue.

EY (Earnings Yield): Earnings per share divided by the share price.

Close: The closing share price at the end of the month.

Free float: As described above under Section 1.6, Definitions of Terms.

Equity returns are computed as the sum of the capital gains, that is, the movement in share price from start to end of period (month), and one-twelfth of the dividend yield for monthly periods to safeguard the study for instances where dividend payment dates were not available (Strugnell et al., 2011). Strugnell et al. (2011) maintain that given the spread of financial year-ends across the calendar year for listed companies, using the dividend yield approximation as noted here is sufficiently accurate for asset pricing research purposes such as the one being undertaken here.

Due to the unavailability of detailed reasons information for companies delisting, the study was not be able to derive an accurate outcome for delistings with the default minus 100% approach adopted for delistings (Strugnell et al., 2011).

3.6 Data analysis and interpretation

The hypotheses formulated above (Chapter 2: Literature Review, 2.7.1 – 2.7.4) are tested using the quantitative methodology and statistical analysis tools described in this chapter (Chapter 3: Research Methodology) to allow for hypotheses testing, clarifying of relationships between variables, identifying trends and proposing reasonable explanations.

To ensure the study demonstrates scientific neutrality, the research follows the approach adopted by Strugnell et al. (2011) by adopting two-tailed significance testing, that is, the null hypotheses are tested against the alternative that the specified difference in mean returns is not equal to zero, as opposed to the one-tailed testing of significance which tests the null hypothesis against the alternative that a given difference in mean returns is greater than or less than zero.

The research is undertaken on gross unadjusted equity returns without making any adjustments for risk because the results on beta (the risk proxy) in studies by Strugnell et al. (2011) and van Rensburg and Robertson (2003) show that beta carries an inverse relationship with equity returns and thus any such beta risk-adjustment only amplifies the reported effects. Consequently, such adjustment was deemed unnecessary.

To enable cross-sectional regression comparison of the estimated slope magnitudes, the variables are cross-sectionally standardised in each month to yield a standard deviation of unity and mean of zero. Because the variables in this study bears differing units of measurement and as such are hard to compare like-for-like in their raw format, standardized values were relied on in addressing this comparison challenge as they (standardized values) present a common measurement basis for all variables in measuring them in standard

deviations such that they can be compared to each other (that is, all variables are reduced to a common basis of measurement).

As a result, beta coefficients as reflected by the standardised values were assessed to gauge the relative strengths of the independent variables within each hypothesis. Standardized values were computed as the difference between a variable's absolute value and its mean, dividend by the standard deviation of that variable. As such, standardized values were computed under the OLS CSR as the estimate equating the variances between the dependent and the independent variable to 1. Hence, these standardized values tells the movement in the standard deviation of the dependent variable (equity returns) resulting from a unit standard deviation movement in the independent variable. By transposing the coefficients into standard scores (z-scores), standardized values can easily and reliably be compared to each other and were thus relied on for assessing the relative strength of the independent variables.

The Student's t-test was used to evaluate whether the arithmetic mean of the slope coefficients are significantly different from zero. The slope coefficients of the univariate, bivariate and multivariate OLS CSR are observed together with the results of the t-tests and the p-values to identify any trend and/or relationship displayed by the introduction of the free float as an explanatory variable for the variations in JSE equity returns.

Initially, analysis was performed on the results from the univariate regressions executed on each of the independent variables against the dependent variable using the below regression form:

$$Ret_{i,t+1} = \beta_{o,t+1} + \beta_{1,t+1}A_t + \varepsilon_{i,t+1} \quad \ldots.(A2)$$

In this instance, t is an integer representing the study period months from 1 to 146 representing a particular month from November 2003 through to December 2015. The OLS CSR of equation A2 above was estimated in each month with each coefficient then computed as its average (Fama & MacBeth, 1973). $Ret_{i,t+1}$ represents the equity return of company i in period t+1 while A_t is the standardised value of the firm characteristic of interest at the end of month t. The disturbance $\varepsilon_{i,t+1}$ is assumed to be independent of the variables in A2 and

to have zero mean (Fama & MacBeth, 1973). $\beta_{0,t+1}$ is the estimated intercept while $\beta_{1,t+1}$ is the slope-coefficients.

Holding period equity returns were computed using the geometric returns formula by taking the combination of the share price appreciation, dividend receipts and any special pay-out receipts to shareholders using the formula:

$$R_{it} = G_{it} + (D_{t+1}/P_t) - 1 \quad \text{....(A5)}$$

Where R_{it} is the equity return for company i at month t, G_{it} is the increase in share price from beginning to end of month t (adjusted for any corporate action/s), while D_{t+1} is the monetary value of all pay-outs to shareholders (dividends plus any special distributions) during month t+1 and P_t is the starting price of the share at month t.

Firm characteristics were ranked in order of significance based on the results of the bivariate regressions of returns on these individual attributes alongside their accompanying t-statistic and the p-value to be followed by pairwise correlations of firm attributes together with the free float noting the correlation level amongst the attributes and their generated R-Square. The above analysis helped in addressing the hypothesised effect of free float on equity returns (the main hypothesis) and in ranking the explanatory power generated by the free float on equity returns compared to market capitalisation (Hypothesis 2: whether free float has a stronger influence to equity returns than corporate size/the size effect).

Bivariate and multivariate OLS CSR at 5% significance level, as displayed in the formula A3 and formula A4, respectively, of up to 3 value indicators/independent variables were ran to observe whether any combination of the free float with any other independent variable displayed stronger explanatory ability than the size-P/E combination (Hypothesis 4) and lastly whether inclusion of the free float to the existing size-P/E optimal return model improves the model's explanatory power (Hypothesis 3).

Bivariate regressions took the form:

$$Ret_{i,t+1} = \beta_{o,t+1} + \beta_{1,t+1}A_t + \beta_{2,t+1}Ø_t + \varepsilon_{i,t+1} \quad \ldots.(A3)$$

Here the main factors remains the same as in formula A2 with the inclusion of an additional independent variable $Ø_t$ at month t+1 together with its coefficient $\beta_{2,t+1}$ while $\varepsilon_{i,t+1}$ denotes the monthly error term with $Ret_{i,t+1}$ as the equity returns of company i.

To satisfy the requirements for Hypothesis 3 (that is, whether the inclusion of the free float to the returns model enhances its explanatory power), multivariate OLS CSR of the existing model constituents size and P/E ratio (as represented by the market capitalisation and price-earnings ratio, respectively) together with the free float were executed. The multivariate OLS CSR took the form:

$$Ret_{i,t+1} = \beta_{o,t+1} + \beta_{1,t+1}A_t + \beta_{2,t+1}Ø_t + \beta_{3,t+1}\mu_t + \varepsilon_{i,t+1} \quad \ldots.(A4)$$

Here the main factors remains the same as in formula A3 above with the inclusion of an additional independent variable μ_t at month t+1 together with its coefficient $\beta_{3,t+1}$. This OLS CSR assesses the combined effect of three firm attributes (free float, market capitalisation and price-earnings ratio as denoted A_t, $Ø_t$, and μ_t in A4). Collinearity diagnostics using condition indices, Eigenvalues and the variation proportion were produced to assess whether or not these variables were highly correlated to avoid the multi-collinearity problem while the Durbin-Watson statistics was relied on for testing autocorrelation amongst the observation errors.

The standard formula for the calculating equity returns of:

$$R_{it} = G_{it} + [(D_{t+1})/P_t] - 1 \quad \ldots.(A5)$$

is adopted with R_{it} as the holding period (monthly) equity returns for company i, G_{it} is the share price movement of company i from start of month to end of period (in cents) adjusted for any corporate action, D_{t+1} denotes dividend receipts and any special pay-outs which are typically in the form of the monetary value of rights issues, unbundled, share splits, and distributed shares,

for a shareholders in company i during the monthly holding period (in cents) whilst P_t is the starting price of the share at month t (Basiewicz & Auret, 2009).

3.7 Limitations of the study

According to Baccalá and Sameshima (2001), like other modern methods, OLS CSR are restricted in their calculations to using just the signal of two structures (dependent variable and the independent variable/s) at a time. These authors showed that regressions methods do not adequately capture “complex connectivity patterns” which invariably leads researchers to only possibly infer from their studies the effects of signal from variables “without clues as to how or through which pathway” the effects takes place (Baccalá & Sameshima, 2001, p. 1-15). In their conclusions, these authors state that “simultaneous recordings as well as analysis of representative samples through multi-site multichannel recoding is crucial for deducing functional connectivity in order to avoid misleading conclusions about the nature of the interactions among elements and therefore linear regression models are doomed to fail in providing an understanding of causality relationships” (Baccalá & Sameshima, 2001, p. 1-15). As such, this study guards against making broad conclusions based on its results.

Detailed delisting reason information was not available thus restricting the study’s ability to derive accurate effects for the outcomes of these delistings (Strugnell et al., 2011).

3.8 Validity and reliability

Golafshani (2003, p. 599) identified two strands insofar as reliability and validity relate to quantitative research: firstly, with regards to reliability, “whether the result is replicable and secondly, with regards to validity, whether the means of measurement are accurate and whether they are actually measuring what they are intended to measure”.

Sale et al. (2002) contest that for research to be valid or reliable in the narrow (quantitative) sense it is required that that which is being studied be

independent of the inquirer and be described without distortion by his/her interests, values, or purposes whereas qualitative studies, according to the view of these authors, are based on the minimum distance between the investigator and the investigated, and seeks multiple definitions of reality embedded in various respondents' experiences.

3.8.1 *External validity*

The results of this research are applicable to various realms of wealth management, investment management, corporate strategy, pension fund management, private equity investments, corporate finance advisory, and equity research analysis (Bikker et. al., 2010; Ideo, 2001; Kaserer & Wagner, 2004).

However, the unique features and peculiarities of the JSE as noted by van Rensburg (2001), Auret and Sinclaire (2006), and Auret and Cline (2011) compels caution to be exercised in extrapolating findings of this study to other markets.

3.8.2 *Internal validity*

Trochim (2006) describes a study's internal validity as denoting the best available approximate truth about inferences, proposition, or conclusion regarding cause-effect or causal relationships.

According to the explanation of Drost (2011, p. 114) a study's internal validity denotes the "meaningfulness of research components" with a focus on whether the research measurements in fact are "measuring that which they intend to measure". She identified four types of validity to be considered: statistical conclusion validity (addressing the existence of the relationship being tested between the variables in order to guide the reasonableness of drawing inferences from the study results), internal validity (the validity of the study itself on whether the observed relationship is a causal one wherein there are no confounding factors in action), construct validity (a researcher's ability to appropriately translate or transform the noted behaviour into operating reality),

and external validity (ability to generalise the study's results across the population and to other populations) (Drost, 2011).

Henceforth, internal validity is deemed to be only relevant in research seeking to establish a causal relationship and is not relevant in most observational or descriptive studies (such as the one performed here).

3.8.3 *Reliability*

Leedy and Ormrod (2005, p. 29) states that reliability is the "consistency with which a measuring instrument yields a certain result when the entity being measured has not changed". The concept also reflects the precision of the measurement tool being used and the degree to which there may be error in the measurements which could vary unpredictably from time to time (Leedy & Ormrod, 2005).

According to Golafshani (2003, p. 598), research reliability could be described as the "extent to which results are consistent over time and an accurate representation of the total population under study" and if the results of a study can be reproduced under a similar methodology, then the research instrument is considered to be reliable. The research design and methods for this study have been extensively employed by other researchers in similar studies (Chan et al., 2004; van Rensburg & Robertson, 2003; Auret & Sinclaire, 2006; van Rensburg, 2001; Basiewicz & Auret, 2009; Du Plessis & Ward, 2009; Auret & Cline, 2011), which studies have already been tested for reliability of their conclusions. Additionally, the software employed (SAS® Studio 3.5) to perform the statistical tests and analysis is a well-recognised and reliable statistical software.

As such, with reasonable confidence the outcome of this study can comfortably be assessed as fairly reliable.

3.9 Chapter Summary

The research is primarily aimed at sourcing empirical evidence identifying any effects, relationships and insights on variations in equity returns of listed shares induced by the free float with the FTSE/JSE All Share Index as the study platform from which constituent companies were extracted. Other previously identified predictors were included in this research in order to address the balance of the study hypotheses with the ultimate object being to assess the superiority, or otherwise, of explanatory power of the free float (individually and in combination with another variable) compared to the size-P/E model.

Data downloaded from the I-Net BFA database was firstly inspected for completeness, cleaned for missing data points with companies having large missing large critical data points removed from the sample. Afterwards, descriptive analysis and tests through SAS® Studio 3.5 (SAS, 2016) were undertaken on each of the independent variables by means of OLS CSR with the holding period monthly equity returns as the dependent variable.

Bivariate regressions were then performed with the free float in combination with each of the independent variables assess their explanatory power relatively to the size-P/E returns model. The analysis was concluded with multivariate OLS CSR of the free float together with the size-P/E variables to examine any beneficial effect yielded by the introduction of the free float. With the help of condition indices, Eigenvalues, and variation proportion generated by each variable, correlation analyses were conducted to assess the correlation between the independent variables with the descriptive statistics of each of the independent variables assessed based on the results of the tests performed.

All 162 FTSE/JSE All Share Index constituent companies were eligible observations for inclusion in the study covering a period of 146 months starting November 2003 through to December 2015 encompassing 5 independent variables and 1 dependent variable. Hence, this generated a total potential eligible data pool of 1 022 data points per company and a total of 165 564 data observations on all constituent companies throughout the study period for all variables. The study sample was extended from the initial 120 months period to

146 months to ensure a more comprehensive data pool and enhance the study robustness.

Two of the independent variables (cashflow-to-price and book-to-market value ratio) included in the research proposal were replaced with the earnings yield and share price close variables. The data feeds from the I-Net Bridge database for the former two variables (the cashflow-to-book value and the book-to-market value ratios) were not available on a monthly frequency basis in line with the other independent variables as prescribed by the study design above, which limitation introduced a severe validity concern to the research results as to self-generate these variables would have necessitated extensive manual data manipulation to average the annual figures into equal monthly data points. It was thus decided to withdraw these variables from the study in order to ensure that the study remains comparable to other prior similar studies and to replace them with the earnings yield and closing share prices (both of which are previously identified equity return predictors) so as not to contaminate the overall research reliability. The replacement firm characteristics (earnings yield and closing share price) have been identified by previous similar studies and were tested by other scholars such as van Rensburg (2001), Auret and Sinclaire (2006), van Rensburg and Robertson (2003), Basiewicz and Auret (2009), Hodnett et al. (2012), and Basiewics and Auret (2010).

CHAPTER 4. PRESENTATION OF RESULTS

4.1 Introduction

Following the statistical tests conducted using the research methodology outlined above, Chapter 4 presents the results of the tests and analysis.

The statistical analysis was conducted through SAS® Studio 3.5 (SAS, 2016) using Ordinary Least Squares ("OLS") Cross-Sectional Regressions ("CSR") with the Reg Proc instruction to produce the descriptive statistics and for performing hypothesises analysis and testing. The descriptive statistics focused on the predictors in order to assess whether or not results demonstrate that they are statistically significant with particular attention devoted to the expected direction (and special attention devoted to the free float variable).

For each of the four hypotheses, five statistical tests and analyses were performed employing analysis of variances, coefficient of variations, parameter estimates, collinearity diagnostics, and tests of independence. The results of these five statistical tests are each described in detail individually (Section 4.3), results of each hypothesis are then separately presented (Section 4.4 – 4.7), and mean procedure summary for each variable provided (Section 4.8).

Key issues related to the data cleaning and organisation of sample observations are presented in Section 4.2 below followed by Section 4.3 giving a description of the statistical procedures and tests performed by means of the univariate, bivariate and multivariate OLS CSR in addressing each of the research hypotheses.

To conclude the chapter, result summaries are presented at the end.

4.2 Data cleaning and organisation

Data points for this study were downloaded from the I-Net BFA database for all constituent companies of the FTSE/JSE All Share Index (J203) and dumped into Microsoft Excel. The data dump was then visually inspect for any glaring inaccuracies and errors using the following basic Microsoft Excel functions:

a). Max and Min functions were computed on each variable for each company to assess for reasonableness

b). Where the data feed produced any output other than a numeric outcome, those were removed from the sample data before any statistical tests were executed

c). Missing data points with #N/A assigned to them were searched for and those were removed and replaced with no output to ease of reading by the SAS® programme (SAS, 2016).

The cleaned data observations were then feed into SAS® Studio 3.5 (SAS, 2016) for executing the initial Reg Proc OLS CSR. Outliers were identified through visual inspection of the graph produced by SAS® and those were assessed and corrected where they considered as an errors, out of line with expectation, or out of trend considering immediate preceding and ensuing data points of that company for that variable.

There were 8 companies (Capital & Regional PLC, Choppies Enterprises Limited, Glencoe PLC, Schroder European Real Estate Investment Trust PLC, Medi-Clinic International PLC, Bidvest Group Limited, South32 Limited, and Bid Corporation Limited) removed from the sample due to missing substantial critical data which could not be salvaged or reliably obtained from alternative sources using reasonable effort at the required monthly frequency at a justifiable cost within the necessary time for undertaking this study. Even with the loss of these 8 companies from the original 162 sample companies, it was decided that the remaining companies offered a sufficiently comprehensive and detailed sample data to justify continuation of the study.

4.3 Description of results presentations

With the manipulation of the above sample observation data points (once cleaned), the Reg Proc OLS CSR instruction in SAS® Studio 3.5 produced a number of useful statistical tables and graphs, which were then examined and relied upon to assess each hypothesis. The key ones are explained in high level here (Sub-section 4.3.1 – 4.3.5) before their results are presented in Section 4.5 – Section 4.8 (Hypothesis 1 – 4).

4.3.1 *Analysis of Variance (ANOVA)*

This is the first table to be presented for each hypothesis which shows the breakdown of variance in the total return (TReturn) categorised into Model, Error and Corrected Total. In addition to the Source categories for Model, Error, and Corrected Total, the table includes columns for Degrees of Freedom (DF), Sum of Squares, Mean Squares, F Value, and the Pr > F (p-values). Each of these column outputs was examined as part of assessing the overall results.

O'brien (1979, p. 877) asserts that the success of the ANOVA-based tests is due largely to the fact that the estimates of the variabilities of the average spreads are obtained directly from the data and consequently are sensitive to the data patterns of the parent distribution". An important observation on the ANOVA table was the difference between the explained variance (Model) and the unexplained variance (Error) associated with the independent variable/s being assessed. The main object was to look for large explained variances as denoted by large F value with the magnitude of the p-value helping in uncovering the strength of the variance identified and statistical significance (Wallenstein, Zucker, & Fleiss, 1980).

The DF columns show the degrees of freedom associated with each of the various independent variables. For each hypothesis, the Model DF output corresponds to all predictors (including the intercept) being estimated less 1 while the DF for the Error row represents the total degrees of freedom less the Model DF with the Total DF being the total number of observations less 1 (Pandey & Bright, 2008).

Next to the DF column, the ANOVA table presents the Sum of Squares related to the three variance sources (Model, Error, and Total) then followed by the Mean Square for the Model and Error, which is the outcome of the Sum of Squares divided by the degree of freedom. The Mean Squares are arrived at by dividing the Sum of Squares by their respective DF values. The significance of the various firm attributes is assessed using the Student's t-statistic (Blair & Higgins, 1980).

Afterwards the F Value, which is computed as the Model Mean Square divided by the Error Mean Square, is presented together with its associated p-value (Pr > F) which was used for testing that the model coefficients are zero under the null hypothesis (Carver, 1978).

4.3.2 *Coefficient of Variation*

Immediately below the Analysis of Variation table, the Coefficient of Variation table is presented listing five outputs, namely, the Root MSE, Dependent Mean, Coeff Var, R-Square, and the Adj R-Sq. The Dependent Mean is the mean of the dependent variable/equity returns (TReturn), the Root MSE is the Square Root of the Error Mean Square (standard deviation of the error term) while the Coeff Var as the coefficient of variation is a unit measure of variation in the dependent variable (equity returns) associated with the independent variable/s (calculated as the Root MSE divided by the mean of the dependent variable times 100). The Coefficient Variation for residuals indicates the strength of model fit over the data and was relied on when comparing different models as it is a unitless measure (Bedeian & Mossholder, 2000).

The R-Square (Model Sum of Square divided by the Total Sum of Squares) was reviewed to get an indication of the proportion of the variance explained by the independent variable/s (Cameron & Windmeijer, 1997). R-Square is the proportion of explained variance in the dependent variable (TReturn) associated with the independent variable/s which indicates the overall strength of the variance in the dependent variable associated with the independent variable/s (Cameron & Windmeijer, 1997). The Adj R-Sq is the R-Square adjusted for addition of extraneous predictors to the model (Cameron & Windmeijer, 1997).

4.3.3 *Parameter Estimates*

The Parameter Estimates tables shows the Variable description to help identify the variable/s from the data feed with the degrees of freedom (DF) related to each independent variable shown in the next column. The degrees of freedom (DF) relating to each source of variance is computed as the number of estimated coefficients, including the intercept, less 1.

First within the Variable column is the Model intercept denoting the height of the Y-axis at which the regression line crosses it denoting the predicted value of the dependent variable (TReturn) when all other variables are zero. The Parameter Estimates columns presents the regression equation values of the independent variable/s used for estimating the dependent variable with the Standard Error associated with each coefficient presented next to it in the fourth column.

The Student's t-statistics (t Value) used for testing coefficient/s for being significantly different from zero and the 2-tailed p-values (Pr > |t|) used for testing that the coefficient/s (parameter/s) is zero are showed next. With 2-tailed test at the 95% confidence, coefficients generating p-values less than 0.05 were regarded as statistically significant. Relying on these p-values (when they were below 0.05), the null hypothesis were rejected and the coefficients are regarded as being significantly different from zero. To help assess the magnitude of potential variance in the coefficient estimates, 95% Confidence Limits are showed at the end of the table. These coefficient confidence intervals related to the p-values shows that, at a 5% alpha, there is 95% confidence that the coefficient is not statistically significant if the interval includes zero (Poole, 2001).

4.3.4 *Collinearity Diagnostics*

Collinearity/multicollinearity tests of the predictor variables were assessed to inspect the degree linear relationship combinations exists amongst the predictors in order to detect which variable/s generates the linearity for diagnosing the likelihood of the coefficients generated by the regression model estimates becoming unstable and thus their standard errors being inflated (Marx

& Smith, 1990). The proportion of variances in uncorrelated linear combinations amongst the independent variables were assessed with the aid of the Eigenvalues (Cullum & Willoughby, 1981). The variance in the dependent variable generated by each of the independent variables is shown in the table with the Eigenvalue producing a condition index for demonstrating the intensity of the correlations between the variables included in a particular test (Cullum & Willoughby, 1981).

The various linear combinations of the variables are assigned numerical numbers along the first left-hand column (Number) followed by the associated Eigenvalue column showing the variance of that linear combination along the row. The proportion of variance of the estimate associated with each variable is listed on the far right, preceded by the intercept column, the column showing the conditional index number derived from the Eigenvalue. With the Eigenvalues showing the proportion of variance the linear combination contributes between the independent variables, collinearity/multicollinearity assessment is conducted by:

a). first identifying the independent variables with high variances in each row/linear combination, then

b). their respective conditional indices are read (as a rule, those more than 30 were considered large).

Associated variables having strong variance contribution (more than 0.5) with related high conditional index figures (above 30) are identified and then assessed to ensure that they are not an indication of the existence of collinearity/multicollinearity concerns. As a rule of thumb, 30 was used as the yardstick for assessing the materiality of conditional indices. The Proportion of Variance figures expresses the proportion of the variance of the estimate produced by the independent variable/s of interest. For conditional indices, 10 was adopted as a rule of thumb indicating the likely existence of weak dependencies that might be starting to affect the regression estimates with numbers in excess of 100 highlighting the likely existence of numerical errors.

4.3.5 *Tests of Independence*

Durbin-Watson tests were performed to assess the autocorrelation of residuals to ensure that errors associated with one observation are independent and not correlated with errors of any other observation (Durbin & Watson, 1971). The mid-point of the Durbin-Watson statistic, which ranges from 0 to 4, is used as the benchmark with statistical outputs below 2 regarded as acceptable.

Positive and negative autocorrelation testing is assessed using results of the p-values reported in the second line (Pr < DW) and the third line (Pr > DW), respectively.

4.4 Results Presentation: Research Hypothesis 1

Research Hypothesis 1: The main hypothesis of this study is that free float bears significant correlations with equity returns for shares listed on the JSE.

Out of the 19 463 total observations, the model lost 3 170 observations due to missing values thus ended up only using 16 293 observations for the regression. The Reg Proc instruction was submitted to SAS® Studio 3.5 with total return (TReturn) as the dependent variable and the free float (FFACT) as the independent variable to test and assess this hypothesis. Results of the ANOVA regression are show in Table 1 below.

Table 1: Analysis of Variance – Hypothesis 1

Analysis of Variance					
Source	*DF*	*Sum of Squares*	*Mean Square*	*F Value*	*Pr > F*
Model	1	184.18130	184.18130	32.66	<.0001
Error	16291	91872	5.63945		
Corrected Total	16292	92056			

For this hypothesis, the free float is the only predictor thus Table 1 above shows that the Model DF as 1 denoting only 1 variable with the total returns as the dependent variable. The output for the Model Sum of Squares came out as

184.18 with the Error Sum of Squares as 91 872 while the Mean Squares for the Model and Error are 184.18 and 5.64, respectively.

The resultant F Value amounts to 32.66 while its related p-value (Pr > F), which is used for assessing whether or not a significant portion of the variance in total returns is explained by the free float, is 0.0001 (indicating that there is a 99% probability that the data is sufficiently fitting line).

Table 2 below (Coefficient of Variation – Hypothesis 1) shows that the mean of the total return (dependent) equates to 2.5 with Root MSE and coefficient variation of 2.37 and 95.03, respectively, while the R-Square is equal to 0.0020 and the adjusted R-Square moving slightly to 0.0019 to account for the addition of extraneous predictors to the model.

Table 2: Coefficient of Variation – Hypothesis 1

Coefficient of Variation			
Root MSE	2.37475	*R-Square*	0.0020
Dependent Mean	2.49906	*Adj R-Sq*	0.0019
Coeff Var	95.02585		

Table 3: Parameter Estimates – Hypothesis 1

Parameter Estimates								
Variable	*DF*	*Parameter Estimate*	*Standard Error*	*t Value*	*Pr > |t|*	*Standardized Estimate*	*95% Confidence Limits*	
Intercept	1	2.18791	0.05754	38.03	<.0001	0	2.07513	2.30068
FFACT	1	0.40898	0.07156	5.71	<.0001	0.04473	0.26870	0.54925

The parameter estimate value for the intercept comes to 2.19, the free float (FFACT) estimate for this regression is 0.41 with associated standard errors of 0.058 and 0.072, respectively. The regression generated a t-statistic of 5.71 together with a 2-tailed null hypothesis testing p-value of 0.0001 using an alpha of 0.05 to give 95% confidence limits of 0.27 and 0.55.

The most noticeable combination from the Collinearity Diagnostics table (Table 4) is combination 2, which exhibits a 0.05 Eigenvalue observed value with a 0.97 proportion of variation and a condition index of 6.02.

Table 4: Collinearity Diagnostics – Hypothesis 1

Collinearity Diagnostics				
			Proportion of Variation	
Number	Eigenvalue	Condition Index	Intercept	FFACT
1	1.94628	1.00000	0.02686	0.02686
2	0.05372	6.01919	0.97314	0.97314

Table 5: Test of Independence – Hypothesis 1

Test of Independence	
Durbin-Watson D	0.076
Pr < DW	<.0001
Pr > DW	1.0000
Number of Observations	16293
1st Order Autocorrelation	0.962

The Durbin-Watson statistic in the above table comes to 0.076 with the 1st order autocorrelation output of 0.962. The negative autocorrelation p-value output is 0.001 whilst the positive autocorrelation p-value is 1.0000.

Results Summary: In summary, the results show an R-Square of 0.2% for the 95.03 coefficient of variation at a statistically significant F-Value of 32.66.

4.5 Results Presentation: Research Hypothesis 2

Research Hypothesis 2: Free float generates a stronger influence on equity returns than corporate size (market capitalisation).

The below descriptive statistics were derived out of 16 293 observations out of a total of 19 463 reads less 3 170 missing values.

Table 6: Analysis of Variance – Hypothesis 2

Analysis of Variance					
Source	*DF*	*Sum of Squares*	*Mean Square*	*F Value*	*Pr > F*
Model	2	651.90103	325.95051	58.09	<.0001
Error	16290	91404	5.61108		
Corrected Total	16292	92056			

The Model DF figure of 2 representing the two independent variables (free float and market capitalisation) has an associated 651.90 Sum of Squares to give out a Mean Square of 325.95. These, together with 91 404 and 5.611 Error Sum of Squares and Error Mean Square respectively, returned an F Value of 58.09 with a p-value of 0.0001.

Table 7: Coefficient of Variation – Hypothesis 2

Coefficient of Variation			
Root MSE	2.36877	*R-Square*	0.0071
Dependent Mean	2.49906	*Adj R-Sq*	0.0070
Coeff Var	94.78657		

The 94.79 coefficient of variation has an associated dependent mean of 2.50 with a Root MSE of 2.37 and an R-Square of 0.0071.

Table 8: Parameter Estimates – Hypothesis 2

Parameter Estimates								
Variable	*DF*	*Parameter Estimate*	*Standard Error*	*t Value*	*Pr > |t|*	*Standardized Estimate*	*95% Confidence Limits*	
Intercept	1	2.25400	0.05785	38.96	<.0001	0	2.14061	2.36739
FFACT	1	0.41203	0.07138	5.77	<.0001	0.04506	0.27210	0.55195
MCAP	1	-0.00000167	1.824042E-7	-9.13	<.0001	-0.07128	-0.00000202	-0.00000131

The predicted model intercept of 2.254 is generated with 95% confidence limits of 2.14 to 2.37 carrying a standard error of 0.058 and a t-value of 38.96. The independent variables parameter estimates are 0.41 for the free float (FFACT) and -0.00000167 for the market capitalisation, respectively.

The regression generated t-values of 5.77 and -9.13 with coefficient standard errors of 0.071 and 1.82 and Standardized Estimates of 0.045 and -0.07 for the free float (FFACT) and the market capitalisation (MCAP) variables, respectively. The lower bands of the 95% confidence limits are 0.27 and -0.00000202 while the upper bands are 0.55 and -0.00000131 for the free float (FFACT) and market capitalisation, respectively.

The DF remained 1 across.

Table 9: Collinearity Diagnostics – Hypothesis 2

Collinearity Diagnostics					
			Proportion of Variation		
Number	*Eigenvalue*	*Condition Index*	*Intercept*	*FFACT*	*MCAP*
1	2.17344	1.00000	0.01994	0.02004	0.06416
2	0.77306	1.67674	0.00991	0.01190	0.93151
3	0.05350	6.37366	0.97014	0.96806	0.00433

The second linear combination shows a 0.93 proportion of variation generated by the market capitalisation with only 0.01 proportion of variation from the free float (with a condition index of 1.68 out of the 0.773 Eigenvalue). The third combination returned a 0.97 proportion of variation for the free float with the market capitalisation only generating 0.00433 proportion of variation (condition index = 6.38 with 0.054 Eigenvalue).

The first combination shows the proportion of variation for the free float and market capitalisation at 0.02 and 0.06, respectively (1.0 condition index and 2.17 Eigenvalue).

Table 10: Test of Independence – Hypothesis 2

Durbin-Watson D	0.077
Pr < DW	<.0001
Pr > DW	1.0000
Number of Observations	16293
1st Order Autocorrelation	0.962

Table 10 shows the results of the test for autocorrelation amongst the residuals performed using the Durbin-Watson test. The observed value in the above table comes to 0.077 while the 1st order autocorrelation of 0.962.

Results Summary: Statistically significant F-value of 58.09 has an associated Model Mean Square of 325.95 confirming the statistical significance of the model. The R-Square of 0.71% is considered very low while the market capitalisation standardised value exceed that of the free float.

4.6 Results Presentation: Research Hypothesis 3

Research Hypothesis 3: Inclusion of the free float to the van Rensburg and Robertson (2003) size-P/E returns model improves the explanatory power of the model.

There were 3 230 missing values from a total of 19 463 observation reads thus resulting in 16 233 observations used for running this multivariate OLS CSR.

Table 11: Analysis of Variance – Hypothesis 3

Analysis of Variance					
Source	*DF*	*Sum of Squares*	*Mean Square*	*F Value*	*Pr > F*
Model	3	938.80865	312.93622	55.94	<.0001
Error	16229	90779	5.59365		
Corrected Total	16232	91718			

The F Value of 55.94 returned a p-value of 0.0001 coming from Model Sum of Squares and Mean Squares of 938.81 and 312.94, respectively. The DF of 3 relates to the free float, market capitalisation and the price-to-earnings ratio as the three independent variables acting as predictors of total returns.

The Error Sum of Squares and Mean Square Error came to 90 779 and 5.59, respectively.

Table 12: Coefficient of Variation – Hypothesis 3

Coefficient of Variation			
Root MSE	2.36509	*R-Square*	0.0102
Dependent Mean	2.49557	*Adj R-Sq*	0.0101
Coeff Var	94.77143		

The regression generated a coefficient of variation of 94.77 with Root MSE of 2.365, Dependent Mean of 2.50 and the R-Square of 0.0102 (adjusted to 0.0101).

Table 13: Parameter Estimates – Hypothesis 3

Parameter Estimates								
Variable	*DF*	*Parameter Estimate*	*Standard Error*	*t Value*	*Pr > |t|*	*Standardized Estimate*	*95% Confidence Limits*	
Intercept	1	2.28470	0.05839	39.13	<.0001	0	2.17025	2.39915
PEARN	1	-0.00260	0.00037207	-6.98	<.0001	-0.05455	-0.00333	-0.00187
MCAP	1	-0.00000161	1.822531E-7	-8.82	<.0001	-0.06894	-0.00000197	-0.00000125
FFACT	1	0.42023	0.07141	5.88	<.0001	0.04598	0.28026	0.56020

The regression produced t-values of -6.98, -8.82, and 5.88, parameter estimates of -0.0026, -0.00000161, and 0.42 with 95% confidence limits of -0.00333 to -0.00187, -0.00000197 to -0.00000125, and 0.28026 to 0.56020 at standard errors of 0.00037, 1.823 and 0.07141 and Standardized Estimates of -0.055, -0.069, and 0.046 for the price-to-earnings ratio, market capitalisation, and free float variables, respectively.

The model intercept parameter estimate of 2.28 attracted a t-value of 39.13 with a standard error of 0.058 with 95% confidence limits of 2.17 and 2.40.

Table 14: Collinearity Diagnostics – Hypothesis 3

Collinearity Diagnostics						
			Proportion of Variation			
Number	*Eigenvalue*	*Condition Index*	*Intercept*	*PEARN*	*MCAP*	*FFACT*
1	2.32582	1.00000	0.01662	0.03987	0.05181	0.01678
2	0.86103	1.64354	0.00084020	0.81514	0.20113	0.00129
3	0.76009	1.74927	0.01351	0.13714	0.74306	0.01713
4	0.05306	6.62055	0.96903	0.00785	0.00400	0.96479

The price-to-earnings ratio, market capitalisation, and free float variable yielded their strongest proportion of variation of 0.815, 0.743, and 0.965 under combination 2, 3, and 4, respectively. The related condition indices and Eigenvalues were 1.64, 1.75, and 6.62, and 0.86, 0.76, and 0.053, respectively, under these linear combinations (2, 3, and 4) with the intercept variation being highest for combination 4 at 0.969 and then followed by combination 1 at 0.0166 (bearing the highest Eigenvalue of 2.33).

Table 15: Test of Independence – Hypothesis 3

Test of Independence	
Durbin-Watson D	0.078
Pr < DW	<.0001
Pr > DW	1.0000
Number of Observations	16233
1st Order Autocorrelation	0.961

Durbin-Watson statistic come out at 0.078 with the 1st order autocorrelation of 0.961 using 16 233 observations.

Results summary: The incremental effect of the introduction of the free float was a movement in the R-Square from 0.64% (market capitalisation and price-earnings only) to 1.02% (market capitalisation and price-earnings together with

free float), which increase is not considered substantive. The enhancement in the F value was not material at 55.94.

4.7 Results Presentation: Research Hypothesis 4

Research Hypothesis 4: A combination of the free float and another firm attribute generates more explanatory power than the size-P/E model.

The bivariate REG procedure OLS CSR performed on free float and earnings yield as independent variables with total return as the dependent variable was used 16 274 observation data points out of a total of 19 463 number of observations reads after having lost 3 189 points due to missing values.

Table 16: Analysis of Variance – Hypothesis 4

Analysis of Variance					
Source	*DF*	*Sum of Squares*	*Mean Square*	*F Value*	*Pr > F*
Model	2	9714.40678	4857.20339	964.45	<.0001
Error	16271	81945	5.03624		
Corrected Total	16273	91659			

With a DF of 2, the Model Sum of Squares of 9 714.4 has a related Mean Square of 4 857.2 producing an F Value of 964.45 at a p-value of <0.0001. The relevant Error Mean Square came to 5.04 with 81 945 Sum of Squares from a DF of 16 271.

Table 17: Coefficient of Variation – Hypothesis 4

Coefficient of Variation			
Root MSE	2.24416	*R-Square*	0.1060
Dependent Mean	2.49931	*Adj R-Sq*	0.1059
Coeff Var	89.79103		

The regression produced a coefficient of variation of 89.791 with a Dependent Mean of 2.499, Root MSE of 2.244 and R-Square of 0.106.

Table 18: Parameter Estimates – Hypothesis 4

Parameter Estimates								
Variable	DF	Parameter Estimate	Standard Error	t Value	Pr > |t|	Standardized Estimate	95% Confidence Limits	
Intercept	1	1.30968	0.05791	22.62	<.0001	0	1.19618	1.42319
FFACT	1	0.46538	0.06768	6.88	<.0001	0.05097	0.33272	0.59804
EY	1	0.11281	0.00260	43.45	<.0001	0.32212	0.10772	0.11790

The intercept, free float, and earnings yield ratio parameter estimates of 1.3097, 0.465, 0.1128 generated t-values of 22.62, 6.88, and 43.45 at 95% confidence limits of 1.196 to 1.423, 0.333 to 0.598, and 0.1077 to 0.1179, with Standardized Estimates of 0.051, and 0.322, respectively. The p-values for all variables were <0.0001 with Standard Errors of 0.058 for the intercept, 0.0677 for the free float, and 0.0026 for the earnings yield ratio.

The DF remained at 1 for all variables.

Table 19: Collinearity Diagnostics – Hypothesis 4

Collinearity Diagnostics					
			Proportion of Variation		
Number	Eigenvalue	Condition Index	Intercept	FFACT	EY
1	2.59186	1.00000	0.01285	0.01413	0.05072
2	0.35661	2.69592	0.02657	0.05604	0.90209
3	0.05152	7.09270	0.96057	0.92983	0.04719

The proportion of variation of the earnings yield ratio under combination 2 amounts to 0.902 with a condition index of 2.696 and an Eigenvalue of 0.3566 while the free float proportion of variation is only 0.056. The Eigenvalue of 0.0515 under combination 3 generated a condition index of 7.093 with a proportion of variation of 0.93 for the free float and 0.047 for the earnings yield ratio.

Table 20: Test of Independence – Hypothesis 4

Test of Independence	
Durbin-Watson D	0.081
Pr < DW	<.0001
Pr > DW	1.0000
Number of Observations	16274
1st Order Autocorrelation	0.959

The Durbin-Watson test returned an observed value of 0.081 from 16 274 observations at a 1st order autocorrelation of 0.959.

Results summary: The combination of free float and the earnings yield ratio produced a reasonably good R-Square of 10.6% with a statistically significant F-Value of 964.5 with no evidence of auto-collinearity from the Eigenvalues and acceptable Durbin-Watson outcome of 0.081.

4.8 Summary of the results

Table 21: The Means Procedure – Summary Statistics

Summary statistics						
Variable	*Label*	*N*	*Mean*	*Std Dev*	*Minimum*	*Maximum*
DATE	DATE	17258	18492.25	1252.19	16070.00	20453.00
FFACT	FFACT	16295	0.7608113	0.2599632	0.0500000	1.0000000
MCAP	MCAP	17258	41099.41	104266.94	40.6720000	1769706.33
PEARN	PEARN	17165	16.9578486	54.4880063	-1600.00	1231.53
EY	EY	17237	7.3234681	12.7181941	-520.8639000	227.6181000
CLOSE	CLOSE	17258	22427.81	213558.66	28.0000000	5676000.00
TReturn	TReturn	17256	2.4481530	2.3661773	-1.8589981	17.7066146

The total return has minimum value of -1.86, a maximum of 17.71, mean of 2.45 with standard deviation of 2.37 from 17 256 observations. The free float had a total number of observations of 16 295 generating a mean of 0.76 with a minimum of 0.05, a maximum of 1.00 with a 0.26 standard deviation.

CHAPTER 5. DISCUSSION OF THE RESULTS

5.1 Introduction

This chapter discusses the findings from results presented in the preceding chapter (Chapter 4) together with the relevant descriptive statistics, statistical tests and correlation analysis performed in order to draw comparison with other similar prior studies to deduce any similarities and identify inconsistencies and peculiarities related to/uncovered by this study. The chapter is organised as follows:

a). Results from the 5 statistical tests (analysis of variance, coefficient of variation, parameter estimates, collinearity diagnostics, and tests of independence) performed for each hypothesis are discussed

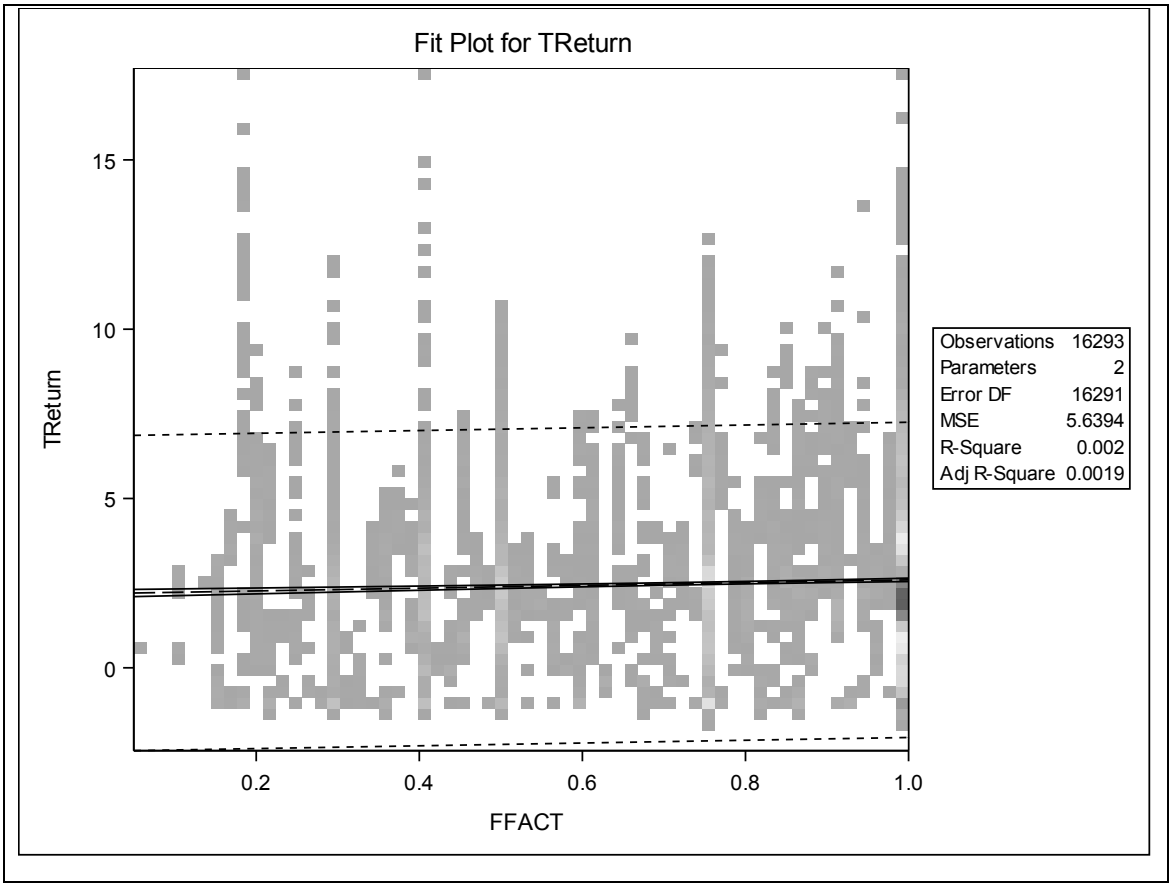
b). Overall conclusion of the chapter is offered at the end with a consolidated perspective to the chapter and summary conclusions under each hypothesis.

Graphical presentations of the regressors are included as part of the discussion of each hypothesis to complement the descriptive statistics from the above tests performed while fit plots for the rest of the other variables are provided in Appendix A. As a follow up from the valuable insights put forward by the literature review, the below explanatory analysis of relationships adds to the insights presented by that chapter.

5.2 Discussion of Results: Research Hypothesis 1

Figure 1 below shows the fit plot for equity returns with the free float variable (predictor) plotted on the x-axis.

Figure 1: Fit Plot for TReturn – Hypothesis 1



Looking at the fit plot graph above (Figure 1), a positive upward trend line is visible. From the upwards inclination it could be inferred that an increase in the free float (FFACT plotted on the X-axis) can be associated with an increase in total returns (TReturn plotted on the Y-axis). This is supported by a positive coefficient.

The above trend is supported by the study of Uno and Kamiyama (2010) who positively linked increases in free float to improved market performance of listed shares. Foley and Greenwood (2010) showed that better performing shares were generally more widely held (with higher free float) and thus benefited from healthier liquidity structures.

The above plot show a pattern wherein equity returns (TReturn) generally increases with increases in the free float with some areas within the increasing trend showing spikes in equity returns while a greater proportion of the observations are scattered making it difficult to draw a patterns with a naked-eye. Around the 0.2, 0.3, 0.4, 0.5, 0.78, and 1.0 free float points, equity returns shows great variations with figures ranging from the negative territory through to high points above the 15% area. The pattern is not very clear to a naked eye but suffice to say that it broadly demonstrated an upward trend.

The Analysis of Variance table (Table 1) showed that the Model Mean Squares (MSM) of 184.18 with the Error Mean Square (MSE) of only 5.64 produced a significant F Value of 32.66. With a 2-tailed test at a 95% confidence level, the corresponding p-value (Pr > F) of <0.0001 leads to conclude that the F Value is significant to validate our inference that a significant amount (184.18 compared to 5.644) of the variance in total returns (the dependent variable) could be explained by the free float.

The significant F-test further gives us comfort that the model itself is statistically significant. The DF of 1 corresponds to the two coefficients estimated by the model (being the intercept and the free float) less 1. The F Value of 32.66 is arrived at as the variance in the ANOVA regression explained by the model (the MSM = 184.18) dividend by the unexplained variance (MSE = 5.64).

The R-Square of 0.002, which is considered very low, indicates that approximately only 0.2% of the variance in equity returns can be said to be accounted for by this model, that is, the free float. This R-Square is considered very minute to validate the research hypothesis.

The free float parameter estimate (0.41) reported in Table 3 is significant (p <0.0001) with the coefficient being positive which indicates that higher free float is associated with higher equity returns. This discovery is in line with expectations of this study. The 95% confidence limits of 0.27 to 0.55 compared to the estimate of 0.41 seem reasonable and sufficiently wide enough to accommodate reasonable movement in the estimate. The coefficient for free float of 0.41 indicates that for a one unit increase in free float it could be

expected that equity returns would increase by 0.41 unit. Alternatively, a company with 100 free float could be expected to generate 4.1 units more equity returns than a company with a 100 lower free float. The free float t-test of 5.71 is statistically significant, which indicates that the regression coefficient for free float is significantly different from zero. The estimated intercept constant of 2.19 is the model estimated value when free float is zero.

If one accepts the notion that firms with high free float are generally more traded/liquid (Chan et al., 2004), then, on the face off it, the above results could be taken as a contradiction of the liquidity hypothesis put forward by Amihud and Mendelson (1986) which claims that illiquid shares generates higher equity returns. However, another aspect embodied in free float is the enhanced information symmetry element free float signals to the wider investor community due to the presence of a larger body of external investors and the muted price-effect of liquid shares, that is, individual trades on more liquid shares have limited impact on trading price and trading costs (Chan et al., 2004). This aspect has a counter effect to the negative illiquidity premium proposed by Amihud and Mendelson (1986). Relying on a dataset of 706 firms in the Czech Republic from 1992 to 1997, Claessens and Djankov (1999) also found that firms with lower free float (more concentrated ownership structure) generated higher equity returns and were more profitable with higher labour productivity. The results from this study did not provide confirmatory empirical evidence in this line as the free float was found to possess a negligible influence on equity returns, with a positive direction.

However, Zhang, Tian, and Wirjanto (2009, p. 228) tested the influence of free float on equity returns using the Chinese stock market data from 1991 to 2001 and concluded that “free float was a significant determinant of the cross-sectional variation in equity returns”. These authors suggests that free float could be viewed as a measure of liquidity and found a positive relation between free float and equity returns (Zhang et al., 2009). Results from the above analysis did not validate this finding by Zhang et al. (2009) with the JSE. This outcome was unexpected as JSE, like the Chinese stock exchange, could be

viewed as an emerging market stock exchange. As such, it was expected that some similarities would persist between these two markets.

Using empirical evidence from a random sample of 223 US firms, Demsetz and Villalonga (2001) found no statistical significant relation between the composition of corporate ownership structure and firm performance thus challenging the theoretical connection put forward by Berle and Means (1932). These scholars view the free float (as a proxy for composition of corporate ownership structure) as the endogenous outcome of profit-maximisation decisions of shareholders together with marketplace trading activity (Demsetz & Villalonga, 2001). They conclude that the composition of corporate ownership structure yields two opposition effects by aggravating the agency problems, on the one hand, while mitigating the information asymmetry challenge, on the other hand, with the effects of latter producing more dominant and positive benefits which subsumes any negative effects coming from the former (Demsetz & Villalonga, 2001). A strict read of the results from this study goes more along the line of the conclusion drawn by Demsetz and Villalonga (2001).

This was unexpected as this outcome could read to say that the JSE (South Africa market) behaves more like the US (developed markets) than the Chinese or Czech Republic markets (developing markets). Although unexpected, this observation is not entirely surprising as there has been a general market narrative that the JSE (South African capital and financial markets) are more developed, highly sophisticated and more advanced than the capital markets of other emerging markets.

Amihud and Mendelson (1986) hypothesised the equity return-liquidity relationship by stating that equity returns are an increasing function of illiquidity. With free float accepted as a key determinant of share liquidity it was the expectation of this study that free float would thus play a statistically significant role in the variation of equity returns, which was not found to be the case or supported by the study results.

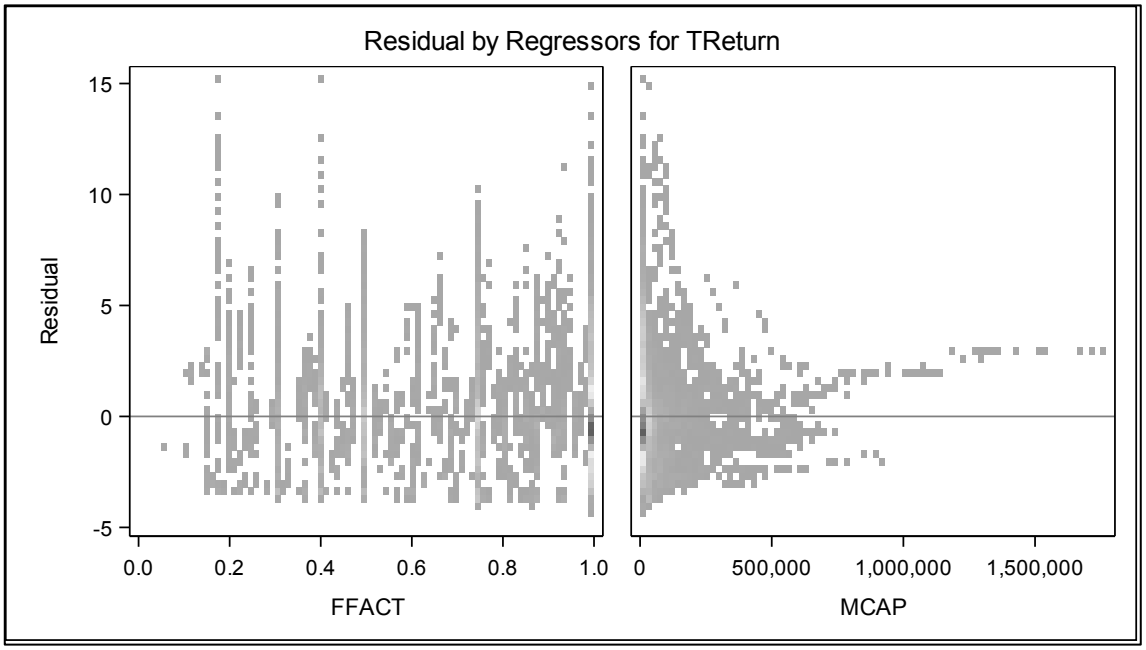
Without in-depth knowledge of the detailed market dynamics embodied by the free float variable, it might be premature to make swift judgments on which

aspect/s endorsed by the free float are at work and to what degree. But suffice to state that this study did not uncover material empirical evidence to support the importance of free float as a firm attribute with statistically significant explanatory power for variations in equity returns.

Conclusion: Based on the analysis of results from the descriptive statistics on the tests conducted above together with the literature review, it is concluded that Hypothesis 1 should be rejected. The model was adjudged to be correctly specified.

5.3 Discussion of Results: Research Hypothesis 2

Figure 2: Residual by Regressors for TReturn - Hypothesis 2



The Model Mean Square of 325.95 generated a significant F Value of 58.09 using the Error Mean Square of 5.61. At an alpha of 0.05, the two-tailed p-value of <0.0001 allows conclusion to be drawn that the F Value is significant and inference to be made that the model is statistically significant.

The Model DF of 2 relates to the two independent variables (free float and market capitalisation) together with the intercept less 1. The DF values together with the Model Sum of Squares (651.9) and Error Sum of Squares (5.61) were deployed to compute the Mean Squares before calculating the F Value of 58.09.

The t-statistic for market capitalisation (MCAP) of -9.13 is generated with a standard error of 1.824 to give a Standard Estimate of -0.071 while the t-statistic of free float came out at 5.77 with a 0.071 Standard Error giving a Standardized Estimate of 0.45. Based on the fact that the market capitalisation has a stronger (and negative) beta coefficient than the free float (-0.071 compared to 0.045), it was concluded that the relative strength of the market capitalisation is greater than that of free float.

Free float is a derivative of the market capitalisation (Chan et al., 2004). As such, the output of the above results which shows that market capitalisation subsumes free float are not entirely unexpected.

The amount of variance in equity returns explained by the two independent variables comes to 0.71% as shown by the model generated an R-Square figure of 0.0071. This is a low R-Square. However, this hypothesis is not very concerned about the explanatory power of the two variables (free float and market capitalisation) on equity returns but more concerned about the relative strength of the variables amongst each other.

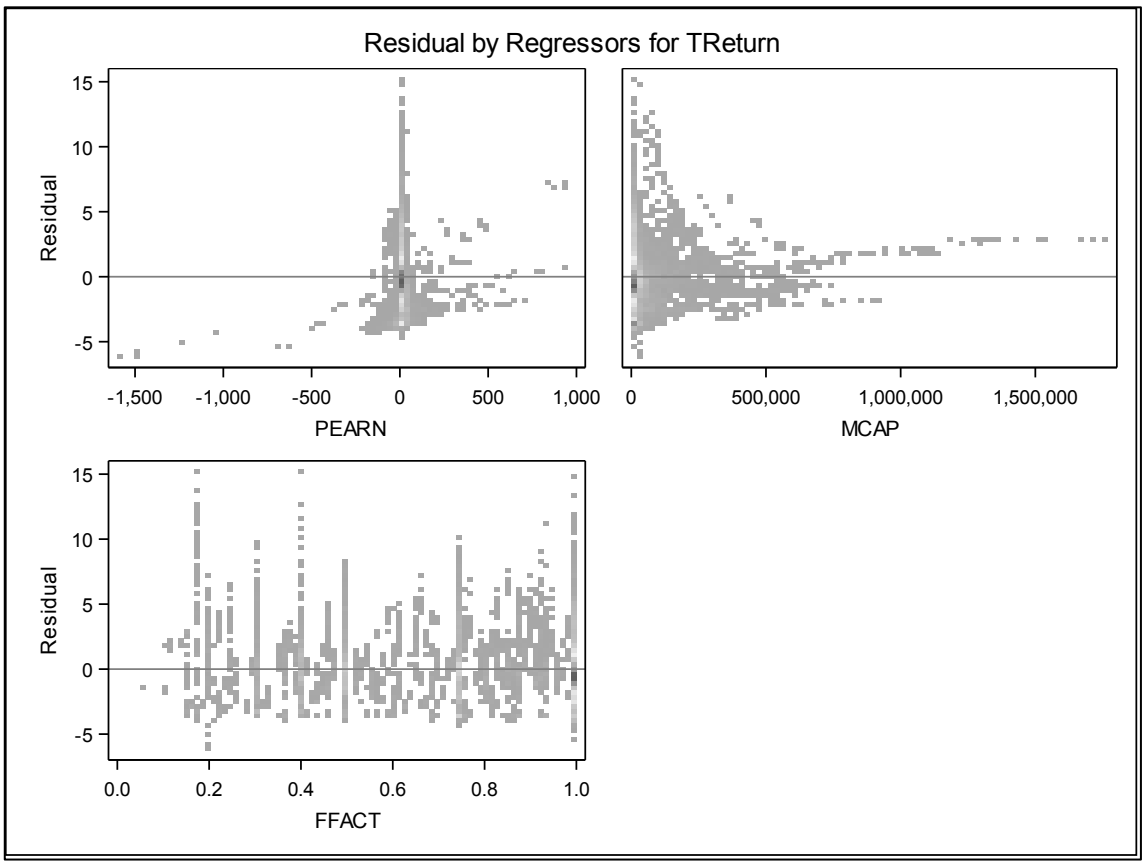
The coefficient of variation as a unit-less measure of variation in equity returns come out as 94.787. The Durbin-Watson statistic of 0.077 provides evidence that these two variables are not a linear relationship of each other.

The collinearity diagnostics test derived condition indices of 1.68 and 6.37 for linear combinations 2 and 3, respectively, with 0.932 and 0.968 variation proportions for the market capitalisation and free float at Eigenvalues of 0.773 and 0.054, respectively. The related proportion of variation for the free float of 0.0119 and 0.00433 for the market capitalisation are regarded as insignificant. As such, the two variables are regarded as not being a linear combination of each other such that the estimates cannot be regarded as unstable.

Conclusion: Consequently, Hypothesis 2 cannot be accepted based on the results of this research. There is sufficient evidence from the above results for a conclusion to be drawn that the model has been correctly specified.

5.4 Discussion of Results: Research Hypothesis 3

Figure 3: Residual by Regressors for TReturn – Hypothesis 3



On their own, the size (market capitalisation) and price-to-earnings ratio predictors boasts a significant F Value of 54.85 with Model Mean Square of 305.04 and Error Mean Square (MSE) of 5.56. The inclusion of the free float to these two predictors increases the F Value from 54.85 to 55.94 with Model Mean Square of 312.94 and Error Mean Square of 5.59.

Without the free float, the R-Square for market capitalisation together with price-to-earnings ratio sits at 0.0064 (0.64%). Inclusion of the free float to these two variables improves the R-Square to 0.0102 (1.02%), which is not considered a substantial enhancement to the model's explanatory power. Equity returns of

listed companies have been found to respond positively to increases in market capitalisation from introduction of new investors (Kadlec & McConnell, 1994). On the other hand, introduction of new investors also has the beneficial effect of widening the shareholder base of companies and thus increases its free float (Cox et al., 2004). Foley and Greenwood (2010) also presented validating evidence confirming the benefits of widening shareholder-base and noted that this dispersion produced positive effect on the performance of listed shares. Consequently, it is not surprising to note that the inclusion of the free float to the size-P/E model does not generate a material movement in the explanatory power.

Looking at the Standardized Estimates of these variables, market capitalisation (-0.06894) has the strongest estimate followed by the price-to-earnings ratio (-0.05455) with the free float being last (0.04598). At a 0.05 alpha, the t-values are significant at -6.98 for the price-to-earnings ratio, -8.82 for market capitalisation and 5.88 for the free float.

The 2 linear combinations generated by the collinearity diagnostics tests depicted the strongest proportion of variation as 0.815 for price-to-earnings ratio while combination 3 assigns a 0.743 proportion of variation to the market capitalisation, whilst the free float has a 0.965 proportion of variation under linear combination 4. The condition index for combination 4 is the highest at 6.62, followed by 1.749 for combination 3 and then combination 2 with 1.644 at Eigenvalues of 0.053, 0.76, and 0.861, respectively. Under all combinations, the balance of the other proportion of variations generated by the other variables were relatively small such that it can be concluded that these predictors are not highly collinear and are not linearly related to each other. Hence, comfort can be derived from the results of this test that there is no concern regarding the estimation of the regression coefficients.

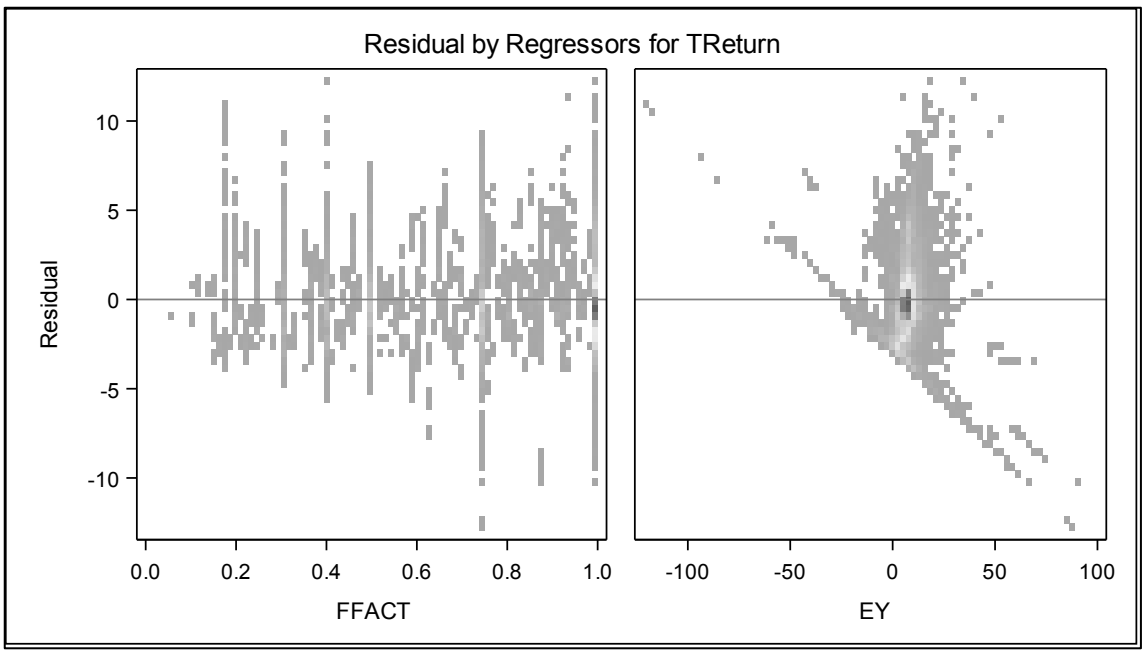
The Durbin-Watson statistic of 0.078 gives assurance that there are no autocorrelation concerns amongst the errors of the observations.

Conclusion: The model specification is regarded as being appropriate based on the result from the above tests. Based on the increase in the F Value to the

model when the free float is included, Hypothesis 3 should not be rejected. Additionally, the increase in R-Square from 0.64% (without free float) to 1.02% (with the free float) supports this position on a relative basis. However, on an absolute basis, the increase in the R-Square of 0.38% (from 0.64% to 1.02%) is considered very low and thus the hypothesis is ultimately rejected.

5.5 Discussion of Results: Research Hypothesis 4

Figure 4: Residual by Regressors for TReturn – Hypothesis 4



The significant F-statistics generated for the free float in combination with the closing share price came to 46.95, 964.45 with earnings yield, 58.09 with market capitalisation, and 44.79 with the price-to-earnings ratio compared to the 54.85 for size-P/E model, that is, the market capitalisation and price-to-earnings ratio. The related R-Squares for free float in combination with closing share price came to 0.57%, 10.60% for earnings yield, 0.71% for market capitalisation, 0.55% for the price-to-earnings ratio, and 0.64% for the market capitalisation and price-to-earnings combination. Based on the superiority of the free float and earnings yield combination over all the other combinations, this combination is regarded as possessing more explanatory than the other combinations (including the size-P/E combination). Alzeaideen and Al-Rawash

(2014) demonstrated the importance of free float in proving market signals affecting economic performance of listed shares, which work helps in uncovering the importance properties contained by the free float.

The parameter estimates for the free float and the earnings yield in this regression came to 0.465 and 0.113 at significant t-values of 6.88 and 43.45 with standard errors of 0.0677 and 0.0026, respectively. The Standardized Estimates for free float was 0.051 and 0.322 for the earnings yield, showing the stronger influence of the earnings yield to equity returns compared to the free float. 95% confidence limits for the free float and the earnings yield were 0.33 to 0.598 and 0.108 to 0.118, respectively. The regression observations read totalled 19 463 with 3 189 missing values resulting in 16 274 observations used. The equity return (dependent variable) mean was 2.499 generating a coefficient of variation of 89.79.

Earnings yield had a 0.902 proportion of variation under combination 2 with condition index of 2.696 and an Eigenvalue of 0.357 while combination 3 produced a 0.9298 proportion of variation for the free float with a corresponding condition index of 7.093 and an Eigenvalue of 0.0515. Under both combination 2 and combination 3, there were no high proportion of variation value by the other variable although the 7.093 condition index for combination 3 is worth highlighting as it can be regarded as approaching the critical point of 10.

According to the Durbin-Watson statistic of 0.081 the observations residuals can be regarded as not highly correlated.

Conclusion: The free float/earnings yield (FFACT/EY) combination exhibits the stronger explanation for variations in equity returns (R-Square of 10.6% compared to the size-P/E model's 0.64%). With the above statistical analysis providing confirmatory evidence that the model is correctly specified and the variables are not highly correlated, it can thus be reasonably concluded that Hypothesis 4 should not be rejected.

5.6 Conclusion

Summary overview of the above discussion and conclusion outcomes are depicted below:

Table 22: Summary of Hypotheses Results

Summary of Hypotheses Results		
	Hypothesis	Result
H1	The main hypothesis of this study is that free float bears significant correlation with equity returns of shares listed on the JSE.	✘
H2	Free float generates a stronger influence to equity returns than corporate size (market capitalisation).	✘
H3	Inclusion of free float to the van Rensburg and Robertson (2003) size-P/E model improves the explanatory power of the model.	✘
H4	A combination of the free float and another firm attribute generates more explanatory power than the size-P/E model.	✓

✘= Hypothesis rejected ✓= Hypothesis not rejected.

CHAPTER 6. CONCLUSIONS & RECOMMENDATIONS

6.1 Introduction

The purpose of this study was to examine the effects of free float on equity returns for listed companies with the aim of ascertaining whether or not free float has any significant bearing on and ability to explain variations in equity returns of listed shares.

In this chapter the study conclusions are discussed, recommendations to the investment community are offered, and areas for potential future research suggested at the end.

6.2 Conclusions of the study

Out of the four hypotheses underlying this study, one (Hypothesis 4) was not rejected and the other three (Hypothesis 1, 2 and 3) were rejected. The overall conclusion of the study is that free float does not exhibit strong explanatory power for variations in equity returns but the free float (together with earnings yield ratio) can be considered as part of a fully specified candidate model for explaining equity return variations.

The combination of the free float and earnings yield ratio depicted stronger explanatory power than the van Rensburg and Robertson (2003) size-P/E model. This finding provides some basic for practitioners to give some consideration to free float as part of their investment decision-making processes.

Rouwenhorst (1999) request that caution should be adopted before adopting inferences from studies conducted in emerging markets due to the generally large standard deviations in these markets which could affect some of the properties of the equity returns observed.

6.3 Recommendations

The following key recommendations are offered to equity investors (both individual and institutional):

Based on the results of the research undertaken above, it is recommended that practitioners include an assessment of the company's free float as part of the investment decision-making process for listed equities. According to Wang and Xu (2003, p. 19) free float provides important informational signals relating to the construct and quality of an investee company's corporate governance structures, which in turn bears significnat influence on the "firm's future cashflows (and growth prospects) and is very useful in understanding variations in cross-sectional equity returns of different firms".

Executive management teams of listed and aspirant listed companies, corporate finance advisors, and investor relations executives are advised as follows:

As part of initial public offering (IPO) or on-going capital raising discussions, consideration needs to be given to the percentage of shares allocated between strategic shareholders (including management) and the general public in ensuring that the free float is set at an appropriate level. With increased funds under-management overseen by institutional investors coming into listed equities, shares with healthy investable universes are enjoying robust demand as a result of these investors' strong need for liquidity and growing popularity of passive investment philosophy, which has resulted in high free float shares included in equity indices being tracked and replicated by index funds (Bostanci & Kilic, 2010).

Pension fund trustee and other custodians tasked giving oversight of the management of third party funds are advised to consider:

Including minimum free float amounts into the investment mandates awarded to portfolio managers to ensure that third party funds are managed and invested into companies boasting appropriate free float amounts. It has been found that shares with low free float promotes information asymmetry to which pension

fund managers adopts a myopic behaviour reflecting their limited visibility on the long-term growth prospects of firms, hence their preoccupation with near-term targets (Uno & Kamiyama, 2010).

Executives of stock exchange companies are asked to:

Consider setting minimum free float amount as part of their listing requirement to ensure only companies with acceptable minimum free float amount are admitted onto the trading platform of their exchanges. Imposing minimum free float threshold is likely to address illiquidity concerns blamed for elevated transaction costs, restricting trading activity, widening bid-ask spreads, and removing the incentive for market participants to trade and research listed companies (Bhide, 1993).

6.4 Suggestions for further research

With free float being a relatively new concept, further research would be useful in uncovering the various economic aspects it represents and providing more theoretically backing to its purported importance. Further research in this regard would be useful to both academia and practitioners.

The potential large differences between the free float of companies listed on the main board and those companies admitted to the Alternative Exchange platform makes a comparison of the effects of free float between these two categories of companies interesting.

Holding period returns for each share were calculated without taking into account the varying risk profiles attaching to each company. Future research can incorporate such a risk factor to assess the impact it has on final results outcome.

Data permitting, future research should be undertaken to assess the influence of corporate ownership composition on equity returns by breaking down strategic shareholders between their various categories.

Future research could be tailored to uncover the granular effects of free float pertaining to key aspects such as liquidity, trading activity, information asymmetry, corporate governance, price volatility etc.

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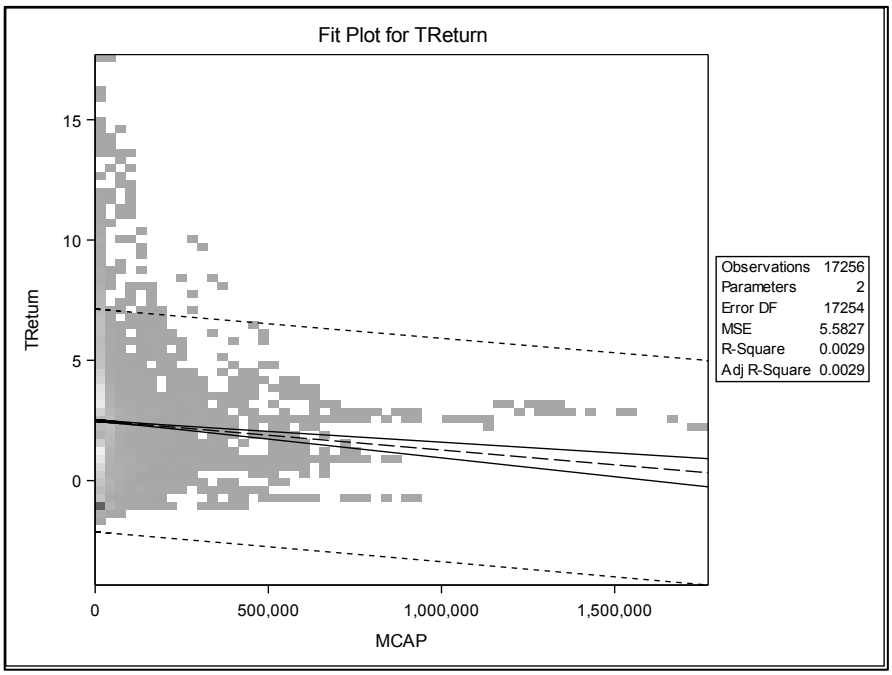
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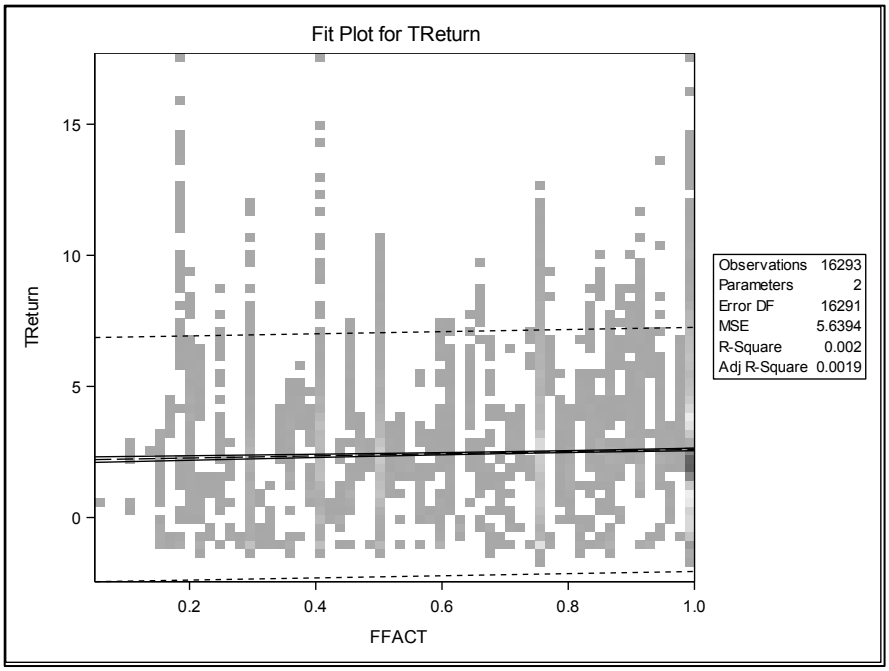
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APPENDIX A – Plots of the Independent Variables

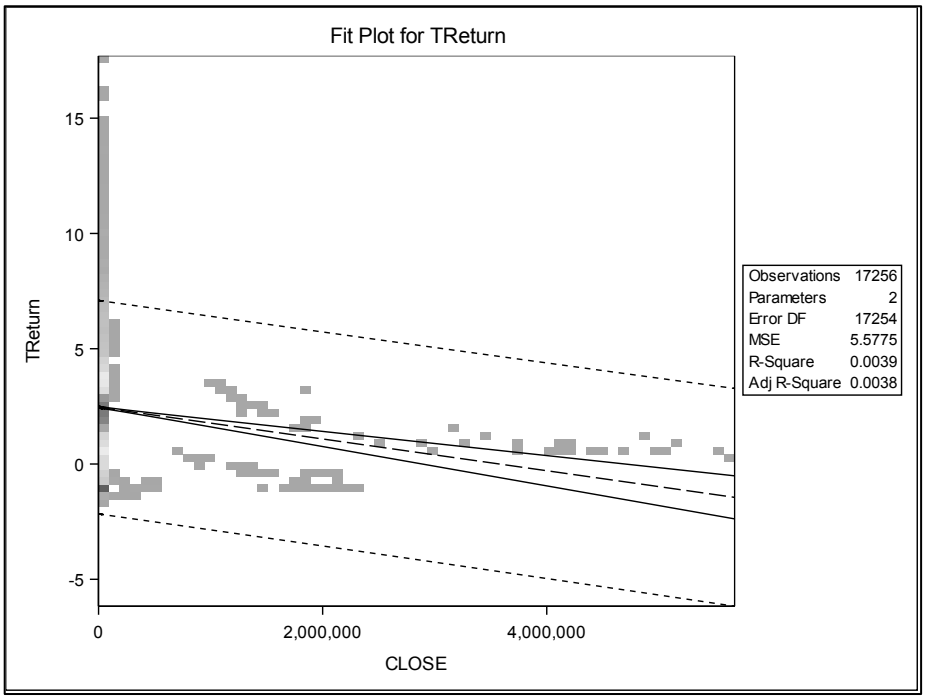
Plot 1 - Fit Plot of the Market Capitalisation



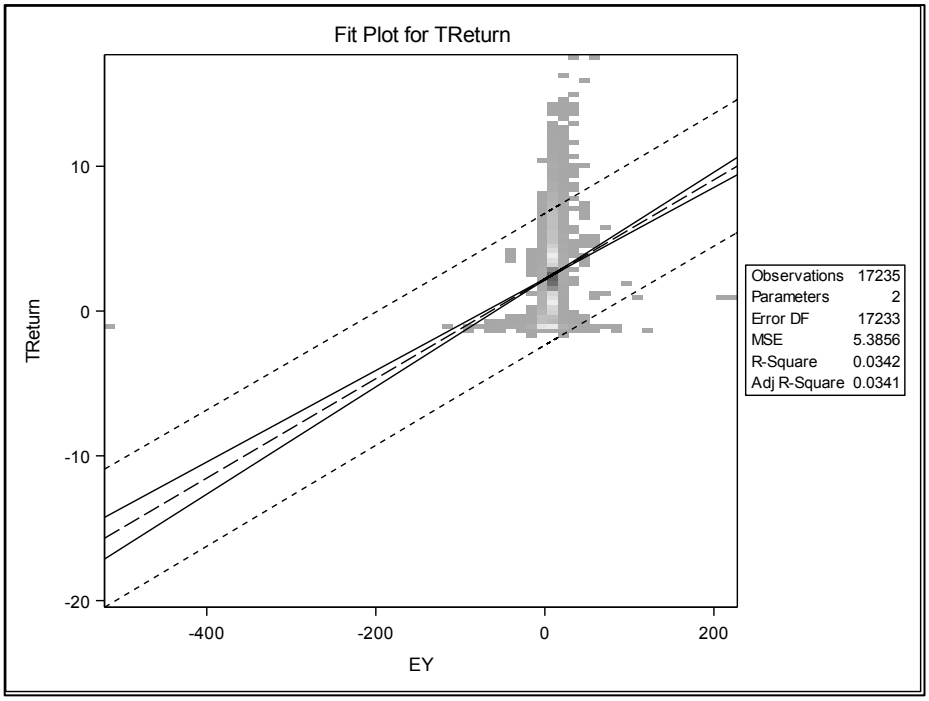
Plot 2 - Fit Plot of the Free Float



Plot 3 - Fit Plot of the Closing Share Price



Plot 4 - Fit Plot of the Earnings Yield



Plot 5 - Fit Plot of the Price Earnings Ratio

