The long-run investment performance of initial public offerings (IPOs) in South Africa

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I. Abstract

This study investigated the long-run investment performance of 411 South African IPOs during the period 1992 to 2007. Consistent with historical studies, no evidence of abnormal performance was found on a calendar-time approach using the Fama-French (1993) three-factor model. While the long-run performance did not differ materially, factors such as financial and industrial industry classifications were found to impact after-market performance of IPO portfolios. It was found that large new company issuances within the Financials and Industrials categories produced abnormal returns, but on a collective basis there was no evidence of abnormal performance. In particular, a positive relationship was found to exist between book-to-market ratios and IPO performance in the financial and industrial sectors, but there was scant evidence on a collective basis. Market conditions were found to have an impact on IPO performance. In periods of market buoyancy, IPOs performed well and in periods of market distress, IPOs' performance suffered. The implications of this study are that investors, in making decisions on whether or not to invest in new issues, should not expect to make superior returns to the market over a five-year period by investing in IPOs. IPO performance after the five-year period was not part of the scope for this study and may form the basis for future studies.

II. Keywords

Fama-French model, initial public offerings (IPOs), long-run performance.

III. Declaration

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

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1.1 Research Title

The Long-Run Investment Performance of Initial Public Offerings (IPOs) in South Africa.

1.2 Introduction to the Research Title

1.2.1 IPOs are Topical

Initial Public Offerings (IPOs) have attracted significant interest in the marketplace. They have been of interest to investors and researchers due to the significant gains associated with the high-profile IPOs of companies such as Google and EBay (Pencek, Hikmet & Lin, 2009). However, Pencek et al. (2009) observed that high short-term performance was not reflective of the long-term performance of IPOs as, after approximately one year, the stock market performance was negative relative to the overall market. Yang, Wang and Jiang (2007) supported this assertion, advocating that investors who hold a newly issued stock normally earn an abnormally high initial return because of a phenomenon known as under-pricing in the short term. However, in the long run, the authors found evidence of under-performance in keeping with international research literature.

Ritter (1991) affirmed that “underperformance of IPOs may include (1) risk mis-measurement (2) bad luck (3) fads and optimism” (p. 4). In addition, Ritter (1991) concluded that the annual volume of IPOs was negatively related to the after-market performance. His study reported that the long-run performance of IPOs in different industries varied widely - an interpretation that correlates with the ‘fads’ hypothesis.

Levis (1993) argued that emerging evidence, after having studied the United Kingdom (UK) IPO market for the period from 1980 to 1988, suggested that first-day returns were the result of intentional under-pricing. He stated that the market deviations from this baseline level represented some form of market overreaction. Levis (1993) concluded that the long-run under-performance of IPOs is not unique

to United States of America (US) new issues but equally applied to new issues in the UK.

Though IPOs' performances have been well documented in the finance literature, most of the studies have focused on the US, Western Europe and other G7 developed economies (Alli, Subrahmanyam & Gleason, 2010). Alli et al. (2010) stated that research on either seasoned equity offerings or IPOs on the African continent is relatively limited. Notable exceptions to this are the studies conducted by Page and Reyneke (1997) that examined the work on IPOs done for the period from 1980 to 1991 in South Africa and Naceur (2000), who analysed the IPOs on the Tunisian Stock market for the period from 1992 to 1997.

Page and Reyneke (1997) indicated that the relatively small size and the low liquidity of the equity markets in most African countries, as well as the historical reliability of data on the African capital markets, may explain why limited research has been done in this area.

Álvarez and González (2005) asserted that evidence of negative, abnormal long-term performance of stock returns after five years following the IPO exists. As noted above, this phenomenon has been reported in the US, Western Europe and other G7 developed markets. They also argued that long-run under-performance of IPOs disappeared after controlling for the characteristics of risk of IPO firms.

The pricing and performance of IPOs has attracted the attention of many researchers in finance (Gompers & Lerner, 2003). Though there is extensive empirical evidence documenting the abnormal initial returns provided by IPOs, the "hot issue markets" and the long-term under-performance of IPO shares, researchers remain unsure about why this is so (Durukan, 2002). IPO performance has puzzled investors for many years. The international evidence has unanimously suggested that IPOs generate positive initial returns (Zaluki, Campbell & Goodacre, 2007). This evidence has been supported by research of IPOs into Thailand, pointing to abnormal returns in the short term but significant under-performance in the long run. (Allen, Morkel-Kingsbury & Piboonthanakiat, 1999).

Furthermore, Allen et al. (1999) indicated that, “fads are likely to be a good explanation for IPO performance because: (i) fads are likely to occur when estimation of the true intrinsic value of the firm is difficult; (ii) risky securities are likely to be subject to high levels of noise trading; (iii) IPO investors appear to be more speculative; and (iv) the marginal investors in initial trading may be over optimistic” (p. 218). Borges (2007) suggested that IPOs aggressively bought by retail investors had higher first-day returns, but also tended to experience lower long-run returns. The conclusion drawn was that investor sentiment drove IPO retail purchases and appeared to have a transitory effect on prices.

Ritter (1991) has argued that “the poor long-run performance of IPOs can be attributed to IPOs coming to the market near market peaks” (p. 4). Moreover, Ritter (1991) also showed that IPOs in the US under-performed when compared to other firms of the same size (based on market capitalisation) by an average of 3.8% during the years following the first day of trading. However, when style matching (based upon market capitalisation and book-to-market) was used, the under-performance shrank to 2.2% per year. Loughran and Ritter (1995) reported that, “the average buy-and-hold three-year and five year returns for the US IPOs are 8.4% and 15.7% respectively, compared to 35.3% and 66.4% respectively for a control sample of non-issuers, matched by firm size and industry” (p. 25). Loughran and Ritter (1995) further argued that US IPO companies did experience significantly negative returns in the first three to five years following an IPO. They concluded that “investing in firms issuing stock is hazardous to an investor’s health” (Loughran & Ritter, 1995, p. 25).

Aggarwal, Leal and Hernandez (1993) declared that the under-performance of IPOs could be explained by the over valuation of the new shares in the initial period after-market trading by investors rather than from being systematically under-priced. Durukan (2002) proposed that the most important positive signal for a company pursuing the IPO route was premised on past historical earnings, followed by underwriter certification. Kooli, L’her and Suret (2006) suggested that IPOs revealed existence of severe after-market under-performance for issuers. This phenomenon was reported in the US and in other countries, and was also

observed with seasoned equity offerings. They further stated that this severe market under-performance could be attributed to after-market efficiency.

Chi and Padgett (2006) argued that high-quality firms under-priced their stocks at the IPOs and, subsequently, conducted seasoned offerings when they had opportunities for information revelation and equilibrium prices were established. The cost of under-pricing and a high probability of their quality being revealed between the two offerings prevented low-quality firms from following suit.

Gompers and Lerner (2003) reported that the debate about under-performance could not easily be answered without out-of-sample tests. They also highlighted that data from non-US markets was not conclusive because of the shorter period employed and the cross-sectional correlation between returns of IPOs in the US and the return of IPOs in these other markets. They concluded that the long-run performance of pre-Nasdaq IPOs depended considerably on the method used for calculating returns and performance. Moreover, the results derived from the CAPM and Fama-French three-factor model suggested that there was no abnormal performance.

Chan, Cooney, Kim and Singh (2008) noted that “over $500 billion has been raised by initial public offerings over the past two decades” (p. 46). They also added that “investors are keenly interested in firm characteristics that help identify IPOs that are more likely to outperform or underperform in the long run” (p. 47). Hence, the level of extensive research efforts that IPOs have generated was not surprising.

However, as noted, scant research has been done into South African IPOs. For this reason, this study attempted to gain a deeper understanding concerning the long-run performance of IPOs, and the relevant factors underpinning this phenomenon. In particular, this research endeavoured to:

I. Establish the broad set of factors affecting IPO performance in the local and international literature. Emphasis was placed on time horizons of up to five years.

II. Investigate the proposed factors that impacted on IPOs listed on the Johannesburg Stock Exchange (JSE) in South Africa.
III. Establish the existence of significant relationships between these factors and the performance of the IPOs over a period of five years.
IV. Draw conclusions regarding the performance of IPOs and provide lessons for potential investors or interested parties.

1.2.2 Relevance of the Study to South African Business

The IPO route "is becoming an increasingly popular mechanism of raising capital and funding growth" (Brau, Ryan & DeGraw, 2006, p. 284). Brau et al. (2006) argued that chief financial officers mainly perceived IPOs as vehicles for funding growth and for developing liquidity. They concluded that the principal exchanges in China, India, Brazil and other emerging markets were mature enough to source funding for the largest companies seeking listings.

IPOs were also deemed attractive as typically financial institutions generally became shareholders, which in turn increased the credibility of the company (Gao, Mao & Zhong, 2006). Government-owned businesses might have also been sold to the public to diversify the shareholding. Alli et al. (2010) studied the use of IPOs as means of facilitating acquisitions in an emerging market for businesses that wanted to expand their activities or footprint.

1.2.3 Changes in South Africa's Business Environment

Covering the period 1980 to 1991, Page and Reyneke (1997) performed a study of IPOs in South Africa (SA). They argued that hot IPOs, which were characterised by unusually high volume of offerings; severe under-pricing; frequent oversubscription of offerings; and, in certain instances, concentrations in particular industries, were characterised by long-term under-performance. On the contrary, cold IPO markets had much lower issuance, less under-pricing and fewer instances of oversubscription and over-performed in the long run. Since then, the South African market experienced major changes, including:

I. the boom and bust phase after 1997;

II. the significant number of IPOs concluded after 1997 (Nyamakanga, 2007);
III. the South African economy increasingly opening up to globalisation and liberalisation dynamics (Alli et al. 2010); and
IV. the number of companies that were unbundled from conglomerates and listed separately (Mcnulty, 2006).

Given the above, there has been debate surrounding IPO performance. The international literature that set out to investigate this produced mixed results. Whilst the JSE is an important capital market, the subject of IPOs has gone largely unresearched. This was surprising, given the attention to the topic in international literature and evidence of mixed results.

This paper attempted to address the SA research gap.

2 Chapter 2: Theory and Literature Review

2.1 Introduction

The theory reviewed in this section investigated the key theme of the research problem, building a foundation of understanding for IPO performance and an argument as to why this particular phenomenon warranted further investigation. This was done in order to:

I. Establish evidence of abnormal performance in the international literature. In addition, an attempt was made to seek the root causes of the difference in performances.
II. Establish popular and widely used IPO performance measures in international finance literature.
III. Identify key factor prescripts that impacted on IPO performance.

2.2 Literature Review

2.2.1 IPOs and their Long-Run Performance

Bessler and Thies (2007) stated that there were a number of well-known reasons why companies went public and raised equity externally, which included: diversification of ownership, liquidity, corporate control and agency problems. Brau and Fawcett (2006) suggested that chief financial officers (CFOs) identified the creation of public shares for future acquisitions as the most important motivation for performing an IPO. Explanations of lowering the cost of capital and the pecking order of financing were not among the most important reasons for conducting an IPO.

Brau and Fawcett (2006) also argued that “chief financial officers took into account market and industry stock returns and placed less emphasis on the strength of the IPO market when considering the timing of their issue” (p. 287). Historical earnings were considered as the most positive signal in the IPO process. The use of a top investment bank as an underwriter of the new issuances was the second most positive signal. This was supported by Crutchley, Garner and Marshall (2002) who argued that IPOs issued by reputable

underwriters performed better than average. Brau et al. (2006) also suggested that commitment to a long lock-up period was regarded as the third most significant signal. The selling of a large portion of the firm, issuing units and selling insider shares were all deemed as negative signals.

Ritter (1991) suggested that the long-run performance of IPOs was of interest to investors for largely two reasons: “first investors view the existence of price patterns as presenting opportunities for active trading strategies to produce superior returns; and secondly, a finding of non-zero aftermarket performance brings into question the informational efficiency of the IPO market” (p. 4). The evidence produced according to Ritter (1991) was that IPOs were subject to fads that affected market prices.

Crutchley et al. (2002) argued that long-term performance of IPOs could have been affected by agency problems. Increased agency costs and informational asymmetry contributed to declines in operating performance following an IPO. Moreover, IPO firms with large institutional holdings performed better than average.

Ritter (1991) found that under-performance was more pronounced among small capitalisation offers and that this under-performance was concentrated among relatively younger growth firms that were being offered in periods with high IPO activity.

Brav and Gompers (1997) argued that under-performance was relatively modest amongst firms with venture companies behind the IPOs, while it was more pronounced among firms without venture companies behind the offering.

Gompers and Lerner (2003) suggested that “individuals often violated Bayer’s rule and rational theories when making decisions under uncertainty” (p. 1356). In a similar vein, long-run pricing anomalies were attributed to investor sentiment. As a result, behavioural theories posited that investors gave too much credence to recent results and trends. Eventually, over-optimism on the part of investors led to disappointment and subsequent returns declined.

Yi (2001) established that IPOs that had positive earnings at the time of offering, fared better than firms that went public with negative earnings.

Yong (2007) argued that Korean IPOs outperformed seasoned firms with similar characteristics. However, much of the over-performance took place during the first month of listing, and that the long-run performance exclusive of the first month was not statistically different from that of seasoned firms. In addition, de-regulation had no impact on the long-term performance of Korean IPOs.

Durukan (2002) argued that “the conceptual framework of the hypotheses formulated to explain the abnormal initial returns were based on uncertainty in the IPO process” (p. 18). The assumption was that IPOs were deliberately under-priced. Hence, under efficient market conditions, the market corrected this deliberate act of under-pricing leading to equilibrium in price, and in the long run these issues tended to under-perform other securities.

Bessler and Thies (2007) indicated that “the investor could not be absolutely sure about the intentions of the owners due to their information advantage” (p. 422). These could only be revealed in initial returns and long-run performance. Thus, there was an extensive body of academic literature examining these issues of IPO under-pricing and positive initial returns as well as the long-run performance of IPOs.

Shiah-Hou (2005) suggested that issuing firms with abnormal high accruals in the year of going public had low stock return performance for the three years after the IPO. Jakobsen and Sørensen (2001) argued that “investment in IPOs was a money losing strategy in the long run” (p. 420). This was supported by Loughran and Ritter (1995) and Levis (1993) who concluded that investing in recent IPOs was to be in sharp contrast to a substantial number of studies of the first-day returns (initial returns) that concurrently reported that it was profitable to invest in IPO stocks in the offering period. They also suggested that relatively large short-term returns could be indicative of offering prices of IPO stocks being set systematically too low.

Jakobsen and Sørensen (2001) indicated that there was no theory proposed that could satisfactorily explain the long-run under-performance of IPO stocks that were observed for up to five years after the initial public offering. They went on to explain that this was regarded a “puzzle”. Coakely, Hadass and Wood (2008) suggested that long-run under-performance of IPOs puzzled investors and was the most controversial area of IPO research. Ritter and Welch (2002) established that the long-run under-performance of IPOs could be the result of only two causes: optimistic expectations; and additional IPOs following successful IPOs. Moreover, “the most optimistic investors, or those who have heterogeneous expectations of the valuation of a firm wanted to buy IPOs” (p. 1798). When the variance of expectations decreased, the marginal investors amended their estimation of the valuation of the firm. This led to a reduction in the price of IPOs.

Borges (2007) suggested that IPOs that were more aggressively purchased by retail investors had higher first-day returns but also got to experience lower long-run returns. He concluded that investor sentiment drove IPO retail purchases and appeared to have a transitory effect on prices. Borges (2007) also argued the prediction that the offer price might have exceeded fundamental value in some cases by as much as 50 percent when compared with industry peer multiples. He found that most overpriced firms were those that subsequently under-performed.

Gompers and Lerner (2003) argued that pricing anomalies had been attributed to investor sentiment. Moreover, investors tended to give too much weight to recent results and trends and, consequently, overly optimistic investors were disappointed and subsequent returns declined.

“Many firms historically made a decision to go public near the peak of the industry-specific fads which in turn justified the “fads” explanation for initial underpricing” (Álvarez & González, 2005, p.327). Álvarez and González (2005) also pointed out that the “fads” explanation predicted a negative relationship between long-run returns and initial returns. Brav, Michaely, Roberts and Zarutskie (2009) suggested that initial returns might be significantly correlated with future IPO volume and also pointed out that higher initial returns could be an

indicator that market conditions were better than expected which led to more companies taking advantage of this “window of opportunity” and going public in the near future.

Gao, Mao and Zhong, (2006) found that IPOs with higher early market return volatility had significantly lower long-term performance one, two, and three years after issuance and that divergence of opinion played a significant role in the levels of volatility

Zaluki et al. (2007) proposed that the evidence showed that investors who purchased shares at the offering date and sold them on the first day of trading gained high positive returns, while those investors who held IPO shares for a longer period did not gain as much.

In a study of the US IPO market, Gompers and Lerner (2003) investigated 3 661 IPOs from 1935 to 1972 for holding periods up to five years after listing. Their findings demonstrated that IPO performance depended on the method used to measure returns.

Their results showed some evidence of under-performance when value-weighted event-time buy-and-hold abnormal returns were used. However, the under-performance disappeared when either equally-weighted event-time buy-and-hold or cumulative abnormal returns were employed. This was also attested by Balatbat (2006) who conducted IPO performance studies for the US market.

A study on Canadian long-term IPO performances revealed that under-priced IPOs outperformed in the long run which corroborated the signalling hypothesis for the explanation of IPO long-run performance in the capital market (Kooli, L’her & Suret, 2006). This was corroborated by Allen et al. (1999), who suggested that companies that were over optimistic about their growth prospects when they adopted the IPO route tended to over-invest for immediate short-term growth and subsequently experienced depressed long-term returns.

2.2.2 Methods for Estimating Long-Term Returns

Ritter (1991), in his path-breaking paper on IPO after-market performance, gave momentum to the numerous studies of the long-run returns of IPO stocks on global capital markets. Ritter (1991) and Loughran and Ritter (1995) found that IPOs in the US on average showed significant under-performance compared to other stocks up to a period of five years after the initial public offerings. The evidence showed that in the US an average under-performance of 29% was reported after the first three years and more than 50% after five years. Levis (1993) found under-performance of 30% after the first three years of the initial public offering. Similar results were found in Brazil and Chile by Aggarwal et al. (1993) and in South Africa by Page and Reyneke (1997).

Chan et al. (2008) stated that, in examining long-horizon stock performance for IPOs, previous studies made use of the buy-and-hold abnormal return (BHAR) method. BHAR was preferred as the investment strategy was regarded as being simple and representative of the returns that a long-horizon investor could earn. However, Fama (1998) argued that BHAR could overstate the long-run performance as it grew with the return horizon, even when there was no abnormal return after the first period. Furthermore, Fama (1998) found that, as the BHAR was computed over a long horizon, several sample firms' BHAR could overlap in different months, making cross-sectional correlations among long-horizon returns. This cross-sectional dependence in sample observations led to poorly specified test statistics for BHAR. Kooli et al. (2006) argued that a major advantage of the BHAR method was that it was a significant measure of investor experience. They further stated that its disadvantage was that it was "more sensitive to the problem of cross-sectional dependence among sample firms" (p. 50). Drobetz, Kammermann and Wälchli (2005) indicated that in their findings a major problem with BHARs was that by compounding monthly returns, long-run BHARs were severely skewed.

Fama and French's (1993) three-factor model gained popularity in empirical studies for the US and other countries. It was employed by Brav and Gompers (1997) in their IPO study to estimate a calendar-time version of the three-factor Fama-French model. Fama and French (1996) argued that "many apparent

anomalies in “efficient markets” studies can be explained by use of the three-factor model where the factors are the excess returns on the market, the difference in returns between companies with high book-to-market value (BMV) and low BMV ratios and the difference in returns between large and small companies (SMB)” (p. 56). Size effects have been taken into account in empirical studies in a variety of ways. Espenlaub, Gregory and Tonks (2000) used size decile control portfolios where each company was assigned a decile membership based upon its market capitalisation at the beginning of the year. However, it should be noted, as argued by Bessler and Thies (2007), that there was as yet no theoretical foundation for these factors. Khurshed (2000) provided evidence that long-run returns were not that different under the BHAR and the Fama and French approaches. Similar empirical evidence was found by Jeanneret (2005) in France.

The calendar-time approach adopted in this study followed that done by Zaluki et al. (2006) and Loughran and Ritter (1995). The use of the event-time returns could overstate the statistical significance of mean abnormal returns because of the cross-sectional dependence of observant returns. Gompers and Lerner (2003) argued that if IPOs under-performed on a risk-adjusted basis, time series portfolios of IPOs would consistently under-perform relative to an explicit asset-pricing model. Recent work done by Fama and French (1993) indicated that a three-factor model could explain the time series of stock returns, although some researchers including Gompers and Lerner (2003) viewed both size and book-to-market as potential measures of sentiment. The control for event clustering and cross-correlations in IPO returns was carried out through the use of the Fama and French (1993) three-factor model. Brav et al. (2009) argued that the standard size and book-to-market factors proposed by Fama and French (1993) explained return co-movement of these issuers as found in earlier studies by Brav and Gompers (1997). They also intimated that issuers with low book-to-market ratios shared a common negative exposure to the Fama and French (1993) book-to-market factor and issuers with low market capitalisations shared a common positive loading on the Fama and French (1993) size factor. According to Zaluki et al. (2006), the use of this method was preferred rather than the capital asset

pricing model (CAPM) due to its well-known and documented failure to describe the cross-section of expected returns.

The return for each sample firm that had its IPO within a certain time period (for example, within the past five years) for each calendar month was calculated and the portfolio return obtained in that month as well as on a yearly basis. The Fama-French three-factor model advocated by Chan et al. (2008) and Espenlaub et al. (2000) was regressed as shown below:

$$R_{pt} - R_{ft} = \alpha + \beta(R_{mt} - R_{ft}) + \gamma\,\mathrm{SMB}_t + \delta\,\mathrm{HML}_t + \varepsilon_t$$

(Equation 1).

Where R_p is the portfolio return from the sample firms, R_f is the risk-free rate, R_m is the market portfolio return, SMB is the small-firm portfolio return minus the big-portfolio return and HML is the high book-to-market portfolio minus the low book-to-market portfolio return. Chan et al. (2008) argued that this approach had appeal due to there being less skewness using monthly returns and the time-series variation of monthly returns accurately captured the effects of correlation across events stocks. The abnormal returns were tested based on the t-value of the regression intercept Alpha. According to Chan et al. (2008), “the statistical approach was based on testing the significance of the differences of means between sub samples, defined according to several criteria” (p. 411). A multivariate regression was estimated in order to determine the factors that affected the market-adjusted returns of IPO firms.

The calendar time-based approach underpinned by the Fama-French (1993) three-factor model was popular in finance literature as it controlled for cross-correlation and event clustering (Zaluki et al., 2006). This was explained in greater detail in the method section of this report. This approach was used to perform regressions in determining the evidence of abnormal performance.

2.2.3 Factors Impacting IPO Performance

Support for the method indicated above was drawn from the international literature discussed below.

Ritter (1991) made use of cross-sectional and time-series patterns in the after-market performance of IPOs. He advocated the use of size in explaining after-market performance.

Aggarwal et al. (1992) argued that initial returns were an appropriate factor in accounting for after-market returns. They also advocated the use of a wealth relative measure to determine whether or not an IPO had outperformed the market in the defined period. If a wealth relative measure was below one, it implied that the IPO had outperformed the market and if it was above one, it had under-performed in comparison to the market.

Levis (1993) supported initial returns as a factor, but argued for the inclusion of gross proceeds (size of issue) as a factor which could explain significant differences in initial returns for placements when categorised in this manner. Loughran and Ritter (1995) examined the statistical and economic significance of book-to-market effects and came to their conclusion on IPO long-run under-performance without controlling for book-to-market effects. Both firm size and book-to-market ratio played a big role in the decision of firms to go public.

An important distinction was made by Loughran and Ritter (1995), who considered that “value firms tend to have higher book-to-market ratios, whilst growth firms have lower book-to-market ratios” (p. 28). If not controlled for, one could “erroneously compare the returns on an IPO with high growth potential but at an early stage of its life cycle (small firm with a low book-to-market) with a control firm that is a “long term loser” with no future growth prospects (small with a high book-to-market ratio)” (Loughran & Ritter, 1995, p. 29). A filter was used for size and then a non-issuer was selected with the closest book-to-market ratio. Loughran and Ritter (1995) indicated that a five-year period interval was long enough to measure the degree of under-performance. Initial returns were examined for elucidation on after-market performance.

Zaluki et al. (2006) made use of the Fama and French model when examining IPO performance in Malaysia. However, Espenlaub et al. (2000) encountered

difficulty when trying to apply the Fama-French model to UK returns due the lack of data for many of the firms on the Datastream database. Espenlaub et al. (2000) indicated that survivorship bias could be a problem when the three-factor model is applied to the UK and the results in estimating abnormal returns should be treated with caution. This was closely scrutinised for similarities, if any, in South Africa.

Barber and Lyon (1997) found that a size filter of 70 to 130 percent yielded well-specified test ratios. Moshirian, Ng and Wu (2010) suggested a filter of 50 to 150 percent as this method involved a trade-off between having a close match or proximity in book-to-market. Page and Reyeneke (1997) examined after-market performance of IPOs in South Africa using issue size as one of the key factors.

In examining Thailand IPOs, Allen et al. (1999) adopted the Ritter (1991) method. In addition, they used initial returns, issuing size, annual volume of listing, industry classification and age of issuing firm as factors in explaining long-run performance. This was obtained from existing evidence concerning IPO performance.

Espenlaub et al. (2000) supported the issue of size and used decile control portfolios, where each company was assigned a decile membership based upon its market capitalisation at the beginning of each year, and ten portfolios were formed with equal number of firms in each decile. Each IPO was then assigned a decile membership based upon its market capitalisation at the beginning of each year.

In examining German IPOs between 1960 and 1992, Stehle, Ehrhardt and Pryzyborowksy (2000) considered size deciles (issue size) as factors in providing explanations for after-market performance. The Danish IPOs study conducted for the period from 1984 to 1992 by Jakobsen and Sørensen (2001) made use of existing factor evidence including size of issue and number of IPOs in that year as factors.

Crutchley et al. (2002) made use of size and book-to-market ratio for IPOs' after-market performance. They also matched each IPO firm in the sample with a non-

issuing firm, basing the match on size and book-to-market ratio. They defined a non-issuing firm as one that had not issued stock within the three years prior to the IPO of the sample firm. The matched firm had the closest book-to-market ratio, subject to the constraint that its market value was within 30% of that of the IPO firm.

Gompers and Lerner (2003) considered the size of the IPO and book-to-market portfolios as being important variables impacting IPO performance in the US. Chan, Wang and Wei (2004) followed the Ritter (1991) method in constructing portfolios using three measures namely the size matched, book-to-market match, and the size-and-B/M non-IPO portfolios. These were also documented extensively Loughran and Ritter (1995) as key determinants of stock returns. This view was supported by Álvarez and González (2005), who proposed that these were determinants of stock returns in Spain. Bessler and Thies (2007) also supported this view and believed that size and book-to-market offered better explanations for stock returns in Germany. Zaluki et al. (2006) utilised the size and book-to-market factors and then used the Fama and French three-factor model as the basis for the statistical regression.

Kooli et al. (2006), in analysing the Canadian IPO market for after-market performance, constructed reference portfolios, which sought to alleviate new listings and re-balancing biases. The portfolios were formed on the basis of firm size and book-to-market ratios which had been suggested by Ritter (1991) and Loughran and Ritter (1995).

Gao et al. (2006) suggested that IPO long-term returns were related to specific factors including size and book-to-market ratio. The size of the issue was used in a study by Chuang, Lee and Chun (2008).

Choi, Lee and Megginson (2010) sought to determine if privatisation IPOs outperform in the long run. Choi et al. (2010) used a sample of 241 privatisation IPOs from 42 countries during the period from 1981 to 2003. They compared one-, three- and five-year holding period returns of privatisation IPOs to those of the

domestic stock market indices and to size and book-to-market ratio (BM)-matched firms as factors from the same countries.

Moshirian et al. (2010) advocated the use of: (i) market indices; (ii) size and book-to-market ratio-matched control firms; and (iii) size and book-to-market ratio-matched reference portfolios. Moshirian et al. (2010) reported that the control approach involved selecting firms that had similar characteristics and financial variables as the sample firms to control for common risk factors that were related to expected returns. As such, the matching was performed on the basis of size and book-to-market ratios.

From the literature evidence provided, the discernable factors used to explain long-run investment performance are size and book-to-market ratios. These were used as part of the Fama-French three-factor model to determine long investment performance of IPOs.

2.2.4 An Academic Case for this Study

The academic literature was far from conclusive on identifying the key prescripts or factors that affected the long-run performance of IPOs. Since the ground-breaking study on IPOs conducted by Ritter (1991), many studies have been performed in different countries but the results have not revealed satisfactory evidence of key factors affecting long-run performance. The popular factors though that appear to have been used regularly are those of size and book-to-market ratios within the Fama-French three-factor regression model The question that was posed is whether or not an investor in South could make superior returns on an IPO investment in the long run? This was supported by the studies conducted from 1991 by Ritter (1991) to Moshirian et al. (2010). An opportunity therefore existed to determine:

I. the appropriate measures for IPO performance in South Africa. As discussed extensively within the literature, it was clear that conflict on the right route to adopt existed. This paper adopted the widely used Fama-French three-factor model;

II. the significance of the factors identified as explanatory variables in explaining after-market IPOs performance in South Africa; and

III. what the impact of these factors on IPOs meant for companies considering going public as well as investor decision-making.

3 Chapter 3: Research Proposition

3.1 Proposition

The following research propositions required investigation as identified in the literature review based on the studies done by Ritter (1991) up to and including Moshirian et al. (2010):

I. the impact that size of the issue had on IPO performance;
II. the book-market equity ratio (BM) phenomenon on IPO price;
III. the overall impact of the market performance on IPO performance;
IV. the extent to which industry classification by Financials, Industrials and Mining played a role in impacting after-market performance of IPOs; and
V. the significance of the intercept (Alpha) in determining the existence of abnormal after-market IPO performance.

3.2 The Research Questions

I. Was there evidence of abnormal performance from IPOs over a five-year period?
II. Was the size of the IPO significant in the after-market long-run returns?
III. What impact did a book-to-market ratio have on IPO performance?
IV. What role did overall market factor performance play in after-market performance?
V. Did industrial classifications such as Financials, Industrials and Mining play a role in IPO after-market performance?

3.3 Hypotheses

3.3.1 Proposed Hypotheses

The research objectives were combined with the extensive literature and hence the following hypotheses were proposed for this study:

3.3.1.1 Objective 1: Company Size of the IPO Portfolio

Company Size of the IPO Portfolio (SMB)

The null hypothesis under Objective 1 stated that the IPO company size had no bearing on after-market performance. The alternative hypothesis stated that the company size of the IPO had a statistically significant impact on after-market performance.

H0: β of the size of the IPO Portfolio = 0.000

H1: β of the size of the IPO Portfolio > 0.000

3.3.1.2 Objective 2: Book-to-Market Ratio of the IPO Portfolio

Book-to-Market Ratio (HML)

The null hypothesis under Objective 2 stated that the book-to-market (BMV) ratios of the IPO had no impact on after-market performance. The alternative hypothesis stated that the BMV ratios had a statistically significant impact on after-market IPO performance.

H0: β of the book-to-market ratio (BMV) of IPO Portfolios = 0.000

H1: β of the book-to-market ratio (BMV) of IPO Portfolios > 0.000

3.3.1.3 Objective 3: Overall Market Performance

Overall Market Performance

The null hypothesis under Objective 3 stated that the overall market performance in a given period had no bearing on after-market IPO performance. The alternative hypothesis stated that the overall market performance in a given period had statistically significant impact on the after-market IPO performance

H0: β of the size of Overall Market Performance = 0.000

H1: β of the size of the Overall Market Performance > 0.000

3.3.1.4 Objective 4: Industry Classifications

Industry Classification – Financials

a. The first null hypothesis under Objective 4 stated that the classification of IPOs under Financials had no impact on after-market performance. The alternative hypothesis stated that the classification of IPOs under Financials had statistically significant impact on after-market IPO performance.

H0: β of the Financials Classification of IPOs = 0
H1: β of the Financials Classification of IPOs > 0

Industry Classification – Mining

b. The second null hypothesis under Objective 4 stated that the classification of IPOs under Mining had no impact on after-market performance. The alternative hypothesis stated that the classification of IPOs under Mining had statistically significant impact on after-market IPO performance.

H0: β of the Mining Classification of IPOs = 0
H1: β of the Mining Classification of IPOs > 0

Industry Classification – Industrials

c. The third null hypothesis under Objective 4 stated that the classification of IPOs under Industrials had no impact on after-market performance. The alternative hypothesis stated that the classification of IPOs under Industrials had statistically significant impact on after-market IPO performance.

H0: β of the Industrials Classification of IPOs = 0
H1: β of the Industrials Classification of IPOs > 0

3.3.1.5 Objective 5: Alpha of Abnormal Returns

The fifth hypothesis stated that the null hypothesis for the intercept (Alpha Coefficient) which depicted abnormal returns showed no abnormal returns. The alternative hypothesis stated that the intercept showed abnormal returns.

H0: α coefficient (intercept) of the abnormal returns = 0

H1: α coefficient (intercept) of the abnormal returns > 0

4 Chapter 4: Proposed Research Method

4.1 Choice of Methods

The research design was quantitative and descriptive in nature. Descriptive research was designed to give description of characteristics of a phenomenon or population. That is, what the factors that affected long-run investment performance of IPOs were (Zikmund, 2003). Zikmund (2003) further alluded to how and why descriptive research was done when there was evidence and understanding of the research problem. He also sought to establish that the descriptive research aimed to determine the answer to who, what, when, where and how questions. In this case:

I. What evidence was there of abnormal performance? What was the root cause of the performance?
II. What were the appropriate IPO performance measures?
III. What were some of the key driving factors impacting on IPO performance?

4.2 Scope and Unit of Analysis

4.2.1 Research Scope

The scope of this enquiry was limited to the factors that affected IPO long-run performance in South Africa. Alli et al. (2010) examined the impact of economic and financial liberalisation on the under-pricing of IPOs in post-apartheid South Africa and juxtaposed this with under-pricing in the apartheid era. The factors and the context of the proposed study were materially different to what was investigated historically. In addition, the most popular IPO performance measures which were identified from the ground breaking study by Ritter (1991) through to the study by Moshirian et al. (2010) were examined in depth and applied to the South African context.

The Fama-French (1996) model was used for regression purposes. The long-run performance period of IPOs proposed for investigation was up to five years.

4.3 Population

Van Rensburg (2000) argued that, in comparison to investigators examining US equity markets, thin trading was a phenomenon that had adverse impacts on South African researchers. Recorded prices were used to represent the underlying price of the stock. Van Rensburg (2000) alluded to the fact that if a security had not been trading for significant periods of time, the recorded price of the security signified the outcome of some transaction in a prior period. However, the underlying price should reflect any new information in the period under review. He suggested that a sample had to be corrected for thin trading through the trade-to-trade approach or excluded altogether from the sample. This study did not exclude any stocks with thin trading as this would have created significant data noise and potentially spurious results.

This study also took into account recommendations made by Van Rensburg (2002) that the IPO stocks had to be grouped into three key groupings of Financials, Mining and Industrials as they represented the formations of the JSE. The population consisted of all IPOs done on the JSE between the periods 1992 to 2007 in all sectors. These were segmented into three main classifications, namely Financials, Mining and Industrials.

4.4 Sample Size and Method

The sample that was used in the study related to all IPOs done between the periods 1992 and 2007. This was done on a non-probability basis. The sample included listed and de-listed IPO companies.

The data was sourced from McGregor-BFA, I-Net Bridge and the JSE databases. Statistics South Africa was utilised for obtaining the risk-free rate (Repo rate). The sample of the data amounted to 411 IPOs that were used for purposes of the study.

4.5 Data Gathering

Secondary data was defined as data that had been previously collected for some purpose other than the one at hand (Zikmund, 2003). Furthermore, Zikmund (2003) stated that the major advantage and disadvantage of secondary data was, respectively, that researchers were able to build on past research (body of business knowledge) and the applicability to the population of interest could be difficult.

The data was primarily gathered from the McGregor-BFA database, I-Net Bridge and the JSE. The database was comprehensive and contained financial information on all JSE IPOs since their debut.

4.6 Data Analysis

Data analysis for each hypothesis was used as follows:

I. Hypothesis 1 had to compare the means of two independent data sets; the most appropriate statistical technique to do this was a t-test. (Zikmund, 2003, p. 524)
II. Hypothesis 2 had to compare the means of the two independent data sets; the most appropriate statistical technique to do this was a t-test. (Zikmund, 2003, p. 524)
III. Hypothesis 3 had to compare the means of two independent data sets; the most appropriate statistical technique to do this was a t-test. (Zikmund, 2003, p. 524)
IV. Hypothesis 4 had to compare the means of two independent data sets; the most appropriate statistical technique to do this was a t-test. (Zikmund, 2003, p. 524)
V. Hypothesis 5 had to compare the means of two independent data sets; the most appropriate statistical technique to do this was a t-test. (Zikmund, 2003, p. 524).

Multi-regression analysis was run on the data sets to test for statistical significance.

4.7 Method of Analysis

The Fama-French method was adopted in this study to measure long-run investment performance of IPOs. This was suggested by Ritter (1991), Loughran and Ritter (1995), Álvarez and González (2005), Gompers and Lerner (2003) and Zaluki et al. (2006).

4.7.1 Calendar-Time Approach

Fama-French Three-Factor Model

Gompers and Lerner (2003) indicated that in the calendar-time analysis, the de-listing return was used until the de-listing month where after it was spliced in the IPO firm's size and book-to-market bench-market return to get the annual return for the IPO in the de-listing year. As a result, the de-listed firm was not included in subsequent calendar-time portfolios following the de-listing year.

As discussed by Zaluki et al. (2006) and Loughran and Ritter (1995), the dependant variable in the Fama-French regression for each calendar month, t, consisted of both equally-weighted and value-weighted monthly returns on a portfolio of IPOs. The three Fama-French factors were regressed on excess returns on the IPO company portfolios as follows:

$$R_{pt} - R_{ft} = \alpha + \beta(R_{mt} - R_{ft}) + \gamma\,\mathrm{SMB}_t + \delta\,\mathrm{HML}_t + \varepsilon_t \quad \text{(Equation 1)}$$

Where R_{pt} was the IPO portfolio return in month t, R_{ft} was the one-month South African Base Lending Rate, observed at the beginning of the month, and R_{mt} was the monthly return of The All-Share-Index (ALSI). SMB_t was the monthly return on the zero investment portfolio for the size factors in the returns, namely the difference between the equal-weight mean of the returns on a portfolio of small stocks and a portfolio of big stocks, constructed independently from the book-to-market portfolio, and HML_t was the monthly return on the zero investment portfolio for the book-to-market equity factor in stock returns, namely the difference

between the return on a portfolio of low book-to-market ratio stocks, constructed independently from the size portfolio.

The study followed the same procedure carried out by Fama and French (1993) and Zaluki et al. (2006) which involved the construction of the portfolios for the size and book-to-market (BMV) factors under the major classifications of financial, mining and industrial portfolios. Size was calculated as the share price multiplied by the number of shares in issue, while the book-to-market ratio was calculated as the book common equity for the fiscal year ending in calendar year t-1, divided by market equity at the end of December t-1. In June of each year, all JSE stocks were ranked by size. The stocks were simply split into the top 50% (big) and the bottom 50% (small) stocks. The JSE stocks were also split into three book-to-market equity groups, based on the bottom 30% (low), middle 40% (medium) and top 30% (high) of the ranked BMV values. As part of the portfolio formation, companies that had negative book values were excluded because they lacked meaningful explanations. The diagrams below depicted the portfolio construction:

Step One:

All stocks were ranked by market capitalisation and classified as Financials, Mining or Industrials and spliced into two; the 50% big ones (B) and 50% small ones (S).

50% Small Stocks	50% Big Stocks

Step Two:

All stocks were spliced into the bottom 30%, the middle 40% and the top 30% based on BMV ratios as per Zaluki et al. (2006) and classified as Financials, Mining or Industrials to form the HML portfolios.

30% BV Ratio Stocks	40% BV Ratio Stocks	30% BV Ratio Stocks

Step Three:

The HML portfolios were then superimposed onto the small and the big stocks to form six portfolios, namely Small Low (SL), Small Medium (SM), Small High (SH), Big Low (BL), Big Medium (BM) and Big High (BH).

BL Portfolio	BM Portfolio	BH Portfolio
SL Portfolio	SM Portfolio	SH Portfolio

The SMB is calculated as SMB = (S/L + S/M + S/H)/3 – (B/L + B/M + B/H)/3 and HML is calculated as HML = (S/H + B/H)/2 – (S/L + B/L)/2

Six value-weighted portfolios (S/L, S/M, S/H, B/L, B/M, B/H) as the intersections of the size and book-to-market ratio groups were formed. The monthly value-weighted returns on the six portfolios were calculated from July of year t to June of year t+1. The intercept α was used to measure the mean monthly abnormal returns of the calendar-time portfolios of IPO companies, and should have equalled zero under the null hypothesis of no abnormal performance.

4.8 Unit of Analysis

The unit of analysis refers to the "what" of the study: "what object, phenomenon, entity, process or event that is being investigated?" (Mouton, 2009, p. 25). In the context of this study, the unit of analysis was IPO performance.

5 Chapter 5: Results

5.1 Introduction

The gathering of information relating to the sample used in this paper proved to be significantly onerous as there is no singular cohesive data source. The sample size was gathered for the period 1992 until 2007, which provides 15 years worth of observations and analysis.

Two primary sources of data were used, namely McGregor-BFA and the JSE. McGregor-BFA is an authorised and accredited JSE vendor, who is internationally renowned and whose financial databases are used widely, thus adding to the company's credibility. For the period reviewed, there were 1 078 companies listed on McGregor-BFA.

Of the 1 078 companies, 791 had full and available BV/MV ratio values; 87 companies that were listed on McGregor-BFA were not listed on the available JSE database. Furthermore, 311 companies on the JSE had a listing date of 28 February 1992. Of these samples, 121 companies showed earlier listings and 174 had no listing date on McGregor's and could not be included in the sample due to missing data, leaving 26 companies listed in 1992. Companies listed after 2007 numbered 26. As was done by Zaluki et al. (2002), companies that had negative BV/MV were removed from the sample.

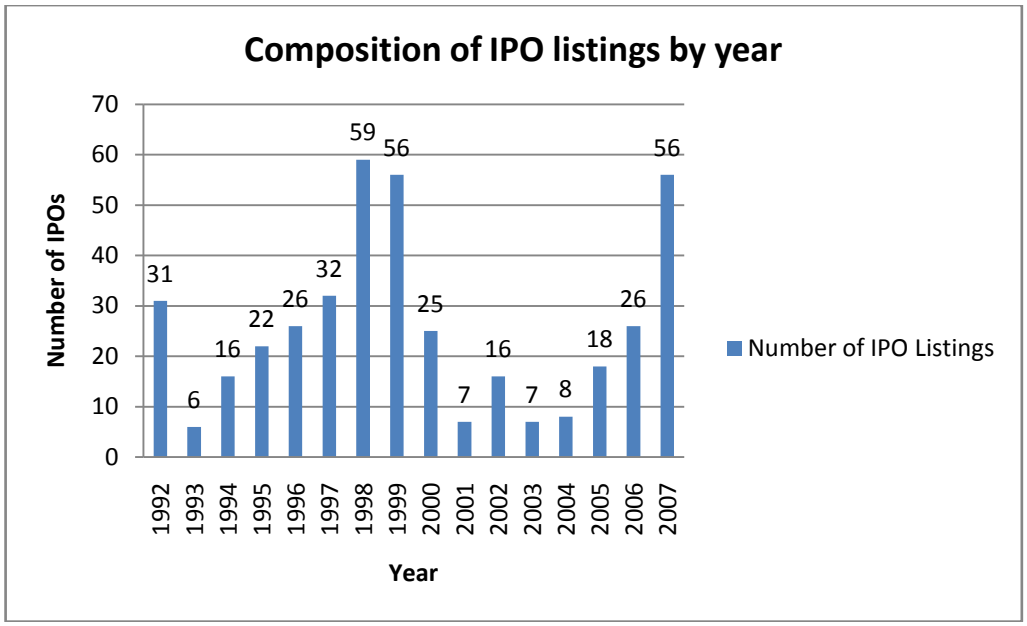
The sample for analysis comprised 411 companies. 185 companies that had conducted an IPO de-listed over the period of review. Each of the qualifying companies were utilised in the final analysis rather than employing a random selection technique. This ensured that there would be a large enough sample to provide the appropriate statistical relevance. Each year all the companies were grouped into the three main categories of Financials, Industrials and Mining, as was recommended by Van Rensburg (2000), as this categorisation provided adequate coverage and representation of the JSE. The Mining category included resource and energy companies. The Industrials group comprised manufacturing, retail, construction, business services and telecommunications. The Financials

classification included investments, banking, private equity and asset management.

Table 1: Final Sample Counts

Year	Financials	Industrials	Mining	Total
1992	9	17	5	31
1993	2	3	1	6
1994	3	13	0	16
1995	8	13	1	22
1996	4	20	2	26
1997	7	22	3	32
1998	20	37	2	59
1999	21	33	2	56
2000	7	17	1	25
2001	4	2	1	7
2002	7	6	3	16
2003	5	1	1	7
2004	1	6	1	8
2005	7	5	6	18
2006	3	17	6	26
2007	4	45	7	56
Aggregate Total	**112**	**257**	**42**	**411**
Weighting %	**27%**	**63%**	**10%**	**100%**

Figure 1: Composition of IPO listings by year



The number of IPO listings was the highest in 1998 (59 listings) and the lowest listings occurred in 1993 with six listings as shown in Figure 1 above.

Six different predictive (explanatory) variables were used in the final analysis. This included the Excess Market returns, returns of Portfolio SML, returns of Portfolio HML and returns of financial, industrial and mining classifications. The dependant variable used was the Excess Portfolio returns (against the given risk-free rate).

The results from the research are presented in this section. The objective was to explore whether a causal relationship exists between the independent variables (Excess Market returns, SML, HML and industry classifications of Financials, Industrials and Mining) and after-market performance by examining the effect on the IPO portfolio excess returns (dependent variable).

The statistical results of each portfolio for every year from the first year to the fifth year were provided in terms of the major classifications of Financials, Mining and Industrials. In addition, the results were presented on an overall basis for all portfolios and for all periods. This is grouped under each objective or hypothesis.

The ordinary least squares (OLS) method was utilised for statistical purposes. The P-test was employed to determine the statistical significance at a confidence level of 5%. This test is simple to use and provides robust statistical data for interpretation.

Espenlaub et al. (2000) found that the Alpha Coefficient was a measure of the average abnormal returns and under the null hypothesis of no abnormal returns it should be zero. If, in addition, intercepts are statistically significant and are negative, this implies long-run under-performance.

The approach taken regarding the classification of the Alpha Coefficient results was as follows:

I. The Alpha result was given for the relevant portfolio from year one to year five for each industrial classification (Financials, Mining and Industrials).
II. The same Alpha results were applicable to all objectives which are SMB, BMV and Excess returns for the relevant portfolios and thus there is no need for them to be repeated under each objective for each portfolio.

The results were interpreted as follows; If the P-stat was greater than 0.05, the null hypothesis could not be rejected. This meant that the estimate coefficient was insignificant, and therefore 0.

If the P-stat was less than 0.05, the null hypothesis was rejected. This implied that the coefficient was significant and the coefficient value could be used to determine what impact a one-unit movement had, whether up or down, on the dependant period. All the portfolios whose results were not statistically significant were not included in the results analysis.

5.2 Objective 1: SML (Company Size) for Portfolios

5.2.1 Financial Portfolios

Table 2: Alpha Coefficient of Portfolio BH

Portfolio	α coefficient	P-test	P(t) > 0.05	Significant
BH 1	-0.04	0.77	Yes	No
BH 2	-0.32	0.33	Yes	No
BH 3	-1.84	0.00	No	Yes
BH 4	-1.54	0.19	Yes	No
BH 5	-0.67	0.80	Yes	No

The P-stat was statistically significant in year three of Portfolio BH. The result was equally applicable and relevant to the HML (book-to-market) and Excess returns variables for BH portfolios as well. The null hypothesis of no abnormal performance was rejected. The Alpha Coefficient was -1.84 meaning that the portfolio BL showed under-performance in year three.

Table 3: P-Stat of Portfolio BH

Portfolio	Estimate	Standard Error	t-value	P-test	P(t) > 0.05	Significant
BH 1	-0.64	0.30	-2.15	0.07	Yes	No
BH 2	-0.77	0.48	-1.60	0.16	Yes	No
BH 3	-1.73	0.24	-7.21	0.00	No	Yes
BH 4	-1.68	0.19	-8.75	0.01	No	Yes
BH 5	-1.34	0.62	-2.19	0.27	Yes	No

The P-stats for Portfolio BH were statistically significant for years three and four. The null hypothesis was rejected and it was concluded that the size of the portfolio had an impact on the returns of Portfolio BH in those stated years. A one-unit increase in SMB (company size) had a -1.73 and -1.68 (coefficient estimates) impact on returns of Portfolio BH.

Table 4: Alpha Coefficient of Portfolio BL

Portfolio	α coefficient	P-test	P(t) > 0.05	Significant
BL 1	-0.54	0.02	No	Yes
BL 2	-0.32	0.15	Yes	No
BL 3	-0.41	0.42	Yes	No
BL 4	-1.08	0.30	Yes	No
BL 5	-0.60	0.07	Yes	No

The P-stat was statistically significant in year one of Portfolio BL. The result was equally applicable and relevant to the HML (book-to-market) and Excess returns variables for Portfolio BL as well. The null hypothesis of no abnormal performance was rejected. The Alpha Coefficient was -0.54 meaning that the portfolio BL showed under-performance in year one.

Table 5: P-Stat of Portfolio BL

Portfolio	Estimate	Standard Error	t-value	P-test	P(t) > 0.05	Significant
BL 1	-1.06	0.34	-3.11	0.01	No	Yes
BL 2	-0.08	0.17	0.49	0.64	Yes	No
BL 3	0.24	0.22	1.11	0.30	Yes	No
BL 4	0.12	0.11	1.15	0.33	Yes	No
BL 5	-0.02	0.01	-1.34	0.27	Yes	No

The P-stat for Portfolio BL was only statistically significant in year one. The null hypothesis was rejected and it was concluded that the size of the portfolio had an impact on the returns of Portfolio BL. A one-unit increase in SMB company size had a -1.06 impact on the returns of Portfolio BL.

Table 6: P-Stat of Portfolio BM

Portfolio	Estimate	Standard Error	t-value	P-stat	P-stat > 0.05	Significant
BM 1	-0.55	0.23	-2.39	0.05	No	Yes
BM 2	-0.15	0.34	-0.43	0.68	Yes	No
BM 3	-1.51	0.91	-1.65	0.15	Yes	No
BM 4	-0.01	0.08	-0.09	0.93	Yes	No
BM 5	0.03	0.82	0.33	0.77	Yes	No

The P-stat for Portfolio BM was only statistically significant in year one. The null hypothesis was rejected and it was concluded that the size of the portfolio had an impact on the returns of Portfolio BM. A one-unit increase in SMB (company size) had a -0.55 impact on the returns of Portfolio BM.

Table 7: Alpha Coefficient of Portfolio SH

Portfolio	α coefficient	P-test	P(t) > 0.05	Significant
SH 1	-0.27	0.04	No	Yes
SH 2	-0.37	0.32	Yes	No
SH 3	-0.39	0.32	Yes	No
SH 4	1.91	0.39	Yes	No
SH 5	-0.16	0.83	Yes	No

The P-stat was statistically significant in year one of Portfolio SH. The result was equally applicable and relevant to the HML (book-to-market) and Excess returns variables for Portfolio SH as well. The null hypothesis of no abnormal performance was rejected. The Alpha Coefficient was -0.27 meaning that the portfolio SH showed under-performance in the first year.

Table 8: P-Stat of Portfolio SH

Portfolio	Estimate	Standard Error	t-value	P-test	P(t) > 0.05	Significant
SH 1	-0.10	0.19	-0.52	0.62	Yes	No
SH 2	0.61	0.30	2.01	0.08	Yes	No
SH 3	0.97	0.17	5.79	0.00	No	Yes
SH 4	0.23	0.23	0.99	0.39	Yes	No
SH 5	0.15	0.06	2.60	0.12	Yes	No

The P-stat for Portfolio SH was only statistically significant in year three. The null hypothesis was rejected and it was concluded that the size of the portfolio had an impact on the returns of Portfolio SH. A one-unit increase in SMB (company size) had a 0.97 impact on the returns of Portfolio SH.

Table 9: P-Stat of Portfolio SL

Portfolio	Estimate	Standard Error	t-value	P-test	P(t) > 0.05	Significant
SL 1	0.66	0.27	2.39	0.04	No	Yes
SL 2	0.43	0.31	1.40	0.20	Yes	No
SL 3	0.31	0.27	1.13	0.30	Yes	No
SL 4	0.29	0.09	2.87	0.10	Yes	No
SL 5	-0.29	0.15	-1.88	0.19	Yes	No

The P-stat for Portfolio SL was only statistically significant in year one. The null hypothesis was rejected and it was concluded that the size of the portfolio had an impact on the returns of Portfolio SL. A one-unit increase in SMB (company size) had a 0.66 impact on the returns of Portfolio SL.

Table 10: P-Stat of Portfolio SM

Portfolio	Estimate	Standard Error	t-value	P-test	P(t) > 0.05	Significant
SM 1	0.54	0.24	2.31	0.05	No	Yes
SM 2	0.46	0.17	2.67	0.03	No	Yes
SM 3	0.61	0.15	3.94	0.01	No	Yes
SM 4	1.34	0.23	5.69	0.01	No	Yes
SM 5	1.75	0.03	4.49	2.34	No	Yes

The P-stats were significant for all years from the first through to the fifth. The null hypothesis was rejected and it was concluded that the size of the portfolio had an impact in returns for Portfolio SM. A one-unit increase in SMB (company size) had the following impacts on the returns of Portfolio SM:

Years	1	2	3	4	5
Estimate	0.54	0.46	0.61	1.34	1.75

5.2.2 Mining Portfolios

Table 11: P-Stat of Portfolio BH

Portfolio	Estimate	Standard Error	t-value	P-test	P(t) > 0.05	Significant
BH 1	-0.74	0.30	-2.42	0.05	No	Yes
BH 2	-0.68	0.59	-1.14	0.29	Yes	No
BH 3	-1.17	0.76	-1.54	0.18	Yes	No
BH 4	-1.57	0.10	-1.52	0.00	No	Yes
BH 5	3.19	1.19	2.67	0.23	Yes	No

The P-stats for Portfolio BH were statistically significant for years one and four. The null hypothesis was rejected and it was concluded that the size of the portfolio had an impact on the returns of Portfolio BH in those stated years. A one-unit increase in SMB (company size) had a -0.74 and -1.57 (coefficient estimates) impact on returns of Portfolio BH.

Table 12: P-Stat of Portfolio SH

Portfolio	Estimate	Standard Error	t-value	P-test	P(t) > 0.05	Significant
SH 1	0.02	0.35	0.05	0.95	Yes	No
SH 2	0.77	0.27	2.86	0.02	No	Yes
SH 3	1.23	0.19	6.55	0.00	No	Yes
SH 4	0.72	0.25	2.82	0.87	Yes	No
SH 5	0.02	0.12	0.19	0.87	Yes	No

The P-stats for Portfolio SH were statistically significant for years two and three. The null hypothesis was rejected and it was concluded that the size of the portfolio had an impact on the returns of Portfolio SH in those stated years. A one-unit increase in SMB (company size) had a 0.77 and 1.23 (coefficient estimates) impact respectively on returns of Portfolio SH.

Table 13: P-Stat of Portfolio SL

Portfolio	Estimate	Standard Error	t-value	P-test	P(t) > 0.05	Significant
SL 1	0.84	0.18	4.63	0.00	No	Yes
SL 2	0.54	0.60	0.89	0.40	Yes	No
SL 3	0.69	0.50	1.38	0.22	Yes	No
SL 4	0.46	0.18	2.56	0.12	Yes	No
SL 5	-0.35	1.36	-0.26	0.82	Yes	No

The P-stat for Portfolio SL was statistically significant for year one. The null hypothesis was rejected and it was concluded that the size of the portfolio had an impact on the returns of Portfolio SL in that year. A one-unit increase in SMB (company size) had a 0.84 impact on returns of Portfolio SL.

Table 14: P-Stat of Portfolio SM

Portfolio	Estimate	Standard Error	t-value	P-test	P(t) > 0.05	Significant
SM 1	0.50	0.37	1.34	0.21	Yes	No
SM 2	0.61	0.24	2.48	0.04	No	Yes
SM 3	0.85	0.20	4.18	0.00	No	Yes
SM 4	1.31	0.19	6.61	0.00	No	Yes
SM 5	1.66	0.09	1.89	0.00	No	Yes

The P-stats were significant from the second year up to and including the fifth year. The null hypothesis was rejected and it was concluded that the size of the portfolio had an impact in returns for Portfolio SM. A one-unit increase in SMB (company size) had the following impacts on the returns of Portfolio SM in the stated years:

Years	2	3	4	5
Estimate	0.61	0.85	1.31	1.66

5.2.3 Industrial Portfolios

Table 15: P-Stat of Portfolio BH

Portfolio	Estimate	Standard Error	t-value	P-test	P(t) > 0.05	Significant
BH 1	-0.71	0.11	-6.67	0.00	No	Yes
BH 2	-0.50	0.37	-1.37	0.22	Yes	No
BH 3	-1.28	0.37	-3.42	0.02	No	Yes
BH 4	-1.74	0.26	-6.73	0.02	No	Yes
BH 5	-1.20	0.62	-1.94	0.30	Yes	No

The P-stats were significant for years one, three and four. The null hypothesis was rejected and it was concluded that the size of the portfolio had an impact in returns for Portfolio BH. A one-unit increase in SMB (company size) had the following impacts on the returns of Portfolio BH in the stated years:

Years	1	3	4
Estimate	-0.71	-1.28	-1.74

Table 16: P-Stat of Portfolio BL

Portfolio	Estimate	Standard Error	t-value	P-test	P(t) > 0.05	Significant
BL 1	-1.40	-0.48	-2.93	0.02	No	Yes
BL 2	0.13	0.14	0.92	0.38	Yes	No
BL 3	0.07	0.10	0.68	0.52	Yes	No
BL 4	-0.50	0.24	-2.11	0.13	Yes	No
BL 5	-0.09	0.03	-2.70	0.07	No	Yes

The P-stats for Portfolio BL were statistically significant for years one and five. The null hypothesis was rejected and it was concluded that the size of the portfolio had an impact on the returns of Portfolio BL in those stated years. A one-unit increase in SMB (company size) had a -1.40 and -0.09 (coefficient estimates) impact respectively on returns of Portfolio BL.

Table 17: P-Stat of Portfolio BM

Portfolio	Estimate	Standard Error	t-value	P-test	P(t) > 0.05	Significant
BM 1	-0.65	0.22	-2.90	0.02	No	Yes
BM 2	-0.04	0.32	-0.13	0.90	Yes	No
BM 3	-0.17	0.19	-0.90	0.40	Yes	No
BM 4	-0.76	0.13	-0.98	0.03	Yes	No
BM 5	-0.96	0.05	-0.96	0.00	No	Yes

The P-stats for Portfolio BM were statistically significant for years one and five. The null hypothesis was rejected and it was concluded that the size of the portfolio had an impact on the returns of Portfolio BM in those stated years. A one-unit increase in SMB (company size) had a -0.65 and -0.96 (coefficient estimates) impact respectively on returns of Portfolio BM.

Table 18: P-Stat of Portfolio SH

Portfolio	Estimate	Standard Error	t-value	P-test	P(t) > 0.05	Significant
SH 1	-0.26	0.24	-1.09	0.31	Yes	No
SH 2	0.65	0.27	2.36	0.05	No	Yes
SH 3	0.88	0.13	6.73	0.00	No	Yes
SH 4	0.35	1.13	0.13	0.78	Yes	No
SH 5	-0.17	0.19	-0.89	0.47	Yes	No

The P-stats for Portfolio SH were statistically significant for years two and three. The null hypothesis was rejected and it was concluded that the size of the portfolio had an impact on the returns of Portfolio SH in those stated years. A one-unit increase in SMB (company size) had a 0.65 and 0.88 (coefficient estimates) impact respectively on returns of Portfolio SH.

Table 19: P-Stat of Portfolio SL

Portfolio	Estimate	Standard Error	t-value	P-test	P(t) > 0.05	Significant
SL 1	0.63	0.25	2.56	0.03	No	Yes
SL 2	0.63	0.33	1.94	0.09	Yes	No
SL 3	0.57	0.23	2.49	0.05	No	Yes
SL 4	0.19	0.13	1.52	0.27	Yes	No
SL 5	-0.09	0.13	-0.67	0.57	Yes	No

The P-stats for Portfolio SL were statistically significant for years one and three. The null hypothesis was rejected and it was concluded that the size of the portfolio had an impact on the returns of Portfolio SL in those stated years. A one-unit increase in SMB (company size) had a 0.63 and 0.57 (coefficient estimates) impact respectively on returns of Portfolio SL.

Table 20: P-Stat of Portfolio SM

Portfolio	Estimate	Standard Error	t-value	P-test	P(t) > 0.05	Significant
SM 1	0.38	0.14	2.76	0.02	No	Yes
SM 2	0.52	0.04	11.82	0.00	No	Yes
SM 3	0.48	0.04	11.78	0.00	No	Yes
SM 4	0.57	0.39	1.47	0.24	Yes	No
SM 5	1.38	0.06	24.68	0.00	No	Yes

The P-stats were significant for years one, two, three and five. The null hypothesis was rejected and it was concluded that the size of the portfolio had an impact in returns for Portfolio SM. A one-unit increase in SMB (company size) had the following impacts on the returns of Portfolio SM in the stated years:

Years	1	2	3	5
Estimate	0.38	0.52	0.48	1.38

5.3 Objective 2: HML (Book-to-Market Ratios) for Portfolios

5.3.1 Financial Portfolios

Table 21: P-Stat of Portfolio BH

Portfolio	Estimate	Standard Error	t-value	P-test	P(t) > 0.05	Significant
BH 1	0.61	0.18	3.42	0.01	No	Yes
BH 2	1.13	0.24	4.72	0.00	No	Yes
BH 3	1.13	0.23	5.01	0.00	No	Yes
BH 4	1.48	0.23	6.57	0.02	No	Yes
BH 5	1.40	0.47	2.98	0.21	Yes	No

The P-stats were significant for years one, two, three and four. The null hypothesis was rejected and it was concluded that the book-to-market ratios of the portfolio had an impact in returns for Portfolio BH. A one-unit increase in book-to-market ratios had the following impacts on the returns of Portfolio BH in the stated years:

Years	1	2	3	4
Estimate	0.61	1.13	1.13	1.48

Table 22: P-Stat of Portfolio BL

Portfolio	Estimate	Standard Error	t-value	P-test	P(t) > 0.05	Significant
BL 1	0.30	0.24	-1.24	0.25	Yes	No
BL 2	-0.42	0.17	-2.53	0.04	No	Yes
BL 3	-0.48	0.33	-1.46	0.19	Yes	No
BL 4	-0.60	0.26	-2.31	0.10	Yes	No
BL 5	0.01	0.06	-0.17	0.88	Yes	No

The P-stats for Portfolio BL were statistically significant for year two. The null hypothesis was rejected and it was concluded that the book-to-market ratio had an impact on the returns of Portfolio BL in year two. A one-unit increase in the book-to-market ratio had a -0.42 (coefficient estimate) impact respectively on returns of Portfolio BL.

Table 23: P-Stat of Portfolio BM

Portfolio	Estimate	Standard Error	t-value	P-test	P(t) > 0.05	Significant
BM 1	0.44	0.16	2.72	0.02	No	Yes
BM 2	0.04	0.33	0.11	0.92	Yes	No
BM 3	0.54	0.17	3.19	0.02	No	Yes
BM 4	0.64	0.16	4.16	0.05	Yes	No
BM 5	-0.70	0.44	-1.59	0.25	Yes	No

The P-stats for Portfolio BM were statistically significant for years one and three. The null hypothesis was rejected and it was concluded that the book-to-market ratios of the portfolio had an impact on the returns of Portfolio BM in those stated years. A one-unit increase in the book-to-market ratios had a 0.44 and 0.54 (coefficient estimates) impact respectively on returns of Portfolio BM.

Table 24: P-Stat of Portfolio SH

Portfolio	Estimate	Standard Error	t-value	P-test	P(t) > 0.05	Significant
SH 1	0.52	0.14	3.87	0.00	No	Yes
SH 2	-0.01	0.29	-0.04	0.97	Yes	No
SH 3	-0.44	0.26	-1.70	0.13	Yes	No
SH 4	0.72	0.58	1.24	0.30	Yes	No
SH 5	-0.26	0.16	-1.61	0.25	Yes	No

The P-stats for Portfolio SH were statistically significant for the first year. The null hypothesis was rejected and it was concluded that the book-to-market ratio had an impact on the returns of Portfolio SH in year one. A one-unit increase in the book-to-market ratio had a 0.52 (coefficient estimate) impact on returns of Portfolio SH.

Table 25: P-Stat of Portfolio SM

Portfolio	Estimate	Standard Error	t-value	P-test	P(t) > 0.05	Significant
SM 1	0.22	0.17	1.32	0.22	Yes	No
SM 2	0.58	0.17	3.45	0.01	No	Yes
SM 3	0.79	0.24	3.38	0.01	No	Yes
SM 4	0.31	0.58	0.53	0.63	Yes	No
SM 5	0.74	0.13	5.75	0.01	No	Yes

The P-stats for Portfolio SM were significant in years two, three and five. The null hypothesis was rejected and it was concluded that the book-to-market ratios had an impact on the returns of Portfolio SM in the stated years.

Years	2	3	5
Estimate	0.58	0.79	0.74

5.3.2 Mining Portfolios

Table 26: P-Stat of Portfolio BH

Portfolio	Estimate	Standard Error	t-value	P-test	P(t) > 0.05	Significant
BH 1	0.49	0.17	2.91	0.02	No	Yes
BH 2	1.02	0.28	3.71	0.01	No	Yes
BH 3	0.07	0.68	0.01	0.93	Yes	No
BH 4	0.76	0.13	6.03	0.03	No	Yes
BH 5	8.52	1.68	5.06	0.12	Yes	No

The P-stats for Portfolio BH were significant in the years one, two and four. The null hypothesis was rejected and it was concluded that the book-to-market ratios had an impact on the returns of Portfolio BH in the stated years.

Years	1	2	4
Estimate	0.49	1.02	0.76

Table 27: P-Stat of Portfolio BL

Portfolio	Estimate	Standard Error	t-value	P-test	P(t) > 0.05	Significant
BL 1	-1.01	0.49	-2.08	0.07	Yes	No
BL 2	-0.52	0.18	-2.83	0.02	No	Yes
BL 3	-1.02	0.43	-2.40	0.05	Yes	No
BL 4	-1.38	0.40	-3.49	0.04	No	Yes
BL 5	-0.01	0.07	-0.15	0.89	Yes	No

The P-stats for Portfolio BL were statistically significant for years two and four. The null hypothesis was rejected and it was concluded that the book-to-market ratios of the portfolio had an impact on the returns of Portfolio BL in those stated years. A one-unit increase in the book-to-market ratios had a -0.52 and -1.38 (coefficient estimates) impact respectively on returns of Portfolio BL.

Table 28: P-Stat of Portfolio SH

Portfolio	Estimate	Standard Error	t-value	P-test	P(t) > 0.05	Significant
SH 1	0.00	0.22	0.02	0.99	Yes	No
SH 2	-0.08	0.26	-0.30	0.77	Yes	No
SH 3	-0.85	0.28	-3.09	0.02	No	Yes
SH 4	-1.20	0.64	-1.86	0.16	Yes	No
SH 5	-0.05	0.43	-0.11	0.92	Yes	No

The P-stats for Portfolio SH were statistically significant for the third year. The null hypothesis was rejected and it was concluded that the book-to-market ratio had an impact on the returns of Portfolio SH in year three. A one-unit increase in the book-to-market ratio had a -0.85 (coefficient estimate) impact on returns of Portfolio SH.

Table 29: P-Stat of Portfolio SL

Portfolio	Estimate	Standard Error	t-value	P-test	P(t) > 0.05	Significant
SL 1	-0.76	0.10	-7.42	0.00	No	Yes
SL 2	-0.73	0.28	-2.64	0.03	No	Yes
SL 3	-1.31	0.40	-3.25	0.02	No	Yes
SL 4	-1.01	0.22	-4.60	0.04	No	Yes
SL 5	-0.51	0.98	-0.53	0.65	Yes	No

The P-stats for Portfolio SL were significant in the years one, two, three and four. The null hypothesis was rejected and it was concluded that the book-to-market ratios had an impact on the returns of Portfolio SL in the stated years as follows:

Years	1	2	3	4
Estimate	-0.76	-0.73	-1.31	-1.01

5.3.3 Industrial Portfolios

Table 30: P-Stat of Portfolio BH

Portfolio	Estimate	Standard Error	t-value	P-test	P(t) > 0.05	Significant
BH 1	0.52	0.06	9.13	0.00	No	Yes
BH 2	0.63	0.21	2.99	0.02	No	Yes
BH 3	0.56	0.33	1.70	0.14	Yes	No
BH 4	1.09	n/a	n/a	n/a	Yes	No
BH 5	1.52	0.41	3.71	0.17	Yes	No

The P-stats for Portfolio BH were statistically significant for years one and two. The null hypothesis was rejected and it was concluded that the book-to-market ratios of the portfolio had an impact on the returns of Portfolio BH in those stated years. A one-unit increase in the book-to-market ratios had a 0.52 and 0.63 (coefficient estimates) impact respectively on returns of Portfolio BH.

Table 31: P-Stat of Portfolio BL

Portfolio	Estimate	Standard Error	t-value	P-test	P(t) > 0.05	Significant
BL 1	-1.03	0.27	-3.78	0.00	No	Yes
BL 2	-0.80	0.15	-5.21	0.00	No	Yes
BL 3	-0.96	0.12	-8.06	0.00	No	Yes
BL 4	1.40	0.40	3.52	0.04	No	Yes
BL 5	-0.01	0.06	-0.22	0.84	Yes	No

The P-stats for Portfolio BL were significant in the years one, two, three and four. The null hypothesis was rejected and it was concluded that the book-to-market ratios had an impact on the returns of Portfolio BL in the stated years as follows:

Years	1	2	3	4
Estimate	-1.03	-0.80	-0.96	1.40

Table 32: P-Stat of Portfolio BM

Portfolio	Estimate	Standard Error	t-value	P-test	P(t) > 0.05	Significant
BM 1	0.26	0.13	2.03	0.073	Yes	No
BM 2	-0.61	0.36	-1.84	0.10	Yes	No
BM 3	0.68	0.22	3.10	0.02	No	Yes
BM 4	-0.08	0.08	6.83	0.43	Yes	No
BM 5	0.50	0.13	4.00	0.06	Yes	No

The P-stats for Portfolio BM were statistically significant for year three. The null hypothesis was rejected and it was concluded that the book-to-market ratio had an impact on the returns of Portfolio BM in year three. A one-unit increase in the book-to-market ratio had a 0.68 (coefficient estimate) impact on returns of Portfolio BM.

Table 33: P-Stat of Portfolio SH

Portfolio	Estimate	Standard Error	t-value	P-test	P(t) > 0.05	Significant
SH 1	0.18	0.14	1.32	0.22	Yes	No
SH 2	-0.40	0.31	-1.30	0.23	Yes	No
SH 3	-0.79	0.16	-5.06	0.00	No	Yes
SH 4	-0.40	0.74	-0.54	0.63	Yes	No
SH 5	-0.10	0.36	-0.28	0.80	Yes	No

The P-stats for Portfolio SH were statistically significant for year three. The null hypothesis was rejected and it was concluded that the book-to-market ratio had an impact on the returns of Portfolio SH in year three. A one-unit increase in the book-to-market ratio had a -0.79 (coefficient estimate) impact on returns of Portfolio SH.

Table 34: P-Stat of Portfolio SL

Portfolio	Estimate	Standard Error	t-value	P-test	P(t) > 0.05	Significant
SL 1	-0.59	0.13	-4.68	0.00	No	Yes
SL 2	-1.13	0.19	-5.79	0.00	No	Yes
SL 3	-1.12	0.19	-5.78	0.00	No	Yes
SL 4	-0.73	0.08	-9.00	0.01	No	Yes
SL 5	-0.96	0.08	-12.58	0.01	No	Yes

The P-stats for Portfolio SL were significant in all the years from the first year up until and including the fifth year. The null hypothesis was rejected and it was concluded that the book-to-market ratios had an impact on the returns of Portfolio SL in the stated years as follows:

Years	1	2	3	4	5
Estimate	-0.59	-1.13	-1.12	-0.73	-0.96

Table 35: P-Stat of Portfolio SM

Portfolio	Estimate	Standard Error	t-value	P-test	P(t) > 0.05	Significant
SM1	-0.06	0.08	-0.811	0.44	Yes	No
SM 2	0.00	0.049	0.08	0.94	Yes	No
SM 3	0.38	0.05	7.82	0.00	No	Yes
SM 4	0.33	0.26	1.28	0.29	Yes	No
SM 5	0.72	0.10	6.96	0.01	No	Yes

The P-stats for Portfolio SM were statistically significant for years three and five. The null hypothesis was rejected and it was concluded that the book-to-market ratios of the portfolio had an impact on the returns of Portfolio SM in those stated years. A one-unit increase in the book-to-market ratios had a 0.38 and 0.72 (coefficient estimates) impact respectively on returns of Portfolio SM.

5.4 Objective 3: Excess Market Returns (R_{mt}-R_{ft}) for Portfolios

5.4.1 Financial Portfolios

Table 36: P-Stat of Portfolio BH

Portfolio	Estimate	Standard Error	t-value	P-test	P(t) > 0.05	Significant
BH 1	0.32	0.38	0.84	0.43	Yes	No
BH 2	2.09	0.54	3.89	0.01	No	Yes
BH 3	3.86	0.76	5.10	0.00	No	Yes
BH 4	1.38	2.18	0.63	0.59	Yes	No
BH 5	-0.39	2.36	-0.17	0.90	Yes	No

The P-stats for Portfolio BH were statistically significant for years two and three. The null hypothesis was rejected and it was concluded that Excess Market returns of the portfolio had an impact on the returns of Portfolio BH in those stated years. A one-unit increase in the book-to-market ratios had a 2.09 and 3.86 (coefficient estimates) impact respectively on returns of Portfolio BH.

Table 37: P-Stat of Portfolio BL

Portfolio	Estimate	Standard Error	t-value	P-test	P(t) > 0.05	Significant
BL 1	1.55	0.42	3.64	0.01	No	Yes
BL 2	1.43	0.36	4.02	0.00	No	Yes
BL 3	1.21	1.12	1.09	0.32	Yes	No
BL 4	2.35	2.24	1.05	0.37	Yes	No
BL 5	0.38	0.27	1.40	0.26	Yes	No

The P-stats for Portfolio BL were statistically significant for years one and two. The null hypothesis was rejected and it was concluded that Excess Market returns of the portfolio had an impact on the returns of Portfolio BL in those stated years. A one-unit increase in the book-to-market ratios had a 1.55 and 1.43 (coefficient estimates) impact respectively on returns of Portfolio BL.

Table 38: P-Stat of Portfolio SH

Portfolio	Estimate	Standard Error	t-value	P-test	P(t) > 0.05	Significant
SH 1	0.66	0.24	2.75	0.02	No	Yes
SH 2	1.21	0.63	1.93	0.09	Yes	No
SH 3	1.22	0.87	1.41	0.20	Yes	No
SH 4	-6.23	4.94	-1.26	0.30	Yes	No
SH 5	-0.46	0.92	-049	0.67	Yes	No

The P-stats for Portfolio SH were statistically significant for the first year. The null hypothesis was rejected and it was concluded that the Excess Market returns had an impact on the returns of Portfolio SH in year one. A one-unit increase in the Excess Market returns had a 0.66 (coefficient estimate) impact on returns of Portfolio SH.

Table 39: P-Stat of Portfolio SM

Portfolio	Estimate	Standard Error	t-value	P-test	P(t) > 0.05	Significant
SM 1	0.54	0.29	1.86	0.10	Yes	No
SM 2	1.93	0.36	5.35	0.00	No	Yes
SM 3	1.59	0.80	2.00	0.09	Yes	No
SM 4	6.07	4.95	1.23	0.31	Yes	No
SM 5	0.95	0.61	1.56	0.22	Yes	No

The P-stats for Portfolio SM were statistically significant for year two. The null hypothesis was rejected and it was concluded that the Excess Market returns had an impact on the returns of Portfolio SM in year two. A one-unit increase in the Excess Market returns had a 1.93 (coefficient estimate) impact on returns of Portfolio SM.

5.4.2 Mining Portfolios

Table 40: P-Stat of Portfolio BH

Portfolio	Estimate	Standard Error	t-value	P-test	P(t) > 0.05	Significant
BH 1	0.14	0.40	0.38	0.72	Yes	No
BH 2	1.66	0.71	2.35	0.06	Yes	No
BH 3	7.40	2.51	2.95	0.03	No	Yes
BH 4	5.59	0.66	8.48	0.01	No	Yes
BH 5	-24.56	6.26	-3.92	0.16	Yes	No

The P-stats for Portfolio BH were statistically significant for years three and four. The null hypothesis was rejected and it was concluded that Excess Market returns of the portfolio had an impact on the returns of Portfolio BH in those stated years. A one-unit increase in the Excess Market returns had a 7.40 and 5.59 (coefficient estimates) impact respectively on returns of Portfolio BH.

Table 41: P-Stat of Portfolio BL

Portfolio	Estimate	Standard Error	t-value	P-test	P(t) > 0.05	Significant
BL 1	1.00	0.89	1.12	0.29	Yes	No
BL 2	0.96	0.45	2.12	0.07	Yes	No
BL 3	2.76	1.51	1.83	0.12	Yes	No
BL 4	8.21	2.14	3.83	0.03	No	Yes
BL 5	0.62	0.33	1.90	0.15	Yes	No

The P-stats for Portfolio BL were statistically significant for year four. The null hypothesis was rejected and it was concluded that the Excess Market returns had an impact on the returns of Portfolio BL in year four. A one-unit increase in the Excess Market returns had an 8.21 (coefficient estimate) impact on returns of Portfolio BL.

Table 42: P-Stat of Portfolio SH

Portfolio	Estimate	Standard Error	t-value	P-test	P(t) > 0.05	Significant
SH 1	0.48	0.40	1.22	0.25	Yes	No
SH 2	0.41	0.63	0.64	0.54	Yes	No
SH 3	2.38	0.98	2.42	0.05	No	Yes
SH 4	6.62	3.46	1.91	0.15	Yes	No
SH 5	1.03	2.29	0.45	0.70	Yes	No

The P-stats for Portfolio SH were statistically significant for year three. The null hypothesis was rejected and it was concluded that the Excess Market returns had an impact on the returns of Portfolio SH in year three. A one-unit increase in the Excess Market returns had a 2.38 (coefficient estimate) impact on returns of Portfolio SH.

Table 43: P-Stat of Portfolio SL

Portfolio	Estimate	Standard Error	t-value	P-test	P(t) > 0.05	Significant
SL 1	-0.55	0.20	-2.69	0.028	No	Yes
SL 2	-0.46	0.68	-0.66	0.53	Yes	No
SL 3	2.75	1.35	2.03	0.09	Yes	No
SL 4	5.44	1.15	4.72	0.04	No	Yes
SL 5	0.33	3.50	0.10	0.93	Yes	No

The P-stats for Portfolio SL were statistically significant for years one and four. The null hypothesis was rejected and it was concluded that Excess Market returns of the portfolio had an impact on the returns of Portfolio SL in those stated years. A one-unit increase in the Excess Market returns had a -0.55 and 5.44 (coefficient estimates) impact respectively on returns of Portfolio SL.

Table 44: P-Stat of Portfolio SM

Portfolio	Estimate	Standard Error	t-value	P-test	P(t) > 0.05	Significant
SM 1	0.34	0.42	0.82	0.43	Yes	No
SM 2	1.59	0.57	2.80	0.02	No	Yes
SM 3	2.79	1.07	2.61	0.03	No	Yes
SM 4	5.91	2.70	2.19	0.12	Yes	No
SM 5	1.67	1.73	0.97	0.40	Yes	No

The P-stats for Portfolio SM were statistically significant for years two and three. The null hypothesis was rejected and it was concluded that Excess Market returns of the portfolio had an impact on the returns of Portfolio SM in those stated years. A one-unit increase in the Excess Market returns had a 1.59 and 2.79 (coefficient estimates) impact respectively on returns of Portfolio SM.

5.4.3 Industrial Portfolios

Table 45: P-Stat of Portfolio SL

Portfolio	Estimate	Standard Error	t-value	P-test	P(t) > 0.05	Significant
SL 1	-0.65	0.30	-2.22	0.06	Yes	No
SL 2	-1.80	0.523	-3.42	0.01	No	Yes
SL 3	-0.30	0.91	-0.33	0.75	Yes	No
SL 4	0.70	1.29	0.54	0.64	Yes	No
SL 5	-0.88	0.39	-2.28	0.15	Yes	No

The P-stats for Portfolio SL were statistically significant for the second year. The null hypothesis was rejected and it was concluded that the Excess Market returns had an impact on the returns of Portfolio SL in year two. A one-unit increase in the Excess Market returns has a -1.80 (coefficient estimate) impact on returns of Portfolio SL.

Table 46: P-Stat of Portfolio SM

Portfolio	Estimate	Standard Error	t-value	P-test	P(t) > 0.05	Significant
SM 1	-0.100	0.18	-0.57	0.59	Yes	No
SM 2	1.93	0.36	5.35	0.00	No	Yes
SM 3	0.27	0.24	1.14	0.29	Yes	No
SM 4	-1.39	4.06	-0.31	0.76	Yes	No
SM 5	0.33	0.50	0.67	0.55	Yes	No

The P-stats for Portfolio SM were statistically significant for year two. The null hypothesis was rejected and it was concluded that the Excess Market returns had an impact on the returns of Portfolio SM in year two. A one-unit increase in the Excess Market returns has a 1.93 (coefficient estimate) impact on returns of Portfolio SM.

5.5 Objective 4 (a): Financials Classification Variables

5.5.1 Portfolios

Table 47: P-Stat of Portfolio BH

Portfolio	Estimate	Standard Error	t-value	P-test	P(t) > 0.05	Significant
BH 1	0.19	0.18	1.03	0.34	Yes	No
BH 2	0.28	0.17	1.64	0.15	No	Yes
BH 3	0.93	0.12	7.72	0.00	Yes	No
BH 4	0.50	0.23	2.19	0.16	Yes	No
BH 5	1.68	0.96	1.75	0.33	Yes	No

The P-stats for Portfolio BH were statistically significant for year two. The null hypothesis was rejected and it was concluded that the financial sector classification had an impact on the returns of Portfolio BH in year two. A one-unit increase in the financial sector had a 0.28 (coefficient estimate) impact on returns of Portfolio BH.

Table 48: P-Stat of Portfolio BL

Portfolio	Estimate	Standard Error	t-value	P-test	P(t) > 0.05	Significant
BL 1	1.17	0.21	5.65	0.00	No	Yes
BL 2	0.24	0.12	2.03	0.08	Yes	No
BL 3	0.58	0.20	2.83	0.03	No	Yes
BL 4	0.73	0.25	2.88	0.06	Yes	No
BL 5	0.23	0.13	1.72	0.18	Yes	No

The P-stats for Portfolio BL were statistically significant for years one and three. The null hypothesis was rejected and it was concluded that the financial sector classification had an impact on the returns of Portfolio BL in years one and three. A one-unit increase in the financial sector had a 1.17 and 0.58 (coefficient estimate), respectively, impact on returns of Portfolio BL.

Table 49: P-Stat of Portfolio BM

Portfolio	Estimate	Standard Error	t-value	P-test	P(t) > 0.05	Significant
BM 1	0.29	0.14	2.06	0.07	Yes	No
BM 2	0.51	0.24	2.12	0.07	Yes	No
BM 3	0.54	0.17	3.19	0.02	No	Yes
BM 4	0.64	0.16	4.16	0.05	Yes	No
BM 5	2.07	0.44	4.78	0.04	No	Yes

The P-stats for Portfolio BM were statistically significant for years three and five. The null hypothesis was rejected and it was concluded that the financial sector classification had an impact on the returns of Portfolio BM in years three and five. A one-unit increase in the financial sector had a 0.54 and 2.07 (coefficient estimate), respectively, impact on returns of Portfolio BM.

Table 50: P-Stat of Portfolio SH

Portfolio	Estimate	Standard Error	t-value	P-test	P(t) > 0.05	Significant
SH 1	0.54	0.12	4.62	0.00	No	Yes
SH 2	0.25	0.21	1.17	0.28	Yes	No
SH 3	0.41	0.16	2.50	0.04	No	Yes
SH 4	1.53	0.56	2.72	0.07	Yes	No
SH 5	1.51	0.40	3.77	0.06	Yes	No

The P-stats for Portfolio SH were statistically significant for year one and year three. The null hypothesis was rejected and it was concluded that the financial sector classification had an impact on the returns of Portfolio SH in years one and three. A one-unit increase in the financial sector had a 0.54 and 0.41 (coefficient estimate), respectively, impact on returns of Portfolio SH.

Table 51: P-Stat of Portfolio SL

Portfolio	Estimate	Standard Error	t-value	P-test	P(t) > 0.05	Significant
SL 1	0.05	0.17	0.33	0.75	Yes	No
SL 2	0.46	0.12	3.96	0.00	No	Yes
SL 3	0.56	0.14	3.99	0.00	No	Yes
SL 4	0.56	0.12	4.63	0.04	No	Yes
SL 5	2.31	0.21	11.15	0.01	No	Yes

The P-stats for Portfolio SL were significant in the years two, three, four and five. The null hypothesis was rejected and it was concluded that the financial sector performance and classification had an impact on the returns of Portfolio SL in the stated years as follows:

Years	2	3	4	5
Estimate	0.46	0.56	0.56	2.31

Table 52: P-Stat of Portfolio SM

Portfolio	Estimate	Standard Error	t-value	P-test	P(t) > 0.05	Significant
SM 1	0.46	0.14	3.19	0.01	No	Yes
SM 2	0.36	0.12	2.98	0.02	No	Yes
SM 3	0.47	0.15	3.12	0.02	No	Yes
SM 4	0.02	0.56	0.04	0.97	Yes	No
SM 5	1.35	0.30	4.50	0.02	No	Yes

The P-stats for Portfolio SM were significant in the years one, two, three and five. The null hypothesis was rejected and it was concluded that the financial sector performance and classification had an impact on the returns of Portfolio SM in the stated years as follows:

Years	1	2	3	5
Estimate	0.46	0.36	0.47	1.35

5.6 Objective 4 (b): Mining Classification Variables

5.6.1 Portfolios

Table 53: P-Stat of Portfolio BM

Portfolio	Estimate	Standard Error	t-value	P-test	P(t) > 0.05	Significant
BM 1	0.51	0.14	3.70	0.00	No	Yes
BM 2	0.21	0.26	0.78	0.46	Yes	No
BM 3	0.20	0.26	0.76	0.48	Yes	No
BM 4	0.94	0.84	1.11	0.38	Yes	No
BM 5	1.23	1.30	0.94	0.45	Yes	No

The P-stats for Portfolio BM were statistically significant for year one. The null hypothesis was rejected and it was concluded that the mining sector classification had an impact on the returns of Portfolio BM in year one. A one-unit increase in the mining sector had a 0.51 (coefficient estimate) impact on returns of Portfolio BH.

Table 54: P-Stat of Portfolio SL

Portfolio	Estimate	Standard Error	t-value	P-test	P(t) > 0.05	Significant
SL 1	0.34	0.11	3.08	0.02	No	Yes
SL 2	0.04	0.21	0.16	0.88	Yes	No
SL 3	0.12	0.25	0.47	0.66	Yes	No
SL 4	1.03	0.60	1.73	0.23	Yes	No
SL 5	0.92	2.03	0.45	0.70	Yes	No

The P-stats for Portfolio SL were statistically significant for year one. The null hypothesis was rejected and it was concluded that the mining sector classification had an impact on the returns of Portfolio SL in year one. A one-unit increase in the mining sector had a 0.34 (coefficient estimate) impact on returns of Portfolio SL.

5.7 Objective 4 (c): Industrials Classification Variables

5.7.1 Portfolios

Table 55: P-Stat of Portfolio BH

Portfolio	Estimate	Standard Error	t-value	P-test	P(t) > 0.05	Significant
BH 1	1.08	0.16	6.78	0.00	No	Yes
BH 2	0.86	0.28	3.10	0.02	No	Yes
BH 3	1.15	0.26	4.38	0.01	No	Yes
BH 4	0.77	0.45	1.73	0.23	Yes	No
BH 5	0.74	0.43	1.72	0.34	Yes	No

The P-stats for Portfolio BH were significant in the years one, two and three. The null hypothesis was rejected and it was concluded that the Industrials classification had an impact on the returns of Portfolio BH in the stated years as follows:

Years	1	2	3
Estimate	1.08	0.86	1.15

Table 56: P-Stat of Portfolio BL

Portfolio	Estimate	Standard Error	t-value	P-test	P(t) > 0.05	Significant
BL 1	2.45	0.72	3.43	0.01	No	Yes
BL 2	0.66	0.21	3.15	0.01	No	Yes
BL 3	0.95	0.12	8.14	0.00	No	Yes
BL 4	1.40	0.40	3.52	0.04	No	Yes
BL 5	0.11	0.06	1.76	0.18	Yes	No

The P-stats for Portfolio BL were significant in the years one, two, three and four. The null hypothesis was rejected and it was concluded that the Industrials classification had an impact on the returns of Portfolio BL in the stated years as follows:

Years	1	2	3	4
Estimate	2.45	0.66	0.95	1.40

Table 57: P-Stat of Portfolio BM

Portfolio	Estimate	Standard Error	t-value	P-test	P(t) > 0.05	Significant
BM 1	0.77	0.33	2.29	0.05	No	Yes
BM 2	1.14	0.48	2.35	0.05	No	Yes
BM 3	0.68	0.22	3.10	0.02	No	Yes
BM 4	1.24	0.18	6.83	0.02	No	Yes
BM 5	1.39	0.07	7.24	0.00	No	Yes

The P-stats for Portfolio BM were significant in the years one, two, three, four and five. The null hypothesis was rejected and it was concluded that the Industrials classification had an impact on the returns of Portfolio BM in the stated years as follows:

Years	1	2	3	4	5
Estimate	0.77	1.14	0.68	1.24	1.39

Table 58: P-Stat of Portfolio SH

Portfolio	Estimate	Standard Error	t-value	P-test	P(t) > 0.05	Significant
SH 1	1.17	0.36	3.26	0.01	No	Yes
SH 2	0.68	0.41	1.64	0.14	Yes	No
SH 3	0.63	0.15	4.05	0.00	No	Yes
SH 4	0.41	1.89	0.21	0.84	Yes	No
SH 5	0.47	0.38	1.23	0.34	Yes	No

The P-stats for Portfolio SH were statistically significant for year one and year three. The null hypothesis was rejected and it was concluded that the industrial sector classification had an impact on the returns of Portfolio SH in years one and three. A one-unit increase in the industrial sector had a 1.17 and 0.63 (coefficient estimate) impact on returns of Portfolio SH.

Table 59: P-Stat of Portfolio SL

Portfolio	Estimate	Standard Error	t-value	P-test	P(t) > 0.05	Significant
SL 1	0.14	0.36	0.39	0.70	Yes	No
SL 2	0.96	0.26	3.65	0.00	No	Yes
SL 3	0.78	0.16	4.70	0.00	No	Yes
SL 4	0.91	0.22	4.13	0.05	Yes	No
SL 5	1.05	0.08	13.07	0.00	No	Yes

The P-stats for Portfolio SL were significant in the years two, three and five. The null hypothesis was rejected and it was concluded that the Industrials classification had an impact on the returns of Portfolio SL in the stated years as follows:

Years	2	3	5
Estimate	0.14	0.78	1.05

Table 60: P-Stat of Portfolio SM

Portfolio	Estimate	Standard Error	t-value	P-test	P(t) > 0.05	Significant
SM 1	1.41	0.20	6.89	7.11	No	Yes
SM 2	1.03	0.07	15.36	3.19	No	Yes
SM 3	0.76	0.05	15.69	1.03	No	Yes
SM 4	1.36	0.66	2.07	0.13	Yes	No
SM 5	0.63	0.11	5.91	0.01	No	Yes

The P-stats for Portfolio SM were significant in the years one, two, three and five. The null hypothesis was rejected and it was concluded that the Industrials classification had an impact on the returns of Portfolio SM in the stated years as follows:

Years	1	2	3	5
Estimate	1.41	1.03	0.76	0.63

5.8 Overall Portfolios and Periods

5.8.1 Objective 1: SMB – Company Size

Table 61: P-Stat of Overall Financial Portfolio Size

Portfolio	Estimate	Standard Error	t-value	P-test	P(t) > 0.05	Significant
Overall	0.27	0.06	24.32	0.00	No	Yes

The P-stat for all portfolios under the financial sector was statistically significant for all the periods. The null hypothesis was rejected and it was concluded that the size of the portfolio had an impact on the returns of portfolios under the Financials classification. A one-unit increase in the portfolio size had a 0.27 impact on the returns of all portfolios under the Financials classification.

Table 62: P-Stat of Overall Mining Portfolio Size

Portfolio	Estimate	Standard Error	t-value	P-test	P(t) > 0.05	Significant
Overall	0.19	0.06	2.93	0.01	No	Yes

The P-stat for all portfolios under the financial sector was statistically significant for all five periods. The null hypothesis was rejected and it was concluded that the size of the portfolio had an impact on the returns of portfolios under the Mining classification. A one-unit increase in the portfolio size had a 0.19 impact on the returns of all portfolios under the Mining classification.

5.8.2 Objective 2: HML – (Book-to-Market)

Table 63: P-Stat of Overall Financials Portfolio BMV Ratio

Portfolio	Estimate	Standard Error	t-value	P-test	P(t) > 0.05	Significant
Overall	0.30	0.08	3.88	0.00	No	Yes

The P-stat for all portfolios under the financial sector was statistically significant for all five periods. The null hypothesis was rejected and it was concluded that the book-to-market ratios of the overall portfolios had an impact on the returns of all portfolios under the Financials classification. A one-unit increase in the portfolios' book-to-market ratios had a 0.30 impact on the returns of all portfolios under the Financials classification.

Table 64: P-Stat of Overall Industrials Portfolio BMV Ratio

Portfolio	Estimate	Standard Error	t-value	P-test	P(t) > 0.05	Significant
HML-Overall	0.99	0.14	6.87	0.00	No	Yes

The P-stat for all portfolios under the Industrials classification was statistically significant for all five periods. The null hypothesis was rejected and it was

concluded that the Excess Market returns of the overall portfolios had an impact on the returns of all portfolios under the Industrials classification. A one-unit increase in the portfolios' book-to-market ratios had a 0.99 impact on the returns of all portfolios under the Industrials classification.

5.8.3 Objective 3: Overall Excess Market Returns

Table 65: P-Stat of the Overall Excess Market Returns - Financials

Portfolio	Estimate	Standard Error	t-value	P-test	P(t) > 0.05	Significant
R_{mt}-R_{ft} Overall	1.01	0.42	2.41	0.02	No	Yes

The P-stat for all portfolios under the Financials classification was statistically significant for all five periods. The null hypothesis was rejected and it was concluded that the market conditions had an impact on the returns of all portfolios under the Financials classification. A one-unit increase in the Excess Market returns had a 1.01 impact on the returns of all portfolios under the Financials classification.

Table 66: P-Stat of the Overall Excess Market Returns - Mining

Portfolio	Estimate	Standard Error	t-value	P-test	P(t) > 0.05	Significant
R_{mt}-R_{ft} Overall	1.11	0.44	2.52	0.01	No	Yes

The P-stat for all portfolios under the mining sector classification was statistically significant for all five periods. The null hypothesis was rejected and it was concluded that the market conditions had an impact on the returns of all portfolios under the Mining classification. A one-unit increase in the Excess Market returns had a 1.11 impact on the returns of all portfolios under the Mining classification.

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Table 67: P-Stat of the Overall Excess Market Returns - Industrials

Portfolio	Estimate	Standard Error	t-value	P-test	P(t) > 0.05	Significant
R_{mt}-R_{ft} Overall	0.99	0.14	6.87	0.00	No	Yes

The P-stat for all portfolios under the Industrials classification was statistically significant for all five periods. The null hypothesis was rejected and it was concluded that the market conditions had an impact on the returns of all portfolios under the Industrials classification. A one-unit increase in the Excess Market returns had a 0.99 impact on the returns of all portfolios under the Industrials classification.

5.8.4 Objective 4 (a): Financials Classification

Table 68: P-Stat of the Overall Financials Classification

Portfolio	Estimate	Standard Error	t-value	P-test	P(t) > 0.05	Significant
Overall	0.70	0.11	6.19	0.00	No	Yes

The P-stat for all portfolios under the Financials classification was statistically significant for all five periods. The null hypothesis was rejected and it was concluded that the Financials classification of the overall portfolios had an impact on the returns of all portfolios under the Financials classification. A one unit increase in the Financials classification had a 0.70 impact on the returns of all portfolios under the Financials classification.

5.8.5 Objective 4 (b): Industrials Classification

Table 69: P-Stat of the Overall Industrials Classification

Portfolio	Estimate	Standard Error	t-value	P-test	P(t) > 0.05	Significant
Overall	0.94	0.14	6.87	0.00	No	Yes

The P-stat for all portfolios under the Industrials classification was statistically significant for all five periods. The null hypothesis was rejected and it was concluded that the Industrials classification of the overall portfolios had an impact on the returns of all portfolios under the Industrials classification. A one-unit increase in the Industrials classification had a 0.94 impact on the returns of all portfolios under the Industrials classification.

5.9 All Variables Regression

Table 70: P-Stat of the Overall Variables

Portfolio	Estimate	Standard Error	t-value	P-test	P(t) > 0.05	Significant
$R_{mt} - R_{ft}$	0.09	0.50	0.19	0.85	Yes	No
SMB	0.06	0.10	0.60	0.54	Yes	No
HML	0.02	0.12	0.20	0.84	Yes	No
F	0.35	0.17	2.06	0.03	No	Yes
M	0.16	0.15	1.03	0.30	Yes	No
I	0.60	0.21	2.83	0.00	No	Yes
				Adjusted $R^2 = 0.32$		

The P-stat was statistically significant for the Financials and Industrials classifications on the overall multiple regression for all portfolios in all periods. The null hypothesis was rejected and it was concluded that the Industrials and Financials classifications had an impact on the returns of all portfolios under the two given classifications. The estimates of the variables were 0.35 and 0.60 respectively. The adjusted R^2 is 0.32 meaning that the dependant variables explain 31.5% of the behaviour in the dependant variable.

The results of this study are discussed extensively in the next chapter (Chapter 6) to determine the impact on investor decision-making as far as it relates to the question of whether or not to invest in IPOs for the initial five years.

6 Chapter 6: Discussion of Results

6.1 Introduction

Gompers and Lerner (2003) made use of the intercept-from-time regression as an indicator of risk-adjusted performance of the pre-Nasdaq IPOs. In addition, the intercepts in these regressions have an interpretation analogous to Jensen's Alpha in the CAPM framework. They found that this approach had the added benefit of statistical inferences that could be made given the assumption of multi-variate normality of the residuals.

Gompers and Lerner (2003) concluded in a study of the IPOs in the US (United States) that, on a calendar approach basis, IPOs over a five-year period offered returns to the same extent as the market did. The intercepts in the Fama-French regression were insignificantly different from zero, suggesting no abnormal performance. Brav et al. (2009) found that Alphas in these regressions were in line with those investigated in previous studies. In all regressions done, the Alphas were insignificant, implying the absence of abnormal returns.

Yong (2007) found that in a study of Hong Kong and Singapore IPOs, there was no significant under- or over-performance after the initial return, which is supported by this study.

Zaluki et al. (2006) supported this view. They found that significant abnormal performance also disappeared under the calendar-time approach using the Fama-French (1993) three-factor model. Zaluki et al. (2006) concluded that that the use of calendar-time analysis did not permit the conclusion that IPOs produced significant (either positive or negative) abnormal returns. The UK IPO study done by Espenlaub et al. (2000) concluded that the statistical significance of under-performance was comprehensively less marked.

The results of this study support these views and are discussed overleaf.

6.2 Intercept Coefficient

6.2.1 Financial IPO Portfolios

The intercept for all IPO portfolios under the Financials classification was statistically insignificant. The null hypothesis of no abnormal performance cannot be rejected. This implied that financial-classified IPOs did not show abnormal performance over a period of five years as was expected in previous studies.

6.2.2 Mining IPO Portfolios

The intercept of all IPO portfolios under the Mining classification was also statistically insignificant. This also means that the null hypothesis of no abnormal returns cannot be rejected. Again, as in the financial IPOs, mining portfolio IPOs did not show superior or abnormal performance over a period of five years.

6.2.3 Industrial IPO Portfolios

The intercept of all the IPOs under the Industrials classification were found to be statistically insignificant. The null hypothesis of no abnormal returns cannot be rejected. Industrial portfolio IPOs are similar to financial and mining portfolio IPOs and did not indicate superior or abnormal performance over a five-year period.

6.3 Portfolio Sizes (SML)

6.3.1 Financial

The results of the study pointed out that the size of the portfolio under the Financials classification was statistically significant and the null hypothesis of size not being a factor had to be rejected. The implications were that the larger the size of the financial portfolio the more profound the impact on portfolio returns. A one-unit movement in the portfolio size resulted in a 0.27 unit impact on portfolio returns. Hence, larger portfolios yielded better returns than smaller portfolios in the financial-classified IPOs.

6.3.2 Mining

The results show that size was statistically significant for mining IPOs. Inferences that could be drawn were that a one-unit movement in the portfolio size had a 0.19 impact on the portfolio returns. Hence, the larger the size of the mining portfolio the greater the impact was on portfolio returns. The impact of size however appeared to be greater on financials compared to mining portfolios if the two portfolios were juxtaposed.

6.3.3 Industrials

Size for industrial IPOs was statistically insignificant for industrial IPOs on an overall basis. The inference drawn was that the portfolio size of the industrial IPOs had no bearing on the portfolios' returns.

6.4 HML (Book-to-Market Ratios)

6.4.1 Financial

The BMV ratio was regarded as being statistically significant for financial IPOs. One-unit movement in the BMV ratio denoted a 0.30 impact on financial portfolio returns. The implications of this is that companies that are trading at a discount relative to their market stock price are likely to produce better returns than those that are trading at a premium of their book values.

6.4.2 Mining

The BMV ratio was statistically insignificant for mining IPOs for all five periods. The inferences that were drawn are that BMV ratios have no impact on the returns of the mining portfolios.

6.4.3 Industrial

The BMV ratio was deemed to be statistically significant. A one-unit movement in the BMV ratio had a 0.99 impact on industrial portfolio return. The impact, if the industrial and financial IPO portfolios are juxtaposed, was more pronounced on the industrial stocks. The inference is that industrial IPOs, who are trading at

discounts to the given market share price, are bound to yield better returns than those trading at a premium of the book values in comparison to the financial IPOs.

6.5 Excess Market Returns

The Excess Market returns are regarded as being statistically significant for all the portfolio classifications (Financials, Mining and Industrials). A one-unit movement in the Excess Market returns had resultant impacts of 1.01, 1.11 and 0.99 on portfolio returns respectively. The inference that was drawn is that the buoyancy in market conditions yielded better returns for IPOs, and harsh and difficult market conditions impacted negatively on IPO portfolio returns. In addition, the IPO portfolio returns appeared to mirror those of the overall market.

6.6 Industry Classifications

The Financials and Industrials classifications showed statistical significance. The estimates were given as 0.70 and 0.94 respectively. The implications based on these estimates indicated that sector placement played a significant role for IPO portfolio returns. Industrial IPOs seemed to exhibit better performances than the financial IPOs.

6.7 Multiple Regression Results

The multiple regression results including all variables substantiated the aforementioned results. Only the Financials and Industrials classification variables showed statistical significances. The inference drawn was that the Industrials-classified IPOs showed the greatest impact on the portfolio returns over the given five-year period.

6.8 Research Question

The research question, which this study sought to answer, is whether or not IPOs in South Africa produced abnormal returns over a five-year period. The response to that question is, on a calendar approach basis using the Fama-French regression, they did not. There is no evidence of abnormal performance as already alluded to in this study. This inference supports studies done previously by Espanlaub et al. (2000), Gompers and Lerner (2003), and Zaluki et al. (2006).

On the whole, IPOs did not produce returns that were superior to the market. The industry classifications of Financials and Industrials had a bearing on the returns of IPO portfolios.

Another element that could be inferred from the study is that the Excess Market returns, as a measure of market performance, had an impact on portfolio returns for all industry classifications if they were regressed separately. The study also showed that if financial and industrial IPOs were regressed separately, the size of the portfolios had an impact on portfolio returns. This however disappeared on a collective basis.

7 Chapter 7

7.1 Conclusion

The study in question explored IPO after-market investment performance in South Africa. This chapter highlighted the key findings of the study and endeavoured to summarise them by means of a main set of results. Investor investment decisions were discussed and limitations of the research tabled. Potential areas of future research were also indicated.

7.2 Findings

The key aims of the research were to realise the stated objectives and elaborate on the following elements:

I. Add to the body of knowledge regarding IPO investment performance in South Africa over a five-year period;
II. Establish whether the factors identified in the international literature were significant in explaining IPO performance;
III. Predict whether an investor who invested in an IPO would make abnormal returns over the five-year horizon; and
IV. Enhance the significance of JSE industry classifications of Financials, Mining and Industrials in explaining IPO after-market investment performance.

Page and Reyneke (1997) documented evidence of under-performance of JSE IPOs for the period January 1980 to December 1981, which was consistent with studies done by Ritter (1991), Loughran (1993), Loughran and Ritter (1995) for the US equity markets, Levis (1993) for the United Kingdom and Aggarwal et al. (1993) for Latin America.

The subsequent results documented in this study for the period January 1992 to December 2007 showed no significant evidence of abnormal performance. This supported the evidence found by Espenlaub et al. (2000), Gompers and Lerner (2003), Zaluki et al. (2006), Yong (2007) and Brav et al. (2009). This was done

through the use of the intercept (Alpha Coefficient) which showed statistical insignificance and thus no evidence of abnormal returns over a five-year period.

The calendar approach was adopted through the use of the Fama-French three-factor regression in running multiple regressions for this study. The results showed that when the different industry IPO portfolios were regressed separately size had the most significant impact on financials and mining IPO portfolios after-market returns. Size impacted on the financial portfolios the most. Portfolios of large companies performed better than small ones.

Furthermore, when the different industry portfolios were regressed separately, BMV ratios had the most significant impact on after-market returns on the financials and industrial portfolios, with the greatest impact being exhibited by the industrial portfolios.

Market conditions impacted on all three portfolios' returns in a significantly positive manner, implying that buoyancy in the market conditions produced better results and vice-versa.

However, when all the portfolios were regressed across the entire five-year period, the most impressive factors turned out to be the financial and industrial classification of the IPOs, which had the greatest impact on after-market long-run performance.

7.3 Investor Investment Decision Implications

The results of this study showed that when an investor invested in new IPOs, the returns that were expected were no better or worse than the market. Investors certainly should not have expected to make superior returns in comparison to the market. What is also of importance is that IPOs that are classified under the financial and industrial portfolios or sectors are expected to provide better returns than other sectors. This, however, did not infer that IPOs would not produce better or superior returns post the five-year study, however, this did not form the scope of this study.

7.4 Limitations of the Study

The limitations of the study were found to be as follows:

I. Only IPOs done for the period 1992 to 2007 on the JSE were used, therefore the results and conclusions may not be applicable to other periods or other countries.
II. IPOs without financial data and negative BMV were excluded from the study.
III. The gathering of the database was exceedingly complex and difficult as there was no single cohesive data source in South Africa. Three different databases had to be used for compilation of the required data set.
IV. Alt-X Stock exchange had only been in existence since 2005 and hence there was data limitation. Inclusion of this information might have resulted in spurious results or data noise.
V. The number of factors that were examined amounted to four, yet there might have been more that could have been used.
VI. A limited data source was used, which was a similar challenge to that encountered in other countries where this study had been performed. As a result, these results need to be interpreted with caution.

7.5 Recommendations for Future Research

Based on the findings and limitations of the current research, the following recommendations could be made for future research:

I. IPO issues in hot and cold markets in South Africa need to be examined to determine the impact on management decision-making
II. Other factors to be explored exist such as initial returns, age of the company pre-IPO, experience of company management, historical earnings and earnings per share (EPS) on long-run after-market performance.
III. Considering the use of other methods such as BHAR and CARs and whether they would yield different results to the Fama and French (1993) three-factor model.

7.6 Final Observations

This study was undertaken as a result of IPOs representing an important method of raising capital in global markets. The increased number of IPOs conducted over the years has led to substantial research regarding their performance and has produced some surprising results. There has been limited research into IPO performance in South Africa. The purpose of this study was to address this gap.

This study expected to find abnormal performance within the South African context. The reality, however, is that there is no evidence of abnormal performance over a five-year period. This has significant implications for academia, private and institutional investors regarding IPO investment decisions.

The limitations to the research imply that the results are without qualification and need to be interpreted with caution. However, the findings do present an important contribution to international and South African finance literature.

8 Appendices

8.1 Reference List

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