THE BUYBACK ANOMALY AND USING THE UNDERVALUATION INDEX ON THE JOHANNESBURG STOCK EXCHANGE

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Declaration

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Abstract

The focus of this study is to add to the available literature on whether companies listed on the Johannesburg Stock Exchange (JSE) deliver persistent long-term excess returns following the announcement of an open market share repurchase. 454 share repurchases across 160 companies were included in the total sample over the period January 2003 to December 2021. Using event study methodology, the buyback anomaly survives the recently developed Fama and French five-factor model: open market share repurchase announcements are followed by statistically significant positive long-term excess returns. Cumulative abnormal average returns (CAARs) of 7.07% and 22.70% were realised after 250 and 720 trading days post-announcement, respectively. The results are consistent with signalling theory and indicate an informationally inefficient market. Furthermore, Peyer and Vermaelen's Undervaluation Index (U-Index) was effective in identifying highly undervalued companies at the time of their respective share repurchase announcements within the total sample. Compared to companies with low to moderate undervaluation scores, companies with high undervaluation scores generated an additional 9.47% after 250 trading days, and 3.57% after 720 trading days within their respective samples. The U-Index improves the predictability of excess returns after an open market share repurchase announcement by companies listed on the JSE. This study makes a significant contribution to the current understanding of long-term excess returns of shares following a share repurchase announcement in South Africa. Furthermore, this study also serves as a test of market efficiency on the JSE and finds that the U-Index offers additional practical application by enhancing various share repurchase related trading strategies. Opportunities for future research on this topic include testing the relationship between positive long-term excess returns and idiosyncratic volatility and combining volatility with Peyer and Vermaelen's undervaluation predictors.

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Chapter 1 – Introduction

The buyback anomaly exists when the actual return generated by a stock following a share repurchase announcement is different to the expected return predicted by an asset pricing model. This can also be termed as the excess or abnormal return realised following a share repurchase announcement. International research has shown that companies deliver long-term excess returns following a share repurchase announcement. For example, over the last 30 years share prices in the United States have been found to increase by approximately two to three per cent between two days before and two days following a share repurchase announcement. Despite this, few large or small cap equity funds have been found to focus on exploiting the buyback anomaly (Evgeniou et al., 2016). A possible reason for this is that most stock market anomalies tend to disappear when their method of measurement is changed or refined (Fama, 1998). Thus, Fama and French (2015) argue that the buyback anomaly does not survive when the five-factor Fama and French asset pricing model is used to price publicly listed equities.

However, some studies[1] have shown the buyback anomaly to be persistent in the long-term. Furthermore, there has been little sign of this trend declining in recent years (Evgeniou et al., 2018). However, most of this research has been conducted in developed markets, with little having been done in potentially less efficient developing markets such as South Africa. This then begs the question: does the buyback anomaly survive on the Johannesburg Stock Exchange (JSE)? While much research has been conducted around share repurchases in South Africa, including work on the factors influencing the decision between conducting a share repurchase or paying a dividend (Wesson et al., 2018), share repurchase and dividend pay-out behaviour (Wesson et al., 2015), and the relationship between buybacks and executive director remuneration schemes (Steenkamp, 2020), to name a few, little research exists on the buyback anomaly in South Africa and how it can be exploited by active managers.

This study tests whether the buyback anomaly survives when using the five-factor Fama and French (2015) model as basis for determining excess returns on the Johannesburg Stock Exchange (JSE). The Capital Asset Pricing Model (CAPM) is used alongside the five-factor model as a test of robustness when calculating average abnormal returns (AARs) over the relevant event window period. Additionally, the second part of this study investigates whether Peyer and Vermaelen's (2009) Undervaluation Index (U-Index) is effective in identifying undervalued companies in the context of share buyback activities, and if greater abnormal

[1] See Ikenberry, Lakonishok and Vermaelen (1994), Peyer and Vermaelen (2009), and Evgeniou et al. (2018)

returns can be generated from investing in these companies at share buyback announcement date compared to overvalued companies. This study analyses cumulative average abnormal returns (CAARs) over various time horizons, namely around the announcement date (1 day prior to 1 day after), 250 trading days after the announcement date, and 720 trading days after the announcement date. This was done to observe the effects of a share repurchase announcement on excess returns over a very short-term period, a medium-term period, and a long-term period. These investigation periods were applied both when testing for the existence of the buyback anomaly on the JSE, and when using the U-Index to discriminate between undervalued and overvalued shares.

1.1. Background

"When companies with outstanding businesses and comfortable financial positions find their shares are selling far below intrinsic value in the marketplace, no alternative action can benefit shareholders as surely as share repurchases" – Warren Buffet (Berkshire Hathaway, 1984).

Companies with excess capital are faced with two primary choices: use the capital to pursue growth opportunities or give value back to investors through a pay-out action. The two most common pay-out methods are a dividend payment, or a share repurchase. Share repurchases are fast becoming the world's favoured pay-out method. Grullon and Michaely (2002) found that between 1980 and 2000 share repurchase activity had grown by an average annual rate of 26.1% in the U.S., with dividend payments only growing by a comparative average annual rate of 6.8% over the same period. The annual aggregate volume of share repurchases by U.S. companies surpassed that of dividend payments in 2005, with that margin widening significantly since 2006 (Dittmar, 2008).

A share repurchase (often referred to as a share buyback) is a transaction in which a company repurchases its own previously issued stock from shareholders in the open market. A share repurchase can be conducted by the holding company or any entity controlled by the holding company, such as subsidiaries or share trusts. When a share repurchase occurs, the number of outstanding shares decreases, with the repurchased shares generally being held in treasury, ready for re-sale (Wesson et al., 2015). Share repurchases have been legal in South Africa since 1 July 1999. There are essentially three types of share repurchases (Wesson et al., 2015; Steenkamp, 2020):

- The first type is an open market or auction repurchase. This is where the holding company goes into the open market and repurchases its own shares at the prevailing market price. In

South Africa, this is referred to as a general repurchase or as a repurchase under general authority. This is the most common share repurchase method used globally, due to fewer regulations being required of the repurchase than compared to the other two methods.

- The second type is a tender offer repurchase. This is where the holding company makes a *pro rata* offer at a predetermined price to existing shareholders. In South Africa, this is referred to as a specific repurchase or as a repurchase under special authority, with the sub-type of "*pro rata* offer".
- The third type is a private offer share repurchase. This is where a specific group of shareholders are targeted by the holding company, and an offer is made at a predetermined price and date. In South Africa, this is referred to as a specific repurchase or as a repurchase under special authority, with the sub-type of "other specific offer".

In South Africa, repurchasing companies must comply with the Johannesburg Stock Exchange's (JSE) Listing Requirements, specifically Chapter 5, Sections 67 – 84. Issuers must apply to the JSE for the removal of the shares they wish to repurchase, as the shares will be delisted. The issuer is also required to announce the repurchase on the same day via Stock Exchange News Services (SENS). The announcement must list the effective date when the shares will be delisted, the number of shares that will be delisted, the price paid by the issuer, and the identities of the shareholders (JSE, 2017). However, it is important to note that, according to Chapter 5 Section 79 of the JSE Listing Requirements, repurchases, early redemptions and/or cancellations of an issuer's securities must be disclosed only if an aggregate of three per cent of the initial number of the relevant class of securities has been repurchased, redeemed, or cancelled.

Share repurchases that are smaller in size and do not reach a cumulative of three per cent of the relevant class of securities being repurchased, need not be announced via SENS (JSE, 2017). While there are several ways one could interpret this rule, it seems that companies have and continue to interpret the "three per cent rule" on an annual basis, despite the JSE officially stating that the disclosure requirement is not limited to a specific year (Wesson, 2014). The "three per cent rule" will likely result in the open market share repurchases figure being understated, making the accurate collection of data more difficult due to a lack of disclosure regarding smaller share repurchases.

According to Chapter 5 Section 72 of the JSE Listing Requirements, the approval of a share repurchase must be obtained from shareholders in terms of a special resolution of the company.

This will most likely be obtained through a general meeting or at the annual general meeting (AGM). Most exchanges around the world require that companies announce their share repurchases immediately after the transaction has occurred, either on the day before the announcement (e.g. in the UK, and Australia), or at the end of the financial quarter (e.g. in the U.S) (Wesson, 2014). South Africa has its own approach to share repurchase announcements. Specific share repurchases are announced on SENS after the terms of the transaction have been finalised, while general share repurchases must be announced once three per cent of outstanding shares have been cumulatively acquired by the holding company (Wesson et al., 2015).

Bester et al. (2010) highlighted that South Africa's share repurchase environment is vastly different to that of developed countries, primarily due to odd disclosure regulations which only require that incremental share repurchases of a size greater than 3% of issued shares be reported. Hence, international literature should not be applied *pari passu*. It was found that only 49% of open market share repurchase value was announced via SENS. This will likely be a limitation to this study, as the majority of share repurchases appear to be smaller in size than is required by the JSE Listing Requirements to make a mandatory SENS announcement. Lastly, the repurchase of shares in South Africa under general authority has to be affected through the order book operated by the JSE trading system and acquired at a premium price less than 10% above the weighted average of the market value for the securities of the five business days preceding the transaction date (JSE, 2017).

A common view is that share repurchases indicate company undervaluation, with management opting to 'invest in themselves'. This is referred to as signalling theory (Steenkamp, 2020). Other theories with regards to the factors influencing the decision to conduct a share repurchase include the leverage theory, the wealth transfer theory, taxation theory, takeover defence theory, and earnings per share growth theory (Nyanga, 2018). Managerial overconfidence also need to be considered when assessing the effect of share repurchase announcements on long-term excess returns. Andreou, Cooper, and Lopez (2018) found that while long-run abnormal returns were positive for a period of up to 48 months following a share buyback announcement, they were substantially lower when the companies' CEOs were overconfident. These authors offer as reason that if it is assumed that share repurchase announcements are driven by mispricing (i.e., undervaluation), and that a company's primary method of signalling undervaluation to the market is through a share buyback, managers who are overconfident of

the company's intrinsic value would be less credible to the market, thus leading to lower expectations of cumulative abnormal returns after the announcement.

Peyer and Vermaelen's (2009) research on the nature and persistence of buyback anomalies concluded that substantial statistically significant abnormal returns were achieved over the long-term when tested against the Fama and French (1993) three-factor model. This conclusion was particularly evident in the case of undervalued stocks. It was also found that open market repurchases were often conducted as a response to market overreaction to bad news, such as significant analyst downgrades, and pessimistic long-term earnings forecasts. The most significant long-term abnormal returns had been realised when a company had experienced a severe share price decline during the previous six months, which acts as strong evidence in favour of the overreaction hypothesis.

Additionally, Peyer and Vermaelen (2009) constructed an Undervaluation Index (U-Index) which measures the probability that the decision to conduct a share repurchase is driven by company undervaluation. The U-Index allows for various additional sample construction possibilities, where companies and their share repurchases can be grouped based on the degree of stock undervaluation. Evgeniou and Vermaelen (2018) expanded upon this by creating an enhanced U-Index which incorporates idiosyncratic risk and volatility in creating subsamples via the original U-Index. This will be covered in greater detail in the literature review section of this paper. This study uses this index to construct various subsamples and compare highly undervalued stocks to moderately undervalued, fairly valued, and overvalued stocks following a share repurchase announcement.

1.2. Motivation, novelty, and contribution

The primary aim of this study is to test whether documented academic studies done abroad (particularly in the United States) on buyback anomalies can be applied to South Africa. South Africa is unique in that it is a developing economy with a sophisticated financial sector. While share repurchases may have only relatively recently been made legal in South Africa in comparison to various developed markets such as the U.S., there has been significant research conducted on both the determinants of share repurchases and their effect on earnings, as well as the South African market overall. However, there has been little research done to investigate the buyback anomaly and its effect on long-term excess returns, particularly post-recession (i.e., the Global Financial Crisis of 2008/2009) (Steenkamp & Wesson, 2020). Furthermore, there currently exists no research on whether an Undervaluation Index is effective in

identifying undervalued stocks at the time of a share repurchase announcement in South Africa. This was further investigated to enhance the practical application of this study.

As alluded to previously, share repurchases have seen an uptick in popularity around the world in the last 20 years. In 2018, the value of share repurchase on the S&P500 reached their highest ever, and since 2010 (following the global financial crisis) the net issuance of shares has been consistently negative (Steenkamp, 2020). According to Wesson et al. (2015), share repurchase activity saw an exponential increase from 2005 to 2007, a slight decrease in 2008, and a steady increase in 2009 in South Africa. Regardless, the increase in global share repurchase activity and consequent uptick in research surrounding the buyback anomaly raises questions over the performance of shares after share repurchase announcements on the South African equities market. These questions are addressed in this study.

There are several benefits to researching buyback anomalies and their effect on long-term excess returns. Firstly, testing the relationship between the buyback anomaly and abnormal returns in South Africa also serves as a test of overall market efficiency. According to Fama (1998), anomalies are chance results and will split randomly between market underreaction and overreaction with near equal frequency. Furthermore, its suggested that large long-term anomalies which cannot be solely attributed to chance, and split evenly between over- and underreaction, will serve as a strong case for market efficiency, despite there being sensitivity to both the methodology and the measurement method used in the relevant study. However, an important conclusion made by Fama is that long-term return anomalies tend to disappear with reasonable adjustments to the technique implemented, either through a change or refinement (Fama, 1998). Additionally, a more recent empirical study of how share prices react to share repurchase announcements in South Africa could inform various trading strategies. If buyback anomalies show positive long-excess returns in the South African capital market, surviving the five-factor Fama and French (2015) model, it would be possible to construct long portfolios comprising of firms that had recently announced a share repurchase.

The investigation into whether Peyer and Vermaelen's (2009) U-Index can be used to accurately identify undervalued repurchasing company shares on the JSE, enhances the practical application of this study. If the buyback anomaly survives the five-factor model and is persistent in the long-term, an effective U-Index could guide investment decisions by assisting investors in identifying which shares will experience the most significant realisation of excess returns following a share repurchase announcement due their undervaluation

characteristics. An argument can be made for why the U-Index might also be useful as a predictor of the likelihood that a company may conduct a share repurchase, as undervaluation is commonly cited as a key factor in management's decision to initiate a share repurchase programme.

In summary, this study makes a significant contribution to the current understanding of long-term excess returns of shares following a share repurchase announcement in South Africa. A result supporting the survival of the buyback anomaly when using the Fama and French (2015) five-factor model to predict expected return will help investors make better investment decisions, inform various trading strategies and portfolio construction philosophies, and act as an overall test of market efficiency. A result which shows that the buyback anomaly does not survive using the Fama and French (2015) five-factor model will provide useful insight into how South Africa, an emerging market with a sophisticated financial sector, differs from a developed market like the United States. An investigation into why the Fama and French (2015) five-factor model better captures excess returns following a share repurchase announcement than abroad will be useful to investors and traders. Lastly, an investigation into whether the U-Index is effective in identifying undervalued shares which deliver additional positive excess returns enhances the practical application of the study and allows for potential prediction of whether a company will choose to conduct a share repurchase.

1.3. Problem Statement, Research Questions and Research Hypotheses

The aim of this study is to investigate whether the buyback anomaly survives the Fama and French (2015) five-factor model on the Johannesburg Stock Exchange (JSE), and whether Peyer and Vermaelen's (2009) Undervaluation Index (U-Index) can be used to accurately identify undervalued repurchasing company shares that lead to additional positive long-term excess returns.

The research problem addressed by this study is as follows: In South Africa it is unclear whether the buyback anomaly survives the Fama and French (2015) five-factor model on the Johannesburg Stock Exchange (JSE). Furthermore, with regards to the shares of companies that conduct a share repurchase, it is unclear whether undervalued shares will outperform the market compared to the remaining shares listed on the JSE, and specifically whether Peyer and Vermaelen's (2009) U-Index can be used to identify these undervalued shares. Currently, investors who wish to outperform their respective performance benchmarks by investing in stocks following a share repurchase announcement lack the relevant research to make informed

investment decisions. Earlier studies conducted abroad in developed markets have found excess returns to be positive persistent following a share repurchase announcement (Evgeniou et al., 2018).

Research Question 1

Does the buyback anomaly survive on the Johannesburg Stock Exchange (JSE) when using the Fama and French (2015) five-factor model to predict expected return?

Research Question 2

Do more undervalued JSE-listed companies at the time of a share repurchase announcement produce greater abnormal returns than less undervalued companies at the time of share repurchase announcement?

1.3.1. Research Hypotheses

Hypothesis 1

Null Hypothesis (H_0): CAARs = 0.

This null hypothesis states that the buyback anomaly does not survive on the Johannesburg Stock Exchange when using the Fama and French (2015) five-factor model to predict expected return. This means that investing in repurchasing company shares during the relevant event window period will not result in persistent positive cumulative average abnormal returns (CAARs).

Alternative Hypothesis (H_1): CAARs $\neq$ 0.

This alternative hypothesis states that the buyback anomaly does survive on the Johannesburg Stock Exchange when using the Fama and French (2015) five-factor model to predict expected return. This means that investing in repurchasing company shares during the relevant event window period will result in persistent positive cumulative average abnormal returns (CAARs).

Hypothesis 2

Null Hypothesis (H_0):

CAAR (More Undervalued Companies) $\leq$ CAAR (Less Undervalued Companies).

This null hypothesis states that cumulative average abnormal returns (CAARs) generated by more undervalued repurchasing companies are less than or equal to the CAARs generated by less undervalued repurchasing companies.

Alternative Hypothesis (H_1):

CAAR (More Undervalued Companies) > CAAR (Less Undervalued Companies).

This alternative hypothesis states that cumulative average abnormal returns (CAARs) generated by more undervalued repurchasing companies are greater than the CAARs generated by less undervalued repurchasing companies.

Peyer and Vermaelen's (2009) Undervaluation Index is used to determine the degree of company undervaluation at the time of a share repurchase announcement. Companies that are classified as "less undervalued" rather than "more undervalued" might also be classified as "overvalued". However, compared to companies that are classified as "more undervalued", they will still be considered "less undervalued".

1.4. Thesis Map

The remainder of this thesis is structured as follows: Chapter 2 looks at the academic literature surrounding share repurchases, the buyback anomaly with additional background regarding the efficient market hypothesis, the use of factor models, and the theoretical foundation of Peyer and Vermaelen's (2009) Undervaluation Index. Chapter 3 discusses the sample and data used in this study. Chapters 4 and 5 covers the methodologies, results, and analyses of both proposed research questions, respectively. Finally, Chapter 6 concludes, expands upon the study's limitations, and suggests future research on the topic.

Chapter 2 – Literature Review

The literature review section of this study unpacks the theory behind why companies might choose to conduct a share repurchase programme. The efficient market hypothesis (EMH) is discussed as it is relevant to understanding the assumptions behind various asset pricing models which look to accurately predict the expected return of stocks, the concept of an anomaly and how its existence can be tested, and how one can test the overall efficiency of the market. Furthermore, the literature covering the development of commonly used multifactor models is included, as well as studies comparing their explanatory power – this informs this investigation's decision to use the Fama and French (2015) five-factor throughout the multiple event studies conducted. Lastly, studies conducted abroad in developed markets and in South Africa regarding the buyback anomaly is covered, as well as some methods of identifying undervalued stocks, and in particular Peyer and Vermaelen's (2009) Undervaluation Index.

2.1. Reasons for Share Repurchases

This section of the thesis analyses and discusses academic research regarding the motivations for why companies conduct share repurchase programmes.

2.1.1. Signalling

Signalling theory was originally developed to help explain the issues of asymmetrical information in labour markets. However, it has been applied to various other areas such as a corporate dividend policy, the choice of capital structure, and the retention of managerial ownership when new shares are issued (Morris, 1987). In essence, the theory suggests that asymmetrical information can be reduced if the party with the informational advantage signals it to the other market participants. Morris (1987) gives a detailed breakdown of how this process typically works in the financial markets. It is assumed that sellers will initially have more information about their own product or company than buyers (or any other party).

In essence, the signalling theory puts forward the idea that insiders (i.e., issuers) are able to determine the real price of their own firm's shares. If it is believed that a firm's shares are mispriced and that the firm itself is undervalued, it is common for an open market share repurchase to be considered by management (Huang, 2015). However, while signalling stock undervaluation is a common motivation for conducting a share repurchase, there has been debate over whether a share repurchase announcement is a strong signal of undervaluation. This is primarily due to the growing popularity of share repurchases as a method of returning

cash to investors, and the lack of obligation to complete a share repurchase following an announcement in the United States (Grullon & Michaely, 2002). Babenko et. al. (2012) point out that investors should only react to the undervaluation signal if the issuer (i.e., insiders) makes it credible with actions that support the sentiment. For example, if insiders choose to purchase their own firm's shares before a share repurchase announcement, this is a strong indication that the firm may be undervalued. The decision to purchase a firm's stock makes an investor vulnerable to significant risk through an absence of diversification. If the stock were in fact overpriced, this would be a costly decision from company insiders (Babenko et al., 2012).

Babenko et al. (2012) also found that despite open market share repurchase announcements normally being linked to equity undervaluation, the market often reacts to them with a degree of scepticism. There is literature which suggests that share repurchase announcements may be used as a tool to mislead investors. Chan et al., (2010) find that share repurchase announcements can act as useful signals of undervaluation to investors. However, open market share repurchase announcements are often criticised for being weak signals, since they lack any firm commitment from the seller. Firms that were suspected of using share repurchases to mislead investors were placed under suspicion if heavy pressure was applied to boost their own share price. It was found that while firms who are suspected of misleading investors experienced a uniform short-term reaction following a share repurchase announcement, over the long-term suspect firms did not achieve the economic performance boost that other firms experienced and tended to repurchase fewer shares from the open market (Chan et al., 2010). Overall, despite only a limited number of firms being found to use share repurchases in a misleading way as "cheap talk", there were no long-term economic benefits to engaging in this sort of behaviour.

In 1982, the U.S. Securities Exchange Commission (SEC) adopted Rule 10b-18 to provide a "safe harbour" for share repurchases. In essence, the rule requires that firms only use one broker or dealer on any single day, limits the daily volume of repurchases, and prevents firms from trading on an uptick or during either the opening or closing thirty minutes of a trading day. Rule 10b-18 was introduced to enable large open-market share repurchases and dampen the threat of firms being charged with stock manipulation (Grullon & Michaely, 2002). While share repurchase announcements may appear to be a tool for misleading the market, there is arguably sufficient red tape preventing firms engaging in such behaviour and realising economic benefits.

However, as far as signals and their strength are concerned, the literature investigating the effects of a "double signal" is relevant. In the context of this study and open market share repurchases, a "double signal" occurs when a share repurchase announcement is accompanied by another management decision which also conveys a message that the company might be undervalued. This will act as a stronger signal of company undervaluation to the market. Firth et al. (2010) conducted an event study in Hong Kong around share repurchases and insider trading. Share repurchases were shown to result in long-term positive abnormal returns, but this was conditional on whether insider trading was present in the market. Insider sales were shown to understate the buy signal created following the share repurchase announcement. However, insider purchases before an announcement enhanced the buy signal, thus acting as a "double signal". The study was found to support the undervaluation signal theory, as well as the free cash flow hypothesis.

In summary, share repurchase announcements will influence both the supply and demand of shares in the open market due to information asymmetry being relevant in determining share price variation. If the market reacts positively to a company's signal, the company's share price will increase. Therefore, company insiders may choose to conduct a share repurchase as a method of signalling confidence in the company's prospects (Tabtieng, 2013).

2.1.2. Share-based Remuneration Schemes

As part of aligning management objectives and interests with that of a firm's ownership, executive remuneration often has a component comprising of share options. Abroad, there is a positive relationship between share repurchases and executive share-based remuneration, thus suggesting that management may be utilising share repurchase policies to increase the value of the call options they receive (Steenkamp, 2020). This is an additional reason why a share repurchase may be preferred to a dividend payment to shareholders. Share options will encourage managers to prefer share repurchases over dividend payments due to share repurchases not diluting the "per share value" of the firm (Dittmar, 2000). The theory relevant to describing the effect a share-based remuneration scheme might have on management's decision to conduct a share repurchase instead of a dividend pay-out is agency theory. Agency theory describes the relationship between principals and agents (or representatives) in an organisation, with an emphasis on misaligned objectives and incentives between these two parties due to the separation of ownership and control over resources within a firm.

This is referred to as the "principal-agent problem" and the essence of it is that if individuals within management choose to act in their best interests rather than that of the ownership, the separation of interests within the firm will likely result in both friction and conflict (Morris, 1987). Companies which exhibit these issues will likely incur agency costs, such as the loss in firm value, and the costs associated with overseeing management and their actions. The loss in firm value is perpetuated by investors having a negative perception of a company when management does not reflect the interests of its owners (i.e., its shareholders). The costs incurred overseeing management are in the interest of attempting to better align their interests with that of the company's shareholders through reward/remuneration schemes (Morris, 1987). Agency theory is relevant in determining why management might choose to conduct an open market share repurchase, and why it may be preferred to a dividend pay-out.

Additionally, agency theory is closely related to the management stock incentives hypothesis, which was first investigated by Lambert et al. (1989). It was found that when a firm decides to pay dividends, the price of its shares will decline by approximately the amount of the dividend on the ex-dividend date (i.e., the trading date on which the dividend payment is no longer owed to a new holder of a share). A firm's management is commonly remunerated based on company share options – typically call options as it would be counterintuitive for management to be rewarded with put options, as put options appreciate when the underlying share price decreases, thus incentivising underperformance.

2.1.3. Leverage Hypothesis

A firm which has excess debt capacity will want to optimise its capital structure. If an optimal leverage ratio exists, a firm may increase its debt-to-equity ratio either through the issuing of new debt or through a share repurchase. Due to a share repurchase decreasing the number of outstanding shares, the debt-to-equity ratio will increase through an increase in the company's debt and a decrease in the company's equity portion. Therefore, a firm is more likely to conduct a share repurchase if its debt-to-equity ratio (i.e., leverage ratio) is below its target ratio. (Dittmar, 2000)

2.1.4. Takeover Defence Hypothesis

Share repurchase programmes not only affect the firm and its owners, but also the relationship between the firm and external parties. In an environment where the supply curve for company shares is upward sloping, a potential target company could conduct a share repurchase to increase their share price, thus driving up the cost of an acquisition. The reason why the

potential cost of acquisition increases following a share repurchase, is because the stockholders that sell their shares back to the firm typically are those with the lowest reservation price (i.e., the lowest price a seller is willing to accept for a good or service) (Dittmar, 2000). As previously outlined, repurchasing firms with a higher probability of being taken over (i.e., vulnerable target companies) realise greater long-term excess returns following a share repurchase announcement. Hence, takeover probability and open-market share repurchases jointly act as a double-signal for conveying that a company's shares are undervalued (Huang, 2015).

2.1.5. Substitution Effect

When companies have excess capital, they are often faced with a decision – do they pursue growth opportunities, pay a dividend to shareholders, or conduct a share repurchase? Share repurchases are often perceived as a substitute for dividend payments. First, one should understand the circumstances under which firms prefer share repurchases to dividend payments, and vice versa. According to Jagannathan et al. (1999), dividends are generally paid by companies with higher "permanent" operating cash flows, while share repurchases are generally conducted by firms with higher "temporary", non-operating cash flows. Additionally, firms which have recently experienced poor market performance will favour a share repurchase, while firms which have recently experienced good market performance will favour paying a dividend to shareholders. Further, another reason why share repurchases are preferred to dividend payments is that they are inherently more flexible.

Dividend payments are often regarded as an ongoing commitment to allocate "permanent" operating cash flows to investors, while share repurchases are sees as the distribution of cash flow, which is "temporary" or non-permanent. The belief that share repurchases act as a substitute for dividends implies that the market will react more negatively to a dividend cut by a non-repurchasing firm than that of a repurchasing firm. Grullon and Michaely (2002) provided evidence that corporations had been substituting dividends for share repurchases. In 1998, Glenn Davenport, CEO of Marrison Health, commented that the reduction in long-term capital gains tax rate made it more efficient to conduct a share repurchase programme, than make a dividend payment. Tax on dividends is significantly higher than tax on capital gains, hence the incentive to conduct a share repurchase (Jiang et al., 2013).

2.2. The Efficient Market Hypothesis

The efficient market hypothesis (EMH) is relevant to this study as it gives insight into how one can test the efficiency of the market and how one conceptualises the idea of an anomaly when using various asset pricing models to predict expected returns. The efficient market hypothesis suggests that when information becomes available, the news spreads quickly and reflects in the prices of securities immediately. Furthermore, if securities markets are efficient, neither technical analysis nor fundamental analysis[2] could be used by investors to achieve positive abnormal returns by holding a randomly selected portfolio of individual stocks or shares. Furthermore, this aids investors in identifying "undervalued" securities which trade at comparatively lower prices (Malkiel, 2003). According to Fama (1970), the efficient market hypothesis is associated with the concept of a "random walk". This means that changes in asset prices are random and cannot be accurately predicted using historical price data.

The random walk model is comprised of two hypotheses – firstly, it is assumed that the current price of a security "fully reflects" available information and implies that successive changes to price are independent of one another. Additionally, it is also assumed that successive changes to security prices are identically distributed. In short, while the integration of new information is assumed to reflect immediately in stock prices without resistance, tomorrow's price change will only reflect information that is available tomorrow, which is independent of any price changes observed today. It is further reasoned that because news is inherently unpredictable, any subsequent changes to stock prices must also be random and unpredictable. Fama (1970) used empirical evidence to show that the EMH does hold, which implies that investors are unable to generate risk-adjusted returns as any profits would be eroded as a result of trading costs.

Fama (1970) identified three forms of market efficiency, namely weak form efficiency, semi-strong efficiency, and strong form efficiency. Weak form market efficiency assumes that if investors were to only utilise historical market data such as trading volume and asset prices for stock analysis, they would be unable to generate abnormal returns. However, there have been numerous studies conducted in emerging market countries which challenge the findings of Fama (1970). Mishra (2011) conducted a global study to test for weak form efficiency across various emerging and developed capital markets, such as India, China, Brazil, South Korea,

[2] As a reminder, technical analysis is the study of past stock prices and patterns in market data in an attempt to predict future stock prices and patterns. Fundamental analysis is the study of publicly available financial information in an attempt to determine a stock's intrinsic value.

Russia, Germany, the United States, and the United Kingdom. It was found via the application of a unit root test and a GARCH (1, 1) model estimation that these markets were not weak form efficient, thus allowing investors the opportunity to generate outsized trading profits from both technical analysis and fundamental analysis.

The second form of market efficiency outlined by Fama (1970) is the semi-strong form. In addition to the assumption of weak form market efficiency, where historical market data such as trading volume and asset prices are immediately reflected in the current stock price, any relevant information that has been publicly disseminated will also quickly reflect in current stock prices. Some examples of public information that is considered to be relevant includes announcements by the firm of annual earnings, stock splits, and share repurchases. If the market is proven to be semi-strong efficient, its asset prices will follow a "random walk" meaning that investors would be unable to consistently outperform the market (i.e., generate positive risk-adjusted returns) by using fundamental stock analysis. Any relevant information contained in in a company's financial statements or that is publicly announced by the firm or an external third-party would immediately reflect in current stock prices.

When testing whether various capital markets are semi-strong efficient in reality, the type of public signal sent to investors following an announcement ought to be considered. Mackey and Bacon (2017) considered 40 firms that announced the issuance of new shares and 40 firms that announced the repurchasing of previously issued shares in the open market – all trading on either the New York Stock Exchange (NYSE) or the NASDAQ. After analysing prior and post announcement price reactions, these authors concluded that these markets were semi-strong efficient following the issuance of new shares, but semi-strong inefficient following the repurchasing of previously issued shares. While there are various studies which look to test for semi-strong market efficiency in developed countries, this hypothesis may not hold in emerging markets. In this regard, Mallikarjunappa and Douza (2017) tested whether the Indian Stock Market reflected a semi-strong efficiency and found using 160 quarterly results from various firms listed on the S&P BSE-200 Index that the market was slow in reacting to the release of new public information.

The third and final form of market efficiency outlined by Fama (1970) is the strong form. In addition to the assumptions of both the weak and semi-strong forms, where historical market data such as trading volumes and asset prices and publicly available information will reflect instantaneously, privately held information is also assumed to be incorporated into current

stock prices. This means that it is impossible for an investor to consistently outperform the market (i.e., generate positive risk-adjusted returns) by any means of stock analysis and that stock prices will continue to exhibit a "random walk". A common critique of the strong form market efficiency hypothesis is that because insider trading is illegal, it is unlikely that privately held information will be able to flow at a rate and/or magnitude so that current stock prices might reflect this information. Hence, it is more practical for academic studies to test for market efficiency using either the weak form or the semi-strong form hypotheses (Malkiel, 1989).

2.3. Multifactor Models

When investigating whether the buyback anomaly exists in the market and is persistent in the long-term, a robust and accurate asset pricing model is required. This calls for the consideration of various factor models which predict the expected returns of stocks. The first "factor model" was developed in the mid-1960s by Sharpe (1964) and Lintner (1965). It was named the Capital Asset Pricing Model (CAPM) and contained only a single market factor. The CAPM built upon the Markowitz model (1959) which assumed that investors choose a portfolio at time $t-1$ that produces a stochastic return at time t, and are risk averse rather than risk neutral or risk seeking. Consequently, investors are assumed to choose portfolios that are "mean-variance efficient", which means that they will minimise variance of return, given expected return, and maximise expected return, given variance.

The CAPM offers a testable prediction about the relationship between total risk and expected return through the identification of an efficient portfolio, since asset prices are to clear the market of all assets (Fama & French, 2004). Two assumptions are added to the Markowitz model (1959) by Sharpe (1964) and Lintner (1965) – *borrowing and lending at the risk-free rate,* and *complete agreement* (i.e., given asset prices that clear the market at $t-1$, asset returns will be jointly distributed from $t-1$ to t). The single factor of the CAPM is the Beta of the security or portfolio, which is explained as the measure of a security or portfolio's risk that is inherent to the market. The market risk exposure coefficient is systematic and cannot be eliminated through diversification.

The CAPM is depicted as follows:

$$E(R_i) - R_f = \beta_i\left[E(R_M) - R_f\right] \tag{2.1}$$

Where:

$E(R_i)$ is the expected return on a security or portfolio i

R_f is the risk-free return

β_i is systematic risk on a security or portfolio i

$E(R_M)$ is the return on the market portfolio

Fama and French (1996) noted that previous work of theirs had shown that average returns on common stocks had been related to firm-specific characteristics such as size, earnings/price, book-to-market ratio, and past growth - both short- and long-term. Because none of these patterns in average returns are explained by the CAPM they are called "anomalies". This brought about the need for a more comprehensive multi-factor model such as the Fama and French (1993) three-factor model. While the CAPM failed to capture the effects of various firm-specific characteristics, factors such as company size and book-to-market ratio were particularly shown to have a significantly larger effect on stock returns.

It was found that small-cap companies performed better than large-cap companies over time, and that companies with a relatively high book-to-market ratio (i.e., firms that are highly undervalued) outperformed companies with a relatively low book-to-market ratio (i.e., firms that are highly overvalued). Hence, two factors were added to the CAPM – a size factor (small minus big) and a value factor (high minus low)[3]. The Fama & French (1993) three-factor model is stated as follows:

$$E(R_i) - R_f = \alpha_i + \beta_i\left[E(R_M) - R_f\right] + s_i R_{SMB} + h_i R_{HML} + \epsilon_i \qquad (2.2)$$

Where:

$E(R_i)$ is the expected return on a security or portfolio i

R_f is the risk-free return

α_i is the intercept in Equation 2.2 is equal to zero for securities and portfolios i

β_i, s_i, and h_i represent each factor's exposures and capture all variation in expected returns

$E(R_M)$ is the return on the market portfolio

R_{SMB} is the return on a portfolio of small/big capitalisation stocks

R_{HML} is the return on a portfolio of high/low B/M stocks (i.e., book value to market value)

e_i is a zero-mean residual term

[3] SMB, small minus big, represents the difference between the return on a portfolio of small stocks and a portfolio of large stocks. HML, high minus low, represents the difference between the return on a portfolio of high book-to-market stocks and a portfolio of low book-to-market stocks (Fama and French, 1996).

Fama and French (1993) concluded that the three-factor model is a good model for the returns on portfolios formed based on firm market capitalisation and book-to-market ratios. The model was effective in explaining the strong patterns of stock returns observed when portfolios were formed on earnings/price, cash flow/price, etc. However, while the reversal of long-term returns identified by De Bondt and Thaler (1985) were captured, the three-factor model could not explain the continuation of short-term returns as outlined by Asness (1995). Carhart (1997) attempted to remedy this flaw by adding a fourth factor to the Fama and French (1993) three-factor model. The momentum factor was developed by testing stocks (or portfolios) which exhibited positive returns over the past twelve months and comparing them to stocks (or portfolios) which exhibited negative returns over the past twelve months. This was done to capture the effects of the one-year momentum anomaly identified by Jegadeesh and Titman (1993). The Carhart four-factor model is stated as follows:

$$E(R_i) - R_f = \alpha_i + \beta_i\left[E(R_M) - R_f\right] + s_i R_{SMB} + h_i R_{HML} + p_i R_{RMW} + \epsilon_i \quad (2.3)$$

Where:

$E(R_i)$ is the expected return on a security or portfolio i

R_f is the risk-free return

α_i is the intercept in Equation 2.3 is equal to zero for securities and portfolios i

β_i, s_i, and h_i represent each factor's exposures and capture all variation in expected returns

$E(R_M)$ is the return on the market portfolio

R_{SMB} is the return on a portfolio of small/big capitalisation stocks

R_{HML} is the return on a portfolio of high/low B/M stocks (i.e., book value to market value)

R_{RMW} is the return on a portfolio of robust/weak profitability stocks

e_i is a zero-mean residual term

For the sake of consistency, R_{RMW} is used in this document to represent the returns captured by the momentum factor across all models which feature it. Carhart (1997) writes the momentum factor specifically as $PR1YR_t$. The Carhart (1997) four-factor model is effective in reducing the average pricing error exhibited by both the CAPM (1964) and the Fama and French (1993) three-factor model. It was shown empirically by Carhart that the four-factor model reduces the mean absolute errors of CAPM and the three-factor model from 0.35 percent and 0.31 percent, respectively, to just 0.14 percent per month. This investigation was performed on the U.S. market by covering all known diversified equity funds from January 1962 to December 1993 (Carhart, 1997). It was also noted that the addition of the momentum factor

eliminated almost all of the patterns in pricing errors, which indicates that it is effective in describing the cross-sectional variation in average stock returns. Carhart reported that if an investor had purchased funds that had performed well over the sample period, and sold funds that had underperformed, they would have realised an outperformance of 8 percent. More than half of this outperformance would have been attributed to market value and momentum, although the momentum's explanatory power decreases significantly after one year as performance experiences mean reversion.

Motivated by the dividend discount model valuation model, Fama and French (2015) introduced the five-factor model, which serves as an extension of the Fama and French (1993) three-factor model. It was noted that the three-factor model missed much of the variation in average returns related to profitability and investment, hence the decision to add these two factors. The profitability factor, also referred to as the Robust Minus Weak (RMW) factor, is defined as the difference in returns between a diversified portfolio of stocks with robust profitability and stocks with weak profitability. Profitability is defined as operating profitability, or more specifically revenue minus cost of goods sold, minus selling, general, and administrative expenses, minus interest expense. The investment factor, also referred to as the Conservative Minus Aggressive (CMA) factor, is defined as the difference in returns between a diversified portfolio of stocks that invest their capital conservatively and stocks that invest their capital aggressively. Both factors' portfolios are sorted similarly to the HML factor, using the NYSE 30^{th} and 70^{th} percentiles as breakpoints to allocate stocks independently to three groups (Fama & French, 2016). The Fama and French (2015) five-factor is mathematically stated in Chapter 4 of this study.

Fama and French (2016) concluded that the five-factor model performs better than the Fama and French (1993) three-factor model for almost all sorting methods examined. Furthermore, companies with positive exposures to both the profitability and investment factors (i.e., companies that generate high profit and invest capital conservatively) experience comparatively lower market beta and lower volatility of returns, while companies with negative exposures to both the profitability and investment factors (i.e., companies that generate low profit and invest capital aggressively) experience comparatively lower predicted returns and higher volatility of returns. A sixth factor representing momentum, which measures the difference between 'winners' and 'losers' with respect to past performance, was added to the five-factor model to test its effectiveness – the regression intercept improved but left a lot of momentum in microcap returns unexplained.

While the Fama and French (2015) five-factor model is still very new, there is literature available comparing its effectiveness to that of the three-factor and four-factor models. In several markets, the Fama and French (2015) five-factor model has outperformed the Carhart (1997) four-factor model and the Fama and French (1993) three-factor model. For examples, Chiah, Chai, Zhong, and Li (2016) tested the effectiveness of the Fama and French (2015) five-factor model on the Australian equity market and found that compared to the Carhart (1997) four-factor model, and the Fama and French (1993) three-factor model, the five-factor model was able to improve overall explanatory power and explain more asset pricing anomalies. However, it was unable to fully explain time-series variations in portfolio returns. Important to note is that despite Fama and French's (2015) conclusion that the HML factor is largely redundant due to its exposures being captured by the exposures of HML to other factors, Chiahh et al. (2016) found that the HML factor retains is explanatory power amongst the newly introduced profitability and investment factors.

Foye (2018) did a comprehensive test of the Fama and French (2015) five-factor model on emerging markets. A sample of 18 countries was used across three different regions, with the five-factor model consistently outperforming the three-factor model in Eastern Europe and Latin America. However, the profitability and investment factors were insignificant in Asia and offered no improvement over the three-factor model. This outcome is supported by Kubota and Takehara (2018) who tested the effectiveness of the five-factor model on the Japanese equity market. Neither the RMW nor CMA factors were statistically significant when conducting generalised method of moments (GMM) tests with the Hansen-Jagannathan distance measure.

2.4. Empirical Research on the Buyback Anomaly

There is sufficient research in developed markets to analyse for the purposes of this study, despite the objective of popular asset pricing models, such as the Fama and French (2015) five-factor model, and the Stambaugh and Yuan (2017) four-factor model, being to attempt to make the buyback anomaly disappear over time. The first study to consider the anomalous price behaviour around open market share repurchases was that of Vermaelen and Lakonishok (1990). 221 share repurchase tender offers of firms listed on the NYSE, AMEX, and OTC between 1962 and 1986, were included in the sample. It was found that purchasing shares before the expiration date of a share repurchase tender offer would, on average, lead to excess returns of more than 9 percent over a period shorter than one week. In analysing the long-term

abnormal returns, both economically and statistically significant excess returns were experienced by firms over a 2-year period following the initial announcement. Positive/upward price drift was discovered and caused by small firms within the sample. In their conclusion, Vermaelen and Lakonishok (1990) found that even without a model to forecast shareholder and managerial behaviours around the initial share repurchase announcement, 75 percent of the trading profit's variation could be explained by a single variable – the market price before the expiration day divided by the tender offer price. Additionally, because the trading strategy was found to be lower risk and simple to implement, the performance of the strategy was inconsistent with an efficient market and therefore implied the validity of a buyback anomaly. If one had to construct a long portfolio consisting of repurchasing firms, a 24 percent abnormal return would have been realised during a 22-month period following the expiration of the repurchase tender offer.

A reason offered for why the anomaly persisted, was that share repurchases had been a rare occurrence during the period. Lastly, price behaviour differed among firms in the sample depending on their size. Small firms experienced negative abnormal returns before the share repurchase and positive abnormal returns after expiration, while large firms experienced positive abnormal returns before the share repurchase and near zero abnormal returns afterwards. This was deemed to imply that repurchases by larger firms were aimed at capital restructuring rather than signalling undervaluation of the firm to the market (Vermaelen & Lakonishok, 1990).

Ikenberry, Lakonishok and Vermaelen (1995) examined the long-term performance of U.S. firms following an open market share repurchase announced in the Wall Street Journal between 1980 and 1990. Despite managers often claiming that share repurchases take place due to market undervaluation, the average market response to an open market share repurchase was only 3.5 percent. This response was deemed to be a small reaction, indicating that either the market appeared to be ignoring undervaluation signals by firms, or that managers were too optimistic of what their firm's share price should have been. The average four-year buy-and-hold abnormal return was measured to be 12.1 percent after the initial share repurchase announcement. However, when combining the average market response to a share repurchase announcement to the long-term excess returns generated, the size of the total undervaluation was approximately 15 percent. This undervaluation was large enough to bolster managers' claims of their firms' shares being mispriced.

While undervaluation is a popular reason for firms choosing to repurchase their own shares, there are other possible reasons. Shares which are repurchased primarily due to undervaluation are expected to experience a larger share price drift following the announcement, even after factoring in the effects of "book-to-market" stock returns. A possible reason for excess returns following a share repurchase announcement could be an unusually high incidence of takeovers. Upward drift may be explained by the takeover premium, where share prices rise because of the probability of a firm being taken over increasing. Value shares with high book-to-market ratios are particularly vulnerable to takeovers since they are attractive to acquiring companies (Ikenberry et al., 1995).

To test whether excess returns may be explained by a takeover premium, Ikenberry, Lakonishok and Vermaelen (1995) examined long-term performance over a period of at least four years following a share repurchase announcement. It was determined that the three-year compounded annual return (CAR) was 13 percent between 1980 and 1988. From this sample, only 84.4% of firms survived and were not taken over by an acquiring company. When focussing on the remaining survivors, the three-year compounded annual returns decrease to 6.7 percent. However, the excess return following a share repurchase announcement is still significant. The same procedure was followed for firms occupying the highest quintile for book-to-market ratio, with the three-year compounded annual returns decreasing from 39.7 percent to 31.6 percent when only survivors were considered. The abnormal return is still extremely positive in this case, thus indicating that takeovers do not seem to explain the excess returns realised because of an open market share repurchase announcement.

With regards to the measurement of performance, the three-factor Fama and French asset pricing model was used. The first factor captured abnormal return of a value-weighted portfolio comprising of NYSE, ASE, and NASDAQ shares. The second factor (i.e., the size factor) captured the difference in returns of small firms in the value-weighted portfolio and the returns of large firms in the value-weighted portfolio. The cut-off for determining the size of a firm was whether market equity was above or below that of the median NYSE stock. The third factor (i.e., the "book-to-market" factor) captured the difference in returns of firms in the value-weighted portfolio that were ranked in the top 30 percent of NYSE stock in terms of book-to-market ratios, and the firms in the value-weighted portfolio that were ranked in bottom 30 percent. A time series of monthly returns in calendar-time was formed, where firms were "bought" at the end of the month in which a share repurchase announcement was made and

held in the portfolio for three years, with rebalances and additions/omissions being made throughout the 1980 to 1990 period (Ikenberry et al., 1995).

However, more recent studies have challenged the hypothesis that the buyback anomaly does not survive various asset pricing models that predict expected stock return. Using the most recent available data at the time of the study, Peyer and Vermaelen's (2009) findings rejected the hypothesis that buyback anomalies first reported by Lakonishok and Vermaelen (1990), and Ikenberry, Lakonishok and Vermaelen (1995) have disappeared over time. There were significant long-term abnormal returns following open market share repurchase announcements for a 48-month period post-announcement, during the period 1991 to 2001. The average abnormal return was approximately 9 percent when trading around the expiration date of fixed price tender offers in the short-term. This presented the groundwork for various trading strategies around buyback announcements as the anomalies were shown to persist for a 25-year period.

In determining the reason for the persistence of the anomaly, strong support was found for the overreaction hypothesis, which states that significant positive long-term abnormal returns are realised when a share repurchase announcement is made following a large decline in a firm's share price during the previous six-month period. Another possible explanation is that analysts tend to be overly negative on the prospects of "beaten down" firms. It is argued that the decision to conduct a share repurchase is a critique of analyst's views on firm performance, hence the need to signal undervaluation to the market. The buyback anomaly prevails the most in smaller firms which do not receive much attention from analysts. Analysts pay more attention to larger firms, hence the market's overreaction to analyst stock downgrades – the average stock price reaction of large firms was found to be approximately -10 percent before share repurchase announcements being made.

Lastly, Evgeniou et al. (2018) tested whether the buyback anomaly survives when using the five-factor Fama and French (2015) and the four-factor Stambaugh and Yuan (2017) models, whilst analysing the relationship between the anomaly and share price volatility. Their findings were that open market share repurchase announcements are followed by positive long-term abnormal returns which are positively related to share price volatility. The asset pricing models used in the study were updated and despite considering Secondary Equity Offerings (SEO) announcements over the period 1985 to 2015, the longest examined period yet, the result was as before - the buyback anomaly persisted and exhibited positive excess returns following a

repurchase announcement. This finding is relevant in the context of Fama and French's (2015) claim that their five-factor model explains the buyback anomaly, thus leading to its disappearance over time. However, Evgeniou et al. (2018) finds that the asset pricing models of both Fama and French (2015) and Stambaugh and Yuan (2017) explain the equity issuance anomaly[4], but not the buyback anomaly.

Not only is the buyback anomaly unexplained by both models, but it is also persistent over the period and has not declined in recent years (since the last few studies on the anomaly were conducted). The reason for this is that Fama and French (2015) pool buybacks and equity issues in a single "net issues" measure. As mentioned previously, this ignores two key differences between repurchases and equity issuances. Firstly, a share repurchase creates the option for a firm to buy back shares where the seller is unaware that they are participating in the repurchase programme. In a share equity issuance, however, the investor is aware that they are purchasing shares from the firm. Therefore, it is easier for the firm to repurchase shares that are undervalued that it would be to issue shares that are overvalued. Secondly, a firm deciding to issue shares which are overvalued might adversely affect shareholder relations and deter them from buying new shares through a secondary offering. (Evgeniou et al., 2018).

The Fama and French (2015) five-factor model was deemed to be superior to the four-factor model in capturing abnormal returns 48 months after a share repurchase announcement, producing statistically significant (at the 1 percent level) excess returns of 0.21 percent per month versus 0.31 percent per month when using the four-factor Stambaugh and Yuan (2017) model. Peyer and Vermaelen (2009) confirmed that long-term abnormal returns were negatively related to firm size, and market-to-book ratio. Evgeniou et al. (2018) summarises these findings by constructing an Undervaluation Index, which allows for the effect of undervaluation on the predictability of excess returns after open market share repurchase announcements to be determined.

2.5. Research on Share Buybacks in South Africa

South African research on share buybacks in general, and the buyback anomaly in particular, is sparse. Thus, Wesson et al. (2014) investigated the market underreaction to open market share repurchases on the JSE between 1 July 1999 to 2009, using 195 open market share repurchases and the Ward and Muller (2010) control portfolio event study method. An event

[4] According to Fama and French (2016), average returns tend to be low after a company issues shares. This is identified as the equity issue anomaly by Evgeniou et al. (2018)

window of 60 trading days before the share repurchase announcement (i.e., approximately three months) was used, and an event window of 720 trading days (approximately three years) was used after the share repurchase announcement. It was discovered that during the examined period, a positive abnormal return of 35% was realised after around two years following share repurchase announcements, with most of the positive excess returns being attributable to value shares.

However, while this study was effective in concluding that abnormal returns can be realised through trading long on shares of repurchasing companies following an announcement, it only covered the approximately ten years up to 2009 and is therefore now fairly dated. Additionally, a 12-parameter "style" model was used in the study. Given that the five-factor Fama and French (2015) model was only introduced subsequently and claimed to cause the buyback anomaly to disappear in selected international markets over time, it appears justified to revisit this topic in the South African context. According to Steenkamp and Wesson (2020), post-recession share repurchase activity in South Africa has increased, hence the relevance of further studies on the buyback anomaly.

Additionally, research has been conducted on South African open market share repurchases from an accounting perspective. For instance, Wesson et al. (2018) investigated the determinants of the choice between share repurchases and dividend payments. This study was conducted in response to the increased share repurchase activity and asked whether the positive share price effect of a repurchase announcement has influenced firms to repurchase shares rather than pay a dividend or invest in future growth opportunities. Factors which proved to be significant in determining the choice that South African firms make between dividend payments and share buybacks included shareholder heterogeneity, the size of the distribution/repurchase, and the degree to which the firm was undervalued[5]. Importantly, short-term share price manipulation was not found to be a significant factor in determining which method of pay-out was chosen.

An interesting expansion of South African research on share repurchases was conducted by Steenkamp (2020), who investigated the relationship between open market share repurchases and share-based remuneration of executive directors of South African listed companies. Evidence was found that South African executives may be conducting share repurchases to

[5] Companies are assumed to experience a high degree of undervaluation if they prefer a fixed-price tender offer over an open market share repurchase to send a reliable signal to the market of the true value of their shares (Wesson et al., 2018).

increase the value of their remuneration (which takes the form of company share call-options), rather than to act in the best interests of shareholders and maximise firm value. It was recommended that regulators improve disclosure requirements of share repurchases, as well as share-option remuneration of executives and the effects of such. Furthermore, the JSE was advised to announce all share repurchase activity in real time, as they occur (similarly to that of other markets).

2.6. Undervaluation and Risk-Adjusted Performance

A share repurchase is often described as a signalling device used by a firm's managers to inform investors that a company's shares may be undervalued (D'Mello and Shroff, 2000). Peyer and Vermaelen (2009) support this theory by suggesting that undervaluation is the primary driver of abnormal buy-and-hold returns following a share repurchase. A share is generally considered to be undervalued if the intrinsic value of its fundamentals is greater than its current market price. However, there are multiple methods of determining whether a stock is truly undervalued. When investigating the determinants of the choice between conducting a share repurchase or a dividend pay-out, Wesson et al. (2018) theorised that an undervalued company would be expected to prefer a fixed-price tender offer over an open market share repurchase to send a reliable signal to the market of the true value of its shares, hence using this as a proxy for undervaluation.

It is also possible to use an earnings-based valuation model to determine a share's intrinsic value. D'Mello and Shroff (2000) tested whether companies that repurchase their stock through fixed-price tender offers are undervalued relative to their "economic value" (EV). EV was calculated by combining a company's book value and its discounted future abnormal earnings. This approach assumes that managers have perfect foresight when making forecasts of future earnings. It was found that 74 percent of the repurchasing firms in the sample where undervalued, while just 51 percent of the non-repurchasing firms in the control sample were undervalued. The sample consisted of 166 fixed-priced self-tender offers announced and completed by firms listed on the NYSE, AMEX, and NASDAQ during the period 1970 to 1989. However, this method simply classified firms as undervalued if their EV exceeded their market value, and as overvalued if their market value exceeded their EV. It was unclear whether a specific share repurchase by a company was undervalued relative to the overall market at the time of the share repurchase announcement.

Peyer and Vermaelen (2009) found strong support for the overreaction hypothesis, with stocks experiencing the most significant positive long-run excess returns if a share repurchase announcement was triggered by a severe decline in stock price during the previous six months. This was particularly evident in the case of small-cap equities compared to large-cap equities. This is primarily due to fewer analysts following small-cap equities and investors relying heavily on ratings – when overly pessimistic analysts downgrade a stock's rating, the market will overreact to the news thus contributing to the degree of undervaluation. To measure the degree of undervaluation, an Undervaluation Index (U-Index) was constructed to determine whether combining prior return, motivation, book-to-market ratio, and size into a single measure might be better at identifying undervalued firms than simply using prior return. This was achieved by dividing up the market into quintiles and assigning each repurchasing company with a score ranging from 1 to 5 for each variable. The score for each individual variable was summed to calculate the total U-Index score. The variables used in the development of the U-Index included the book-to-market ratio, market capitalisation, prior raw returns[6], and the firm's motivation at the time of the share repurchase announcement. Company share repurchases were then classified as either High or Low U-Index based on their total score, allowing for highly undervalued shares at the time of a share repurchase announcement to be collated (Peyer & Vermaelen, 2009).

2.7. Conclusion to the Literature Review

In conclusion, this study investigates whether the buyback anomaly survives on the Johannesburg Stock Exchange following a share repurchase announcement. This serves as a test of market efficiency, and whether the asset pricing model selected can accurately predict expected returns. The primary drivers of a stock's undervaluation were discussed in this chapter, including signalling, share-based remuneration schemes, takeover defence, and degree of leverage. The efficient market hypothesis was unpacked to explain what makes a market efficient or inefficient. Finally, relevant asset pricing models and the various methods of determining whether a stock is undervalued were expanded and compared. The next chapter will discuss the nature of the sample and data used in this study.

[6] Prior raw returns is defined as the 11-month return of a stock from 12 months prior to the announcement until 1 month prior to the announcement (Peyer and Vermaelen, 2009)

Chapter 3 – Sample and Data

This chapter discusses the sample and data used in this study. These are common to both of the empirical investigations that constitute this study, namely the event study component, and Undervaluation Index analyses, as described in Chapters 4 and 5, respectively.

3.1. Sample

The Financial Times Stock Exchange/Johannesburg Stock Exchange (FTSE/JSE) All-Share Index (ALSI) was used as a representation of the South African capital market, since it represents approximately 99 percent of the full market capitalisation of all ordinary securities listed on the mainboard of the JSE (FTSE Russell, 2022). The sample used in this study consisted of South African companies listed on the Johannesburg Stock Exchange (JSE) over the period January 2003 to December 2021. The period was selected due to data availability constraints that will be discussed later in this chapter.

ALSI-listed companies that conducted at least one open market share repurchase over the sample period were identified using the JSE Stock Exchange News Service (SENS) and the Bloomberg database to create a dataset of open market share repurchasing companies. A limitation of this study in terms of data collection is that the JSE Listing Requirements requires that only open market share repurchases which represent three or more percent (cumulative) of the relevant class of securities being repurchased have to be announced via SENS (JSE, 2017). This "three percent rule" means that smaller repurchases will be difficult to find announcements for, thus contributing to a dataset which is not as comprehensive as those constructed in developed markets such as the U.S

The following key words were used to help in searching for only open market share repurchase announcements made by publicly listed companies over the period January 2003 to December 2021:

Headings:

- Include: 'repurchase', 'buyback', 'buy-back', 'buy back'
- Exclude: 'update', 'notice'

Entire article (including headings):

- Include: ‘repurchase programme’, ‘repurchase program’, ‘buyback programme’, ‘buyback program’, ‘buy-back programme’, ‘buy-back program’
- Exclude: ‘financial statement’, ‘financial results’

Based on these parameters, Bloomberg generated a list of public open market share repurchase announcements made on SENS over the investigation period. Because share repurchase announcements are generally not standardised and vary in presentation and format between companies and over time, the data is classified as unstructured data and needed to be sorted through and extracted manually. The date that the open market share repurchase announcement was published via SENS was used as the event date in the event study, as this is when the information is publicly disseminated. In total, 454 open market share repurchases were identified across 160 listed companies between 1 January 2003 and 31 December 2021 (see Appendix 4a and Appendix 5). Of this total, 96 share repurchases were announced by 38 companies that were, or are currently, listed on the Alternative Exchange (AltX).

The AltX is a division of the Johannesburg Stock Exchange (JSE) which allows small- and medium-sized companies the opportunity to grow and access capital despite having a small market capitalisation, making them ineligible to list on the JSE main board (Scholtz, 2015). Compared to firms that are listed on the JSE main board, AltX companies are smaller, less liquid, and are subject to different risk exposures. Additionally, it was not possible to gain access to a list of both past and present AltX members. This was an issue when constructing the Undervaluation Index for this study, as it required that all listed companies be a part of the quintile calculation process, which will be covered in greater detail in Chapter 5. As a result, all companies that currently are, or have in the past been, listed on the AltX were removed from the sample and hence did not form part of this investigation.

The following was done to identify which listed companies have yet to list on the JSE main board during the period 1 January 2003 to 31 December 2021 without the use of an official AltX membership database: Refinitiv Eikon was used to collect data on all companies which joined or left the FTSE/JSE All-Share Index between 2002 and 2022. This data was merged, and duplicates were removed to account for repeat relisting and delisting, resulting in a list of companies that were listed on the ALSI between 2002 and 2022. Any companies which were identified via SENS as having conducted a share repurchase between 1 January 2003 and 30 June 2022 that did not also reflect in the list of ALSI-listed companies were assumed to be listed on the AltX, as a company would need to be listed (i.e., a public company) in some capacity in order to make a share repurchase announcement via SENS.

Some companies were identified to be serial share repurchasers (i.e., they announced multiple open market share repurchases within a period of a single calendar year). This could possibly bias the study since a company's stock price may be biased upwards by the original share repurchase announcement during the event window period of a follow-on open market share repurchase announcement. To determine whether this would affect the results of the study, an additional subsample was created by removing all share repurchase announcement events falling within one calendar year of a share repurchase announcement made by the same company. This also allowed for a fairer comparison between companies which regularly announce share repurchases and companies which rarely announce share repurchases.

Finally, some share repurchases were excluded from the total sample due to insufficient price data to cover the full event window period, or missing data required to calculate the factor model loadings required for the event study, as discussed in more detail in Chapter 4. Specifically, the factor model loadings were calculated over the period -240 trading days up to -61 trading days. The factor model loadings are then held constant for the duration of the event window period. Furthermore, this study examines the excess returns generated by holding shares following the announcement of an open market share repurchase for up to 720 trading days post the event date. This means that share repurchases announced within the last three years were removed from the total sample due to insufficient share price data being available to allow for the above post-event period.

The final sample of open market share repurchases announced by publicly listed companies on the JSE was 298 events for 250 trading days, and 233 events for 720 trading days. When adjusting for multiple share repurchases announced within a single calendar year by a single company, the sample size reduced to 192 events for 250 trading days, and 154 for 720 trading days, respectively. This is relatively small compared to studies conducted in developed markets such as the United States. For example, Evgeniou et al (2018) was able to examine U.S. share repurchases from 1985 to 2015 and had a final sample size of 11,327 share repurchases using the SDC Repurchases database and screening for various parameters such as the primary stock exchange either being the NYSE, NASDAQ, or AMEX. However, South Africa is a much smaller, developing market, where share repurchases have only been allowed since 1999. Furthermore, Wesson et al. (2014) had a sample of 195 South African share repurchase announcements over the period 1999 to 2009, which is more comparable to the final sample size used for this study.

3.2. Data

The data for this study was obtained from three sources, namely Refinitiv Eikon, Peresec, and Bloomberg.

The daily portfolio factor returns for the Fama and French (2015) five-factor model were obtained from Peresec's South African Factor Data Library. Peresec is a financial services provider with a presence in both South Africa and Guernsey. Monthly portfolio factor returns are available on Peresec's website for both long portfolios and long/short portfolios for various factor models from 1 January 2003 onwards, but daily data had to be obtained from Peresec on request. The underlying stock universe used by Peresec consists of all FTSE/JSE ALSI constituents at each month from January 1996 to the present day. Due to severe fundamental data limitations, Peresec only publishes factor returns from December 2002 onwards, hence this study's period of investigation commences from 1 January 2003. Since the factor model loadings were calculated over the period -240 trading days to -61 trading days, all share repurchases announced during the year 2003 were eliminated from the sample.

The following definitions apply to the Fama and French (2015) five factor data as supplied by Peresec:

1. *Market* is defined as the total return of the ALSI minus the 3-month Negotiable Certificate of Deposit (NCD) rate.
2. *Size* is defined as the market capitalisation value of the stock as at the end of the previous month (Fama & French, 1993).
3. *Value* is defined as the ratio of book value to market value. This ratio is calculated by taking the most recent book value from six months prior to the current month and dividing it by the market value as at the end of the previous month. Peresec notes that while this differs slightly from Fama and French (1993), the change is in line with Asness and Frazzini (2013).
4. *Momentum* is defined as the prior twelve-month total stock return, less the prior month's return to account for any short-term reversal effects (Carhart, 1997)
5. *Profitability* is defined as the ratio of operating profit (i.e., total revenue, net of sales and other expenses) to the most recent book value for the previous year (Fama & French, 2015)
6. *Investment* is defined as the relative growth in total assets six months prior to the current month (Fama & French, 2015)

With regards to the sorting methodology used to create the long/short factors, Peresec outlines their process in a Microsoft Excel workbook available on their website under *Readme*[7]. The Full ALSI Universe Long-Short Factors were used for this study.

Peresec outlines the constraints with regards to using long/short factors versus long-only factors in their 2016 publication, *Factor Investing in South Africa*. The most pertinent of these is the fact that many investors might be unable to short sell assets as they wish or at all. This is addressed in the construction of long-only factors, which accounts for the asset "investability" of the underlying factor portfolios. However, because Peresec's long-only factors contain residual market risk by construction, and do not have the same theoretical basis as the long/short factors, the long/short portfolio returns were decidedly used for this event study. Additionally, Peresec's factor portfolio returns can either be equal-weighted or cap-weighted. In the case of the dataset provided by Peresec, the scale of the momentum factor is significantly larger than any of the other factors, including the market factor. Historically, the largest ten stocks listed on the ALSI have accounted for nearly 60% of the index's total value. As a result, there is a significant momentum tilt, thus suggesting that the equal-weighted portfolio returns are more diversified. Furthermore, momentum related portfolio rebalances occur on a monthly basis and thus a large proportion of the returns could be eroded due to high turnover costs (Peresec, 2016).

The total return index values for all of the companies that conducted an open market share repurchase announcement between January 2003 and December 2021 was obtained from Bloomberg. The total return index value was also required for the FTSE/JSE ALSI to make use of the CAPM as a test of robustness. For constructing the quintile values for Peyer and Vermaelen's U-Index (see Chapter 5), daily market capitalisation and book-to-market values are required for every company listed on the JSE ALSI over the investigation period. These were similarly obtained from the Bloomberg database. Refinitiv Eikon was used to get the risk-free rate, which in this study was the daily short-term fixed-interest index (Stefi), as well as to obtain a list of all companies that left of joined the ALSI over the period. These lists were the combined with all currently listed ALSI constituents and duplicates eliminated, which established a master list of all companies listed on the ALSI at any point in time since 2002. Table 3.1 below summarises the data and sources thereof as used in this study.

[7] Peresec's website: https://www.peresec.com/insights/

Table 3.1 Data Summary

Data Element	**Source**	**Description**
Company Total Return Index	Bloomberg	Daily total return index value for each company in the sample
ALSI Total Return Index	Bloomberg	Daily change total return index value for the ALSI
STEFI	Refinitiv Eikon	Daily STEFI value for the risk-free rate
Market Factor	Peresec	Daily FTSE/JSE ALSI returns less the daily equivalent change in the 3-month NCD rate
Size Factor	Peresec	Daily average outperformance of small versus big companies
Value Factor	Peresec	Daily average outperformance of high versus low book-to-market value companies
Profitability Factor	Peresec	Daily average outperformance of robust profiting companies versus weak profiting companies
Investment Factor	Peresec	Daily average outperformance of companies that invest capital conservatively versus aggressively
Market Capitalisation	Bloomberg	Daily value of a company's outstanding shares multiplied by its share price
Book-to-Market Ratio	Bloomberg	Daily ratio of a company's book value to its market value

Chapter 4 that follows explains the methodology used when testing for survival of the buyback anomaly using the Fama and French (2015) five-factor model on the Johannesburg Stock Exchange. Furthermore, the results from the event study are reported and discussed in detail.

Chapter 4 – The Buyback Anomaly: Methodology, Results and Analysis

This chapter covers the methodology followed in conducting an event study around the buyback anomaly. This study followed a standard event study methodology as per Binder (1998). There were various subsamples that were tested, namely a set of two subsamples using the total sample, and another set of two subsamples using a constrained sample where each repurchasing company is limited to a single share repurchase announcement within a period of a calendar year. Each of the two subsamples within a set look at a different time period following a share repurchase announcement, namely 250 trading days and 720 trading days, respectively. This was done so that the effects of a share repurchase announcement on cumulative average abnormal returns (CAARs) may examined over the very short-term (around the announcement date), the medium-term (up to 250 trading days following), and the long-term (up to 720 trading days following). Furthermore, the results of this event study , as well as their implications, both theoretical and practical, are discussed.

4.1. Methodology

The short- and long-term effects of share repurchase announcements of JSE-listed companies on abnormal returns was investigated using standard event study methodology as outlined by Binder (1998). A key requirement of an event study is that the benchmark against which excess returns are measured is reliable. In view of this, the Fama and French (2015) five-factor model was selected for use in this study. Excess returns are examined from 60 days before an open market share repurchase is announced to 720 trading days following the initiation of the event. This is in-line with Wesson, Ward, and Muller (2014) so that comparisons can be made between the Fama and French (2015) five-factor model and their model which uses 12 control portfolios as per Ward and Muller (2010). The CAPM was used as a robustness test when calculating CAARs for each repurchasing company across all the event studies conducted (Appendix 3).

Since the development of the Fama and French (1993) three-factor model, many authors, including Evgeniou et al. (2018), have suggested that the three-factor model and the four-factor model may not be adequate in explaining the variation in the cross-section of share returns. Thus, the Fama and French (2015) five-factor model introduced new factors for firm profitability and level of investment. According to Flint et al. (2016), the justification for the five-factor models stems from the bottom-up dividend discount model, rather than arbitrage pricing theory (APT), on which the three-factor and four-factor models are based. It is

suggested that expected share returns are based on three variables, namely the book-to-market ratio, expected earnings, and expected growth in book equity. The Fama and French (2015) five-factor model is shown by the following equation,

$$R_{it} - R_{ft} = \alpha_i + \beta_i\left(R_{Mt} - R_{ft}\right) + s_i R_{SMB_t} + h_i R_{HML_t} + r_i R_{RMW_t} + c_i R_{CMA_t} + e_{it} \qquad (4.1)$$

Where:

- R_{it} is the return on a security or portfolio i for period t
- R_{ft} is the risk-free return
- α_i is the intercept in (4.1) and is equal to zero for securities and portfolios i
- β_i, s_i, h_i, r_i, and c_i represent each factor's exposures and capture all variation in expected returns
- R_{Mt} is the return on the market portfolio
- R_{SMB_t} is the return on a long/short portfolio of small/big capitalisation stocks
- R_{HML_t} is the return on a long/short portfolio of high/low B/M stocks (i.e., book value to market value)
- R_{RMW_t} is the return on a long/short portfolio of robust/weak profitability stocks
- R_{CMA_t} is the return on a long/short portfolio of conservatively/aggressively invested stocks
- e_{it} is a zero-mean residual term

Daily total return index values were obtained from the Bloomberg database for each stock in the sample. The daily change in total return index values were calculated as a percentage for each repurchasing company's shares using Equation 4.2,

$$R_{it} = \log\left[\frac{P_{it}}{P_{it-1}}\right] \qquad (4.2)$$

Where:

R_{it} is the total return percentage for share i for day t; and
P_{it} is the total return index value for share i for day t; and
P_{it-1} is the total return index value for share i for day $t-1$

The short-term fixed-interest index (Stefi) was used as the risk-free rate. The Stefi is based on an overnight call deposit index, and the three-, six-, and twelve-month NCD indices. The daily change in the Stefi was calculated as a percentage using Equation 4.2.

The factor loadings represent the beta coefficients of each explanatory variable in the multiple linear regression, which in this case is the Fama and French (2015) five-factor model. The factor loadings were calculated by regressing the daily market, size, value, profitability, and investability factor portfolio returns on each company's daily total return less the daily risk-free rate (i.e., the Stefi) starting from 240 trading days prior to the announcement date, up to 61 trading days prior to the announcement date. It is assumed that each factor exposure would remain constant for the duration of the share repurchase event window for each individual share buyback.

The estimator of the daily abnormal returns using the Fama and French (2015) five-factor model is defined as,

$$AR_{it} = (R_{it} - R_f) - \beta_i\left(R_{Mt} - R_{ft}\right) + s_i R_{SMB_t} + h_i R_{HML_t} + r_i R_{RMW_t} + c_i R_{CMA_t} \qquad (4.3)$$

Where:

- AR_{it} is the daily abnormal return of share i for time t
- R_{it} is the actual daily total return of share i for time t
- R_f is the risk-free rate for time t
- β_i, s_i, h_i, r_i, and c_i represent each factor's exposures and capture all variation in expected returns
- R_{Mt} is the *market* factor daily return for time t
- R_{SMB_t} is the *size* factor daily return for time t
- R_{HML_t} is the *value* factor daily return for time t
- R_{RMW_t} is the *profitability* factor daily return for time t
- R_{CMA_t} is the *investability* factor daily return for time t

Reference labels were used to help extract the correct daily values for both explanatory and explained variables from a reference data worksheet in Microsoft (MS) Excel for use in the calculation of daily abnormal returns. The daily abnormal returns for each company share repurchase were then transported to another worksheet via an Excel Macro function (see Appendix 1a for the relevant code). As per Binder's (1998) methodology, all the share repurchase events were then lined up to the same event window period from 60 trading days prior to both 250 trading days and 720 trading days following the announcement date, respectively. The estimator of the daily average abnormal returns (AARs) is defined as:

$$AAR_s = \sum_{i=1}^{N_s} \frac{AR_{is}}{N_s} \quad (4.4)$$

Where:

- AAR_s is the daily average abnormal return of all shares in the sample for time t
- AR_{is} is the daily abnormal return of all shares in the sample for time t

N_s is the number of shares in the sample for time tThe estimator of the daily cumulative average abnormal returns (CAARs) is defined as:

$$CAAR_{S_1,S_2} = \sum_{s=S_1}^{S_2} AAR_s \quad (4.5)$$

Where:

- $CAAR_s$ is the cumulative average abnormal return of all shares in the sample from the start of the event window to time t
- AAR_{is} is the daily average abnormal return of all shares in the sample for time t

CAARs were examined over various periods such as -60 to -2 days, -1 to 1 days (around the announcement date), 2 to 250 days, and 2 to 720 days. When testing for the level of statistical significance, the t-statistic was calculated and compared with the various critical values for alphas of 10%, 5%, and 1%. The standard error for each day in the event window was calculated by simply dividing the daily standard deviation by the square root of the number of share repurchases in the sample. The total standard error (denominator of the t-statistic) over the relevant period where CAAR is being examined was calculated as follows:

$$Total\ Standard\ Error = \sqrt{\sum_{i=S_1}^{S_2} {SE_t}^2} \quad (4.6)$$

Where: ${SE_t}^2$ is the square of the monthly standard errors for the sample at time t

4.2. Results

The results are presented separately for the total sample, and for the "1-year" sample, where the total sample is constrained by restricting each repurchasing company to a single share repurchase announcement in a period of one calendar year. This is to account for potential differences in cumulative average abnormal returns generated by companies that announce many share repurchases per year as opposed to announcing fewer (or one) share repurchase/s per year. Each of these samples are then further subdivided into a 250-day and a 720-day subsample. Each subsample has a different number of observations – the 720-day subsample

has fewer observations than the 250-day subsample, due to there being insufficient price data for later year share repurchases when examining CAARs for approximately three years.

4.2.1. Total sample

The total sample for the 250-trading day analysis consisted of 298 open market share repurchases within the period January 2003 to December 2021. From 60 days to 2 days prior to the share repurchase announcement date, the CAARs generated were a modest 0.25%, with the t-stat of 0.25 failing to surpass the 10% significance level critical value of 1.65. Therefore, the excess returns realised are deemed to be statistically non-significant. Around the share repurchase announcement date (one day prior to one day post announcement), a CAAR of 0.96% was generated with a t-statistic of 3.04, thus indicating that the excess returns realised are statistically significant at the 1% level.

From 2 days to 250 days post announcement, a CAAR of 6.12% was generated with a t-statistic of 2.51, indicating that the excess returns realised were statistically significant at the 5% level, but not at the 1% level. Lastly, throughout the entire event window period a CAAR of 7.33% was generated with a t-statistic of 2.75, indicating that the excess returns realised were statistically significant at the 1% level. The CAPM showed additional CAARs from one day prior to the announcement date onwards, indicating that the five-factor model captured more of the expected returns than the single-factor model in this sample. Table 4.1. shows the Excel output, and Figure 1.1 shows the movement of CAAR for the 250-day subsample over time.

Table 4.1: CAARs for the total sample over 250 trading days following a share repurchase announcement[8].

Table 4.1: Cumulative Average Abnormal Returns (250-Day Sample)					
	All 5F			All CAPM	
	CAAR	*t-stat*	Significance	CAAR	*t-stat*
-60 to -2	0,25%	0,25		-0,17%	-0,17
-1 to 1	0,96%	3,04	***	1,01%	3,19
2 to 250	6,12%	2,51	**	7,57%	3,15
-60 to 250	7,33%	2,75	***	8,41%	3,20
Observations	298			298	

[8]The critical values for the various t-tests conducted in this study are as follows – 1.65 at the 10% (*) significance level, 1.97 at the 5% (**) significance level, and 2.59 at the 1% (***) significance level.

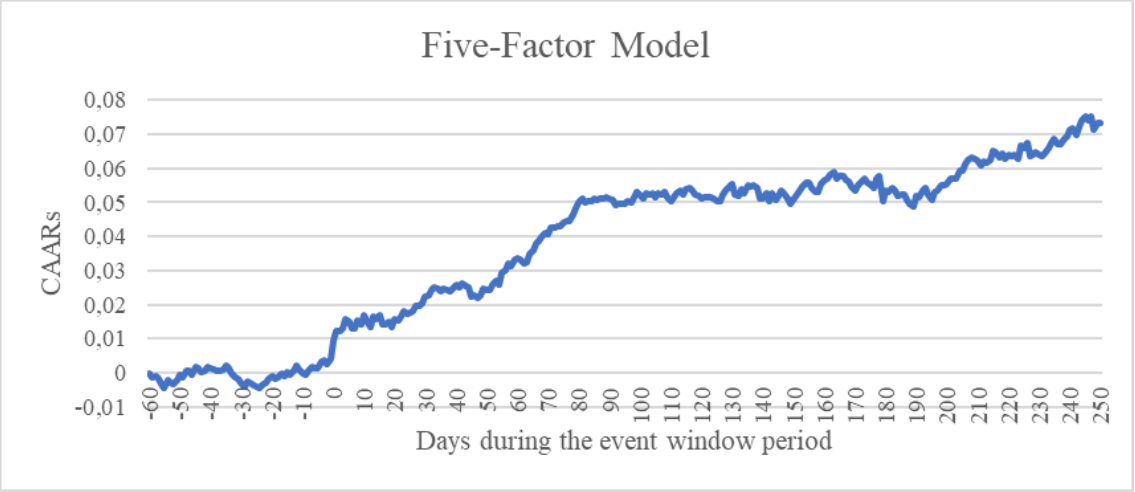


Figure 4.1: Total sample CAARs of the 250-day subsample generated according to the Fama and French (2015) five-factor model.

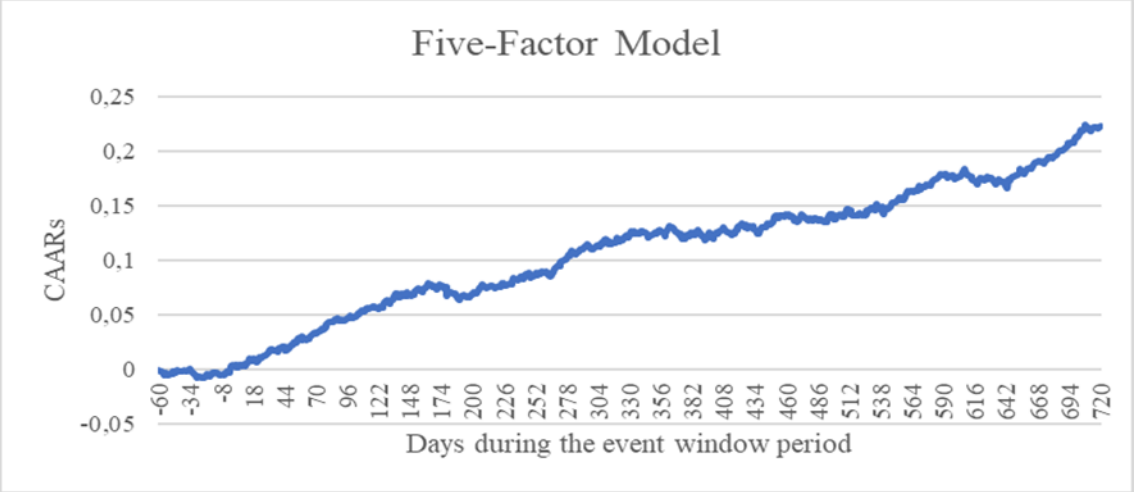
The total sample for the 720-trading day analysis consisted of 233 open market share repurchases within the period January 2003 and December 2021. The CAPM was used as a test of robustness when analysing CAARs according to the Fama and French (2015) five-factor model. From 60 days to 2 days prior to the share repurchase announcement date, the CAARs generated were a modest -0.38%, with the t-stat of -0.36 failing to surpass the 10% significance level critical value of 1.65. Therefore, the excess returns realised are deemed to be statistically non-significant. Around the share repurchase announcement date (one day prior to one day post announcement), a CAAR of 0.72% was generated with a t-statistic of 2.82, thus indicating that the excess returns realised are statistically significant at the 1% level.

From 2 days to 250 days post announcement, a CAAR of 8.14% was generated with a t-statistic of 3.15, thus indicating that the excess returns realised were statistically significant at the 1% level. From 2 days to 720 days post announcement, a CAAR of 21.98% was generated with a t-statistic of 5.07, which indicates that the excess returns realised were statistically significant at the 1% level. Lastly, throughout the entire event window period a CAAR of 22.32% was generated with a t-statistic of 4.99, thus indicating that the excess returns realised were statistically significant at the 1% level. The CAPM showed less CAARs from one day prior to the announcement date onwards, indicating that the five-factor model captured less of the expected returns than the single-factor model in this sample. Table 4.2. shows the output from Excel, and Figure 1.2 shows the movement of CAAR for the 250-day subsample over time.

Table 4.2: CAARs of the total sample over 720 trading days following the share repurchase announcement.

Table 4.2: Cumulative Average Abnormal Returns (720-Day Sample)					
	All 5F			All CAPM	
	CAAR	*t-stat*	Significance	CAAR	*t-stat*
-60 to -2	-0,38%	-0,36		-0,71%	-0,68
-1 to 1	0,72%	2,82	***	0,65%	2,46
2 to 250	8,14%	3,15	***	6,69%	2,61
2 to 720	21,98%	5,07	***	17,57%	6,84
-60 to 720	22,32%	4,99	***	17,50%	6,28
Observations	233			233	

Figure 4.2: Total sample CAARs of the 720-day subsample generated according to the Fama and French (2015) five-factor model.



4.2.2. One-Year Period Subsample

The total sample for the 250-trading day analysis was then constrained by limiting each company to a single share repurchase announcement in a span of a calendar year. The 1-year sample for the 250-trading day analysis consisted of 192 open market share repurchases within the period January 2003 to December 2021. From 60 days to 2 days prior to the share repurchase announcement date, the CAARs generated were a modest -0.39%, with the t-stat of -0.30 failing to surpass the 10% significance level critical value of 1.65. Therefore, the excess returns realised are deemed to be statistically non-significant. Around the share repurchase announcement date (one day prior to one day post announcement), a CAAR of 1.28% was generated with a t-statistic of 2.85, thus indicating that the excess returns realised are statistically significant at the 1% level.

From 2 days to 250 days post announcement, a CAAR of 5.99% was generated with a t-statistic of 1.92, thus indicating that the excess returns realised were statistically significant at the 10% level but not at the 5% level. Lastly, throughout the entire event window period a CAAR of 6.88% was generated with a t-statistic of 2.02, thus indicating that the excess returns realised were statistically significant at the 5% level. The CAPM showed additional CAARs from one day prior to the announcement date onwards, indicating that the five-factor model captured more of the expected returns than the single-factor model in this sample. Table 4.3. shows the output from Excel, and Figure 1.3 shows the movement of CAAR for the 250-day subsample over time.

Table 4.3: CAARs for the constrained 1-year sample over 250 trading days following the share repurchase announcement.

Table 4.3: Cumulative Average Abnormal Returns (250-Day Sample)					
	1-Year 5F			1-Year CAPM	
	CAAR	*t-stat*	Significance	CAAR	*t-stat*
-60 to -2	-0,39%	-0,30		-1,18%	-0,90
-1 to 1	1,28%	2,85	***	1,32%	2,95
2 to 250	5,99%	1,92	*	7,21%	2,33
-60 to 250	6,88%	2,02	**	7,36%	2,17
Observations	192			192	

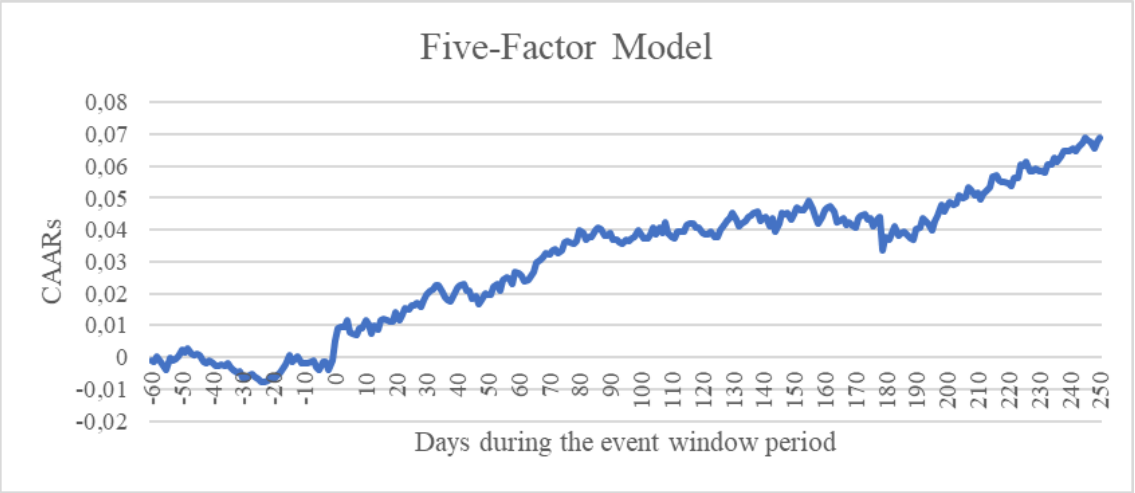


Figure 4.3: 1-year sample CAARs of the 250-day subsample generated according to the Fama and French (2015) five-factor model.

The total sample for the 720-trading day analysis was then constrained by limiting each company to a single share repurchase announcement in a span of a calendar year. The 1-year

sample for the 720-trading day analysis consisted of 154 open market share repurchases within the period January 2003 to December 2021. The CAPM was used as a test of robustness when analysing CAARs according to the Fama and French (2015) five-factor model. From 60 days to 2 days prior to the share repurchase announcement date, the CAARs generated were a modest -1.19%, with the t-stat of -0.91 failing to surpass the 10% significance level critical value of 1.65. Therefore, the excess returns realised are deemed to be statistically non-significant. Around the share repurchase announcement date (one day prior to one day post announcement), a CAAR of 0.87% was generated with a t-statistic of 2.77, thus indicating that the excess returns realised are statistically significant at the 1% level.

From 2 days to 250 days post announcement, a CAAR of 8.07% was generated with a t-statistic of 2.41, thus indicating that the excess returns realised were statistically significant at the 5% level but not at the 1% level. From 2 days to 720 days post announcement, a CAAR of 16.96% was generated with a t-statistic of 3.12, which indicates that the excess returns realised were statistically significant at the 1% level Lastly, throughout the entire event window period a CAAR of 16.64% was generated with a t-statistic of 2.97, thus indicating that the excess returns realised were statistically significant at the 1% level. The CAPM showed lower CAARs from one day prior to the announcement date onwards, indicating that the five-factor model captured less expected returns than the single-factor model in this sample. Table 4.4. shows the output from Excel, and Figure 1.4 shows the movement of CAAR for the 720-day subsample over time.

Table 4.4: CAARs for the constrained 1-year sample over 720 trading days following the share repurchase announcement.

Table 4.4: Cumulative Average Abnormal Returns (720-Day Sample)

	1-Year 5F			1-Year CAPM	
	CAAR	*t-stat*	Significance	CAAR	*t-stat*
-60 to -2	-1,19%	-0,91		-1,20%	-0,92
-1 to 1	0,87%	2,77	***	0,83%	2,60
2 to 250	8,07%	2,41	**	6,24%	1,87
2 to 720	16,96%	3,12	***	13,98%	2,60
-60 to 720	16,64%	2,97	***	13,61%	2,45
Observations	154			154	

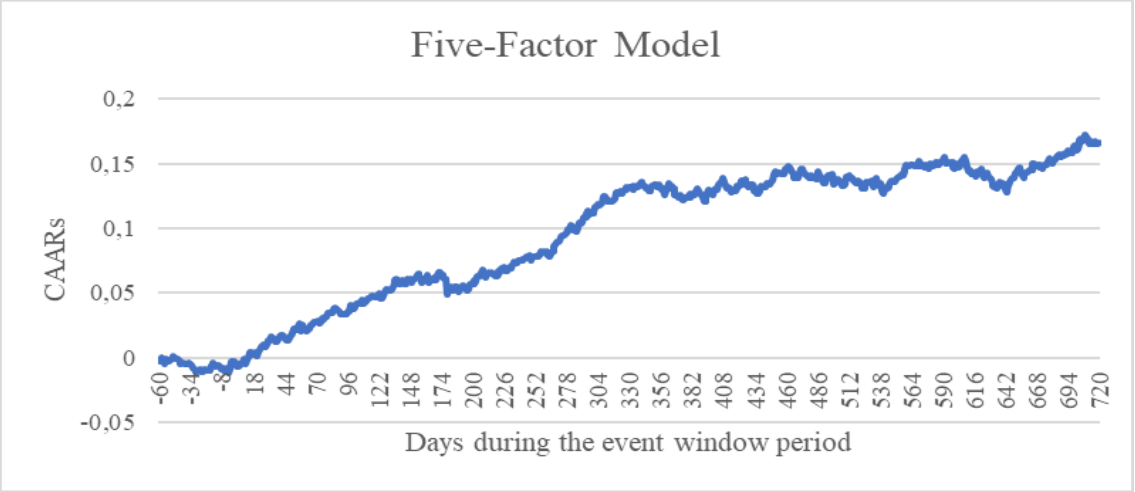


Figure 4.4: 1-year sample CAARs of the 720-day subsample generated according to the Fama and French (2015) five-factor model.

4.2.3. Conclusion

The first research question of this study was whether the buyback anomaly survives the Fama and French (2015) five-factor model on the Johannesburg Stock Exchange. In all of the samples tested, a positive long-term CAAR was generated around and following the share repurchase announcement date. The CAARs of the total sample over 250 and 720 trading days were both statistically significant at the 1% level around the announcement date (one day prior to one day post announcement), and statistically significant at the 1% level throughout the entire event window period (60 days prior to 250 and 720 days post announcement). The CAARs of the one-year sample over 250 and 720 trading days were both statistically significant at the 1% level around the announcement date (one day prior to one day post announcement), and statistically significant at the 5% level throughout the entire event window period for the 250-day subsample, and at the 1% level for the 720-day subsample. The CAARs calculated using the CAPM closely followed the CAARs calculated using the Fama and French (2015) five-factor model, thus indicating that the five-factor was robust throughout the examination process. The CAPM CAARs can be viewed in Appendix 2b. In the case of the FTSE/JSE All Share Index (ALSI), these results indicate that the market is inefficient. Furthermore, these results inform various trading strategies, particularly strategies which involve purchasing repurchasing company stock following the announcement of a share repurchase programme.

Chapter 5 – Undervaluation Index: Methodology and Results

This chapter covers the methodology followed in the second part of this study, consisting of using Peyer and Vermaelen's (2009) Undervaluation Index (U-Index) to create subsamples by sorting share repurchases based on their degree of undervaluation at the time of announcement, and using these as inputs into further event studies. Eight event studies were run, namely a set of four using the total sample, and another set of four using a constrained sample where repurchasing companies were limited to a single share repurchase announcement in a calendar year. Each set covered a different time period following a share repurchase announcement (either 250 or 720 trading days), for both of the U-Index subsamples, namely a "High U-Index" and the "Remaining U-Index" companies, respectively. This was done so that the effects of a share repurchase announcement on cumulative average abnormal returns (CAARs) could be examined over the very short-term (around the announcement date), the medium-term (up to 250 trading days following), and the long-term (up to 720 trading days following), as well as compare share repurchases with high U-Index scores to the remainder of the sample across these periods.

5.1. Methodology

Peyer and Vermaelen's (2009) Undervaluation Index was utilised to identify highly undervalued companies within the total sample as at the event dates, and to compare their CAARs against those of the remaining (non-undervalued) companies. Part of this process involves assigning each company an Undervaluation Score (U-Score) based on various firm-specific characteristics at the date of their share repurchase announcement, sorted against those of all other companies listed on the same stock exchange at that date. The Peyer and Vermaelen (2009) computation of U-Scores involves firstly allocating each company listed on a specific market at a specific date (in this case on each of the share repurchase announcement dates in the sample) into five quintiles for each of four separate characteristics as defined below. The four ranking scores (each between 1 and 5 based on ranks within the five quintiles a company ends up in) are then added to obtain a final undervaluation score that in the original Peyer and Vermaelen (2009) methodology ranged from 4 to 20. The four undervaluation ranking elements and scoring process are as follows:

- Book-to-market (BM) ratio (scores of 1 to 5): the companies with the lowest BM ratios (glamour stocks) are scored a 1, while the companies with the highest BM ratio (value stocks) are scored a 5.

- Size (scores of 1 to 5): the smallest companies are scored as 5, while the largest firms receive a score of 1.
- Prior raw returns (scores 1 to 5): the companies with the lowest prior raw return[9] receive a score of 5, while the companies with the highest prior raw return are scored as 1.
- Motivation (scores of 1, 3 or 5): if a company states that its motivation for repurchasing shares is "undervaluation" or "best use of money", a score of 5 is allocated, but if it states its motivation as "dilution" or "EPS management", it is allocated 1. The remaining companies who fulfil neither of these stipulations receive a 3.

In the original Peyer and Vermaelen (2009) approach, companies with score higher than 15 at the time of the share repurchase, was classified as highly undervalued at that date. All companies with scores lower than 9 were classified as potentially overvalued at the time of the share repurchase. However, because a large proportion of share repurchasing companies do not reveal their motivation for this action publicly or give multiple motivations, Manconi, Peyer and Vermaelen (2013) subsequently removed the motivation component from their U-Score calculation. Evegeniou et al (2018) also removed the motivation score when enhancing the U-Index by combining the latter with idiosyncratic volatility. Further, a manual inspection of press releases available on SENS, revealed that South African companies rarely disclose their motivation for conducting open market share repurchases. The decision was therefore taken to similarly remove the motivation score from the calculation of share repurchase U-Index scores in this study. Each undervaluation ranking element was then subdivided into quintiles, to help assign ranks 1 to 5 to each share repurchase.

In order to do allocate each company into its appropriate quintile per parameter (see Peyer and Vermaelen, 2009), every company that was listed on the FTSE/JSE ALSI at the time of each share repurchase had to be determined. This required compiling a list of all past and present members of the FTSE/JSE ALSI since 2002. Refinitiv Eikon was used to acquire the required data and the following process was followed to determine which companies were listed on the FTSE/JSE ALSI at any point of this study's investigation period:

- The list of all current members of the FTSE/JSE ALSI was obtained.
- The list of all or companies which have joined the FTSE/JSE ALSI since 24 June 2002 was obtained.

[9] Prior raw returns is defined as the 11-month return from 12 months prior to the announcement date up until one month prior to the announcement date.

- The list of all companies which have left the FTSE/JSE ALSI since 24 June 2002 was obtained.
- These lists were then combined, and all duplicates deleted to account for companies which have either joined or left the FTSE/JSE ALSI more than once over the period.

The list thus contained all companies which have ever been listed on the FTSE/JSE ALSI since June 2002. This information was then used to acquire the data to calculate the quintile breakpoints required to assign U-Index scores to each company associated with each individual share repurchase (Appendix 4b). As per Peyer and Vermaelen (2009), three variables were used to compile the U-Index, namely, market capitalisation (size), book-to-market ratio, and prior raw returns (the 11-month total return from 12 months prior to 1 month before the share repurchase announcement date). The four quintile breakpoints for each variable were then calculated for every trading day from 2 January 2003 to 30 June 2022.

There were some complications while attempting to do this, the biggest being the fact that the composition of the FTSE/JSE ALSI changes over time, with companies listing and delisting. When the data was downloaded from a Bloomberg Terminal to Excel, the most recent available datapoint prior to delisting was held constant for the remainder of the period, rather than being left blank. This became an issue when trying to calculate quintile breakpoints for each trading day, as companies that had delisted were being included in the calculation and skewing the output (see Appendix 2b for the Excel Macro that was required to resolve the issue). The list of companies which contains all companies that have ever at any point been listed on the FTSE/JSE ALSI included the dates at which they joined and left the index. If a company left the index, its data would be deleted, and if it joined again, its data would be included in the calculation of the quintile breakpoints. Each datapoint for each variable on each trading day was then given a reference number, thus allowing for each explanatory and explained variable to be correctly matched on each respective trading day.

Due to this study's sample size being significantly smaller than that of Peyer and Vermaelen (2009) and Evgeniou et al (2018), the U-Index breakpoints were adjusted compared to their approach. Thus, in these studies, companies with a U-Index score of more than 10 were defined as "High U-Index", and companies with a U-Index score of less than 6 were defined as "Low U-Index". Because companies can score between a minimum of 3 and a maximum of 15 in the three-factor system, in this study allocation to the various categories was done in a more symmetrical fashion, where companies with a U-Index score of more than 11 were defined as

"High U-Index" companies, and companies with a U-Index score of less than 7 were defined as "Low U-Index" companies. Companies with U-Index scores between these values were classified as "Moderate U-Index" companies. Due to limitations that will be discussed in further detail in Chapter 6 pertaining to insufficient data and small sample size, low and moderate scoring companies were combined to form a sample called "Remaining Companies".

Within the two sets which look at the total sample and the constrained 1-year sample of share repurchases, both the "High U-Index" and the "Remaining U-Index" subsamples were analysed in terms of an event study over 250 trading days and 720 trading days post-announcement, respectively. Each share repurchase from the original CAAR spreadsheet used in the event study conducted in Chapter 4 was colour coded to correctly correspond with whether they were defined as "High U-Index", "and or "Remainder" subsample. In essence, another event study was conducted testing whether excess returns can be generated against the Fama and French (2015) five-factor following a share repurchase announcement. This time, however, a comparison was made between share repurchases classified as "High U-Index" and share repurchases classified as "Remaining U-Index", to see whether additional excess returns can be generated by investing in shares that are highly undervalued according to Peyer and Vermaelen's (2009) U-Index.

5.2. Results

The results are presented separately for the total subsample and the constrained 1-year subsample, for both the "High U-Index" sample and the "Remaining U-Index" sample. Each of these subsamples are then further subdivided into a 250-day and a 720-day subsample. Each subsample has a different number of observations – the 720-day subsample has fewer observations compared to the 250-day subsample, due to there being insufficient price data for later year share repurchases when examining CAARs for approximately three years.

5.2.1. Total sample

For the 250-trading day analysis the "High U-Index" total sample consisted of 63 share repurchases, and the "Remaining U-Index" total sample consisted of 232 share repurchases. From 60 days to 2 days prior to the share repurchase announcement date, the "High U-Index" sample generated an additional 0.07% CAAR compared the "Remaining U-Index" sample, with both t-stats failing to surpass the 10% significance level critical value of 1.67. Therefore, the excess returns realised are deemed to be statistically non-significant. Around the share repurchase announcement date (one day prior to one day post announcement), the "High U-

Index" sample generated an additional 0.42% CAAR compared to the "Remaining U-Index" sample. The "High U-Index" sample's excess returns are statistically significant at the 1% level, while the "Remaining U-Index" sample's excess returns are only significant at the 5% level.

From 2 days to 250 days post announcement, the "High U-Index" sample generated an additional 9.05% CAAR compared the "Remaining U-Index" sample. The "High U-Index" sample's excess returns are statistically non-significant at the 1% level, while the "Remaining U-Index" sample's excess returns failed to surpass the 10% significance level critical value of 1.67. Lastly, throughout the entire event window period the "High U-Index" sample generated an additional 9.54% CAAR compared to the "Remaining U-Index" sample.

The "High U-Index" sample exhibited a t-statistic of 3.44, thus indicating that the excess returns realised were statistically significant at the 1% level. The "Remaining U-Index" sample exhibited a t-stat of 1.71, thus indicating that that the excess returns realised were only statistically significant at the 10% level. Table 5.1. shows the output from Excel, and Figures 1.5 show the movement of CAARs for both the "High U-Index" sample and the "Remaining U-Index" sample over 250 trading days.

Table 5.1: CAARs for the total sample over 250 trading days, comparing "High U-Index" to "Remaining U-Index" share repurchases following a share repurchase announcement. The significance level pertains to the "High U-Index" sample.

Table 5.1: Cumulative Average Abnormal Returns (250-Day Sample)					
	All 5F (High)			All 5F (Remain)	
	CAAR	*t-stat*	Significance	CAAR	*t-stat*
-60 to -2	0,31%	0,17		0,24%	0,20
-1 to 1	1,30%	2,72	***	0,88%	2,32
2 to 250	13,36%	3,42	***	4,31%	1,48
-60 to 250	14,97%	3,44	***	5,43%	1,71
Observations	63			232	

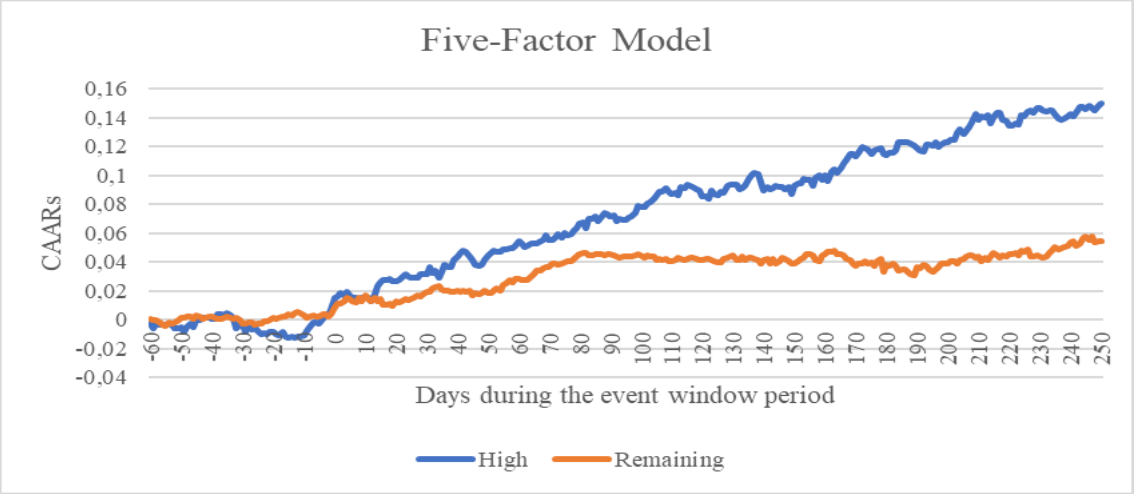


Figure 5.1: Total sample CAARs of the 250-day subsample comparing High U-Index companies with the remaining companies, generated according to the Fama and French (2015) five-factor model.

The "High U-Index" total sample consisted of 59 share repurchases, and the "Remaining U-Index" total sample consisted of 174 share repurchases for the 720-trading day analysis. From 60 days to 2 days prior to the share repurchase announcement date, the "High U-Index" sample generated an additional 0.34% CAAR compared the "Remaining U-Index" sample (although both were negative), with both t-statistics failing to surpass the 10% significance level critical value of 1.65. Therefore, the excess returns realised are deemed to be statistically non-significant. Around the share repurchase announcement date (one day prior to one day post announcement), the "High U-Index" sample generated an additional 0.92% CAAR compared to the "Remaining U-Index" sample. The "High U-Index" sample's excess returns are statistically significant at the 1% level, while the "Remaining U-Index" sample's excess returns are only significant at the 10% level.

From 2 days to 720 days post announcement, the "High U-Index" sample generated an additional 2.64% CAAR compared the "Remaining U-Index" sample. Both the "High U-Index" and the "Remaining U-Index" samples' excess returns are statistically significant at the 1% level. Lastly, throughout the entire event window period the "High U-Index" sample generated an additional 3.92% CAAR compared to the "Remaining U-Index" sample. The "High U-Index" sample exhibited a t-stat of 3.31, thus indicating that the excess returns realised were statistically significant at the 1% level. The "Remaining U-Index" sample exhibited a t-statistic of 3.95, thus indicating that that the excess returns realised were statistically significant at the 1% level. CAARs for the "Remaining U-Index" sample increases significantly after approximately two years, catching up to the total CAAR generated by the "High U-Index" sample. Table 5.2.2 shows the output from Excel, and Figures 1.6 show the movement of

CAARs for both the “High U-Index” sample and the “Remaining U-Index” sample over 720 trading days.

Table 5.2: CAARs for the total sample over 720 trading days, comparing “High U-Index” to “Remaining U-Index” share repurchases following a share repurchase announcement. The significance level pertains to the “High U-Index” sample.

Table 5.2: Cumulative Average Abnormal Returns (720-Day Sample)					
	All 5F (High)			All 5F (Remain)	
	CAAR	*t-stat*	Significance	CAAR	*t-stat*
-60 to -2	-0,13%	-0,07		-0,47%	-0,37
-1 to 1	1,41%	2,81	***	0,49%	1,64
2 to 250	13,49%	3,38	***	6,33%	1,99
2 to 720	23,95%	3,25	***	21,31%	4,07
-60 to 720	25,24%	3,31	***	21,32%	3,95
Observations	59			174	

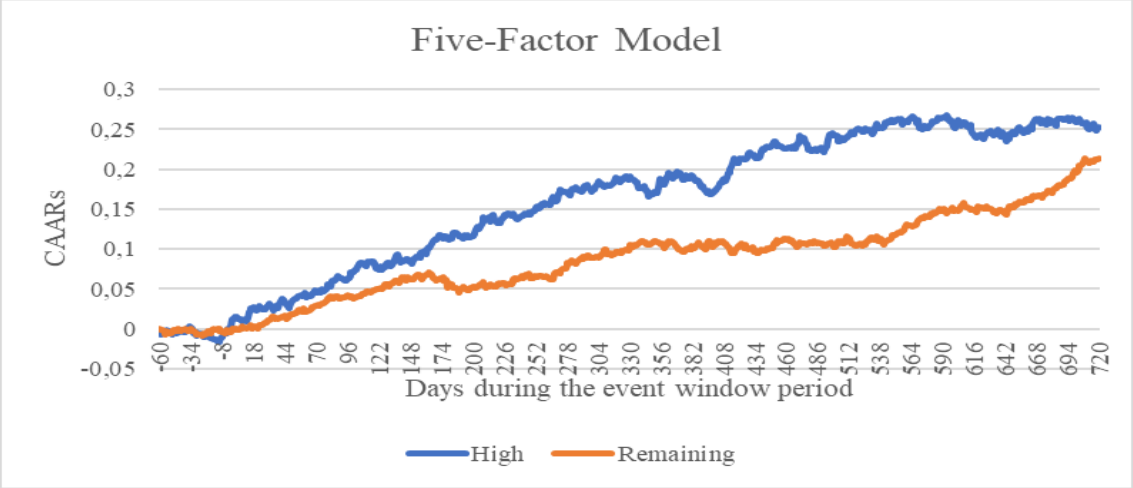


Figure 5.2: Total sample CAARs of the 720-day subsample comparing High U-Index companies with the remaining companies, generated according to the Fama and French (2015) five-factor model.

5.2.2. Constrained One-Year Period Subsample

The total sample for the 250-trading day analysis was then constrained by limiting each company to a single share repurchase announcement in a span of a calendar year. The “High U-Index” 1-year sample for the 250-trading day analysis consisted of 40 open market share repurchases within the period January 2003 and December 2021. The “Remaining U-Index” 1-year sample for the 250-trading day analysis consisted of 151 open market share repurchases. From 60 days to 2 days prior to the share repurchase announcement date, the CAARs generated by the “High U-Index” sample were worse than the “Remaining U-Index” sample with a

modest figure of -2.10%. Neither sample was significant at the 10% level, with the t-statistics of –0.90 and -0.04, respectively. Around the share repurchase announcement date (1 day prior to 1 day post announcement), an additional CAAR of 0.69% was generated by the "High U-Index" sample compared to the "Remaining U-Index" sample, with a t-statistic of 2.85 and 2.22, respectively, thus indicating that the "High U-Index" sample's excess returns were statistically significant at the 1% level, and the "Remaining U-Index" sample's excess returns were statistically significant at the 5% level.

From 2 days to 250 days post announcement, an additional CAAR of 8.89% was generated by the "High U-Index" sample compared to the "Remaining U-Index" sample, with a t-statistics of 2.70 and 1.14, respectively, thus indicating that the "High U-Index" sample's excess returns were statistically significant at the 5% level, and the "Remaining U-Index" sample's excess returns failed to surpass the critical value of 1.68 at the 10% significance level. Lastly, throughout the entire event window period an additional CAAR of 7.54% was generated by the "High U-Index" sample compared to the "Remaining U-Index" sample, with a t-statistics of 2.37 and 1.32, respectively, thus indicating that the "High U-Index" sample's excess returns were statistically significant at the 5% level, and the "Remaining U-Index" sample's excess returns failed to surpass the critical value of 1.68 at the 10% significance level. Table 5.3. shows the output from Excel, and Figure 1.7 shows the movement of CAAR for the 250-day subsample over time.

Table 5.3: CAARs for the constrained 1-year sample over 250 trading days, comparing "High U-Index" to "Remaining U-Index" share repurchases following a share repurchase announcement. The significance level pertains to the "High U-Index" sample.

Table 5.3: Cumulative Average Abnormal Returns (250-Day Sample)					
	1-Year 5F (High)			1-Year 5F (Remain)	
	CAAR	*t-stat*	Significance	CAAR	*t-stat*
-60 to -2	-2,10%	-0,90		-0,06%	-0,04
-1 to 1	1,84%	2,85	***	1,15%	2,22
2 to 250	13,11%	2,70	**	4,22%	1,14
-60 to 250	12,86%	2,37	**	5,32%	1,32
Observations	40			151	

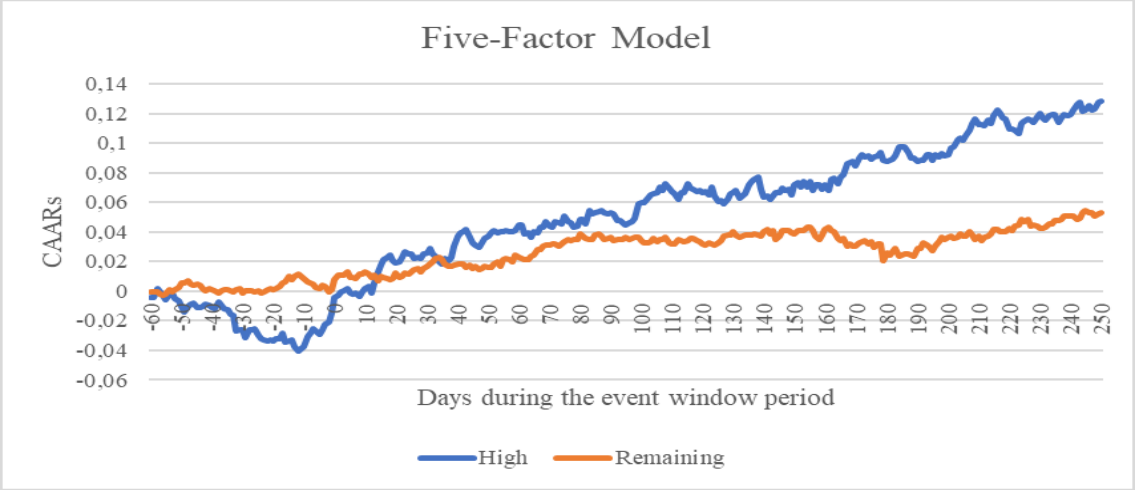


Figure 5.3.: 1-year sample CAARs of the 250-day subsample comparing High U-Index companies with the remaining companies, generated according to the Fama and French (2015) five-factor model.

The total sample for the 720-trading day analysis was then constrained by limiting each company to a single share repurchase announcement in a span of a calendar year. The "High U-Index" 1-year sample for the 720-trading day analysis consisted of 38 open market share repurchases within the period January 2003 and December 2021. The "Remaining U-Index" 1-year sample for the 250-trading day analysis consisted of 116 open market share repurchases. From 60 days to 2 days prior to the share repurchase announcement date, the "Remaining U-Index" sample outperformed the "High U-Index" sample by generating a 1.52% higher CAAR (although both were negative), with both t-statistics failing to surpass the 10% significance level critical value of 1.66. Around the share repurchase announcement date (one day prior to one day post announcement), an additional CAAR of 1.35% was generated by the "High U-Index" sample compared to the "Remaining U-Index" sample with a t-statistics of 2.77 and 1.53, respectively, thus indicating that the excess returns realised by the "High U-Index" were statistically significant at the 1% level, and that the excess returns realised by the "Remaining U-Index" sample failed to the surpass the critical value of 1.69 at the 10% significance level.

From 2 days to 720 days post announcement, an additional CAAR of 2.93% was generated by the "High U-Index" sample compared to the "Remaining U-Index" sample, with a t-statistics of 2.07 and 2.48, respectively, thus indicating that the "High U-Index" sample's excess returns were statistically significant at the 5% level, and the "Remaining U-Index" sample's excess returns were statistically significant at the 5% level. Lastly, throughout the entire event window period an additional CAAR of 2.74% was generated by the "High U-Index" sample compared to the "Remaining U-Index" sample, with a t-statistics of 1.95 and 2.37, respectively, thus

indicating that the "High U-Index" sample's excess returns were statistically significant at the 10% level, and the "Remaining U-Index" sample's excess returns were statistically significant at the 5% significance level. CAARs for the "Remaining U-Index" sample increases significantly after approximately two-and-a-half years, catching up to the total CAAR generated by the "High U-Index" sample. Table 5.4. shows the output from Excel, and Figure 1.8 shows the movement of CAAR for the 720-day subsample over time.

Table 5.4: CAARs for the constrained 1-year sample over 720 trading days, comparing "High U-Index" to "Remaining U-Index" share repurchases following a share repurchase announcement. The significance level pertains to the "High U-Index" sample.

Table 5.4: Cumulative Average Abnormal Returns (720-Day Sample)					
	1-Year 5F (High)			1-Year 5F (Remain)	
	CAAR	*t-stat*	Significance	CAAR	*t-stat*
-60 to -2	-2,33%	-0,98		-0,81%	-0,53
-1 to 1	1,89%	2,77	***	0,54%	1,53
2 to 250	13,23%	2,66	**	6,38%	1,54
2 to 720	19,17%	2,07	**	16,24%	2,48
-60 to 720	18,73%	1,95	*	15,96%	2,37
Observations	38			116	

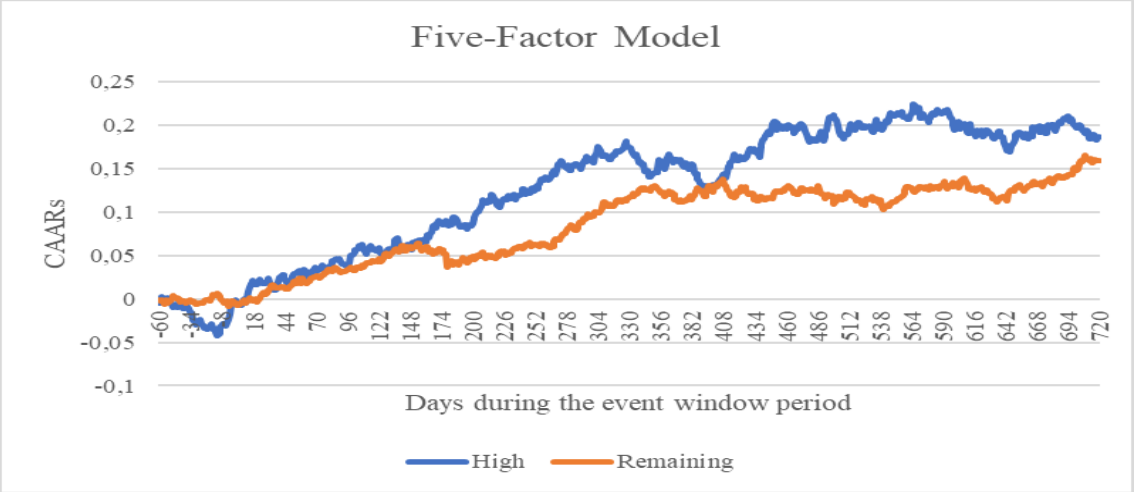


Figure 5.4: 1-year sample CAARs of the 720-day subsample comparing High U-Index companies with the remaining companies, generated according to the Fama and French (2015) five-factor model.

5.2.3. Conclusion

The second research question of this study was whether more undervalued companies at the time of a share repurchase announcement produce greater abnormal returns than less undervalued ones. In all of the samples tested, both around and following the repurchase announcement date, the "High U-Index" sample producer greater positive long-term CAARs than the "Remaining U-Index". The "High U-Index" total sample's CAARs over 250 and 720 trading days were both statistically significant at the 1% level around the announcement date (one day prior to one day post announcement), and statistically significant at the 1% level throughout the entire event window period (60 days priors to 250 and 720 days post announcement). The CAARs of the 1-year "High U-Index" sample over 250 and 720 trading days were both statistically significant at the 1% level around the announcement date (one day prior to one day post announcement), and statistically significant at the 5% level throughout the entire event window period for the 250 day subsample, and at the 10% level for the 720 day subsample. The "Remaining U-Index" sample outperformed the "High U-Index" sample after approximately two years or 500 trading days, as CAARs seemed to plateau. The CAARs calculated using the CAPM closely followed the CAARs calculated using the Fama and French (2015) five-factor model, thus indicating that the five-factor was robust throughout the examination process. The CAPM CAARs are depicted in Appendix 2b.

The results obtained are consistent with the findings of Peyer and Vermaelen (2009) – significant long-term abnormal returns during the 48 months following a share repurchase announcement were realised, which represents a market underreaction. Without underreaction, strategies involving companies repurchasing their stock when their shares are undervalued cannot be successful. The biggest underreaction was observed in the sample of companies that experienced a significant drop in their stock price in the six months prior to the share repurchase announcement (Peyer and Vermaelen, 2009). The buyback anomaly persists and survives when tested against the Fama and French (2015) five-factor model in the event study conducted. A possible explanation for this is that a share repurchase can be viewed as a company's management criticising overly pessimistic downgrades by analysts. It is suggested that because the buyback anomaly prevails strongest in companies that are relatively small and followed by fewer analysts, their opinions are heavily relied upon by investors which contributes to negative excess returns in the lead up to a share repurchase announcement. (Peyer and Vermaelen, 2009).

The Peyer and Vermaelen (2009) U-Index is effective in identifying undervalued companies at the time of a share repurchase announcement, as evident by the additional risk-adjusted returns generated after the undervaluation signal is sent to investors. The most significant additional excess returns generated by "High U-Index" companies are realised within the first year following a share repurchase announcement. After roughly 250 trading days, the gap between CAARs generated "High U-Index" companies and "Remaining U-Index" companies begins to close. Therefore, the U-Index can be used to enhance a trading strategy where an investor buys share repurchasing stock on the day of the public announcement – if the company has a high U-Index score (*i.e.,* is more undervalued), it is more likely to generate additional significant abnormal returns in the long-term.

Chapter 6 – Conclusion

This study tested whether the buyback anomaly survives following the announcement of an open market share repurchase on the Johannesburg Stock Exchange (JSE) for a sample of 454 share repurchase announcements between January 2003 and December 2021. Furthermore, Peyer and Vermaelen's (2009) Undervaluation Index was used to test whether highly undervalued shares outperform overvalued shares following a share repurchase announcement. These questions are both significant in an academic context, and within the asset management industry.

Open market share repurchases have grown in global popularity at a rate greater than that of dividend payments over the last forty years (Wesson, 2015). While it may still be a relatively new pay-out method in South Africa compared to other global equity markets, share repurchase activity is expected to grow in the coming years. This presents opportunities for South African investors to take advantage of long-term abnormal returns if the same behaviour shown following an open market share repurchase announcement in the U.S. and Europe is observed in South Africa. According to Chiah, Chai, Zhong, and Li (2016), and Fama and French (2016), the Fama and French (2015) five-factor model has been shown to be more effective in capturing stock returns compared to the three-factor and four-factor models. Seeing that the five-factor is an improvement over the three-factor model, which is widely used within the asset management industry, the former was used in this study as it allows comparison with the aforementioned buyback anomaly studies conducted in developed markets.

It would be beneficial to determine which open market share repurchases produce the largest and most significant long-term abnormal returns, based on a company's firm-specific characteristics. Because undervaluation is commonly cited as a driver of a company's decision to conduct a share repurchase, Peyer and Vermaelen (2009) developed an Undervaluation Index to help identify undervalued companies by assigning an undervaluation score to each firm at the time of its share repurchase announcement. This study used Evgeniou et al's (2018) modified Undervaluation Index to assess whether undervalued identified using this method yield greater abnormal returns than their peers on the JSE.

6.1. Study Overview

In order to test whether the buyback anomaly survives on the Johannesburg Stock Exchange (JSE), an event study methodology as per Binder (1998) was followed. A sample of share repurchasing companies was compiled which consisted of 454 open market share repurchases

by 160 firms. The Fama and French (2015) five-factor model was used to calculate expected stock returns from January 2003 and December 2021. Each company's daily average abnormal returns (AARs) were summed together to calculate the sample's cumulative average abnormal returns (CAARs) for each day within the relevant event window period, which spanned from 60 trading days prior to the announcement date, up to 250 or 720 trading days following the announcement date. The CAPM was used as a robustness test with regards to the sample's CAARs over the period. The total sample was subdivided into the following subsamples:

- The total sample's CAARs examined over 250 trading days post announcement.
- The total sample's CAARs examined over 720 trading days post announcement.

The total sample was then constrained by limiting each company to just a single open market share repurchase announcement within a period of a calendar year. An additional two subsamples were created:

- The 1-year constrained sample's CAARs examined over 250 trading days post announcement.
- The 1-year constrained sample's CAARs examined over 720 trading days post announcement.

The CAARs of each subsample were examined from 60 trading days prior to the announcement to 2 days prior, 1 day prior to 1 day post, and 2 days post up until the end of the event window period (i.e., either 250 or 720 trading days). Each CAAR's t-statistic was then calculated and compared to critical values across significance levels of 10%, 5%, and 1% to determine the statistical significance of results. The results were fairly consistent across the four samples, with the following notable findings:

- In the total 250 trading day sample, CAARs were statistically significant at the 5% level from 2 days post announcement to the end of the event window, and statistically significant at the 1% level around the announcement date (one day prior to one day after), and over the entire event window period (60 days prior to the end of the event window).
- In the total 720 trading day sample, CAARs were statistically significant at the 1% level around the announcement date (one day prior to one day after), from 2 days post announcement to the end of the event window, and over the entire event window period (60 days prior to the end of the event window).

- In the 1-year 250 trading day sample, CAARs were statistically significant at the 10% level from 2 days post announcement to the end of the event window, and statistically significant at the 5% level around the announcement date (one day prior to one day after), and over the entire event window period (60 days prior to the end of the event window).
- In the 1-year 720 trading day sample, CAARs were statistically significant at the 1% level around the announcement date (one day prior to one day after), from 2 days post announcement to the end of the event window, and over the entire event window period (60 days prior to the end of the event window).

These results indicate that the buyback anomaly survives the Fama and French (2015) five-factor model on the Johannesburg Stock Exchange (JSE) over the period January 2003 to December 2021. It is indeed possible to generate statistically significant long-term positive excess returns by going long on shares where the company has recently announced an open market share repurchase via SENS. Constraining the total sample by restricting companies to just a single share repurchase announcement within a period of a calendar year resulted in smaller t-statistic values and less statistically significant CAARs across all subsamples. This indicates that the CAARs generated in the total sample are a result of multiple open market share repurchases overlapping and undervaluation signals compounding when companies are classified as serial repurchasers.

The Undervaluation Index (U-Index) was created by emulating the methodology of Peyer and Vermaelen (2009) as modified by Evgeniou et al (2018). The quintile values for each key variable were calculated for each day from January 2003 to December 2021, as per the composition of the FTSE/JSE All-Share Index (ALSI) at that point in time. Scores for each of the three key variables (size, book-to-market, prior raw returns) ranging from 1 to 5 were assigned to each share repurchase in the total sample to calculate the total Undervaluation Index score. The total sample was then subdivided according to U-Index scores, with share repurchases with a score greater than 11 being classified as “High U-Index”, and share repurchases with a score of 11 or lower being classified as “Remaining U-Index”. The total sample was subdivided into the following subsamples:

- The “High U-Index” sample’s CAARs examined over 250 trading days post announcement.
- The “High U-Index” sample’s CAARs examined over 720 trading days post announcement.

- The “Remaining U-Index” sample’s CAARs examined over 250 trading days post announcement.
- The “Remaining U-Index” sample’s CAARs examined over 720 trading days post announcement.

The total sample was also constrained by limiting each company to just a single open market share repurchase announcement within a period of a calendar year. An additional four subsamples were created:

- The 1-year “High U-Index” sample’s CAARs examined over 250 trading days post announcement.
- The 1-year “High U-Index” sample’s CAARs examined over 720 trading days post announcement.
- The 1-year “Remaining U-Index” sample’s CAARs examined over 250 trading days post announcement.
- The 1-year “Remaining U-Index” sample’s CAARs examined over 720 trading days post announcement.

The CAARs of each subsample were then examined from 60 trading days prior to the announcement to 2 days prior, one day prior to one day post, and 2 days post announcement up until the end of the event window period (i.e., either 250 or 720 trading days). Each CAAR’s t-statistic was calculated and compared to critical values across significance levels of 10%, 5%, and 1% to determine the statistical significance of results. The results were fairly consistent across the eight samples, with the following notable findings:

- In the total “High U-Index” 250 trading day sample, CAARs were statistically significant at the 1% level around the announcement date (one day prior to one day after), from 2 days post announcement to the end of the event window, and over the entire event window period (60 days prior to the end of the event window). The “High U-Index” sample outperformed the “Remaining U-Index” sample by 0.42% around the announcement date, and 9.54% over the entire event window period.
- In the total “High U-Index” 720 trading day sample, CAARs were statistically significant at the 1% level around the announcement date (one day prior to one day after), from 2 days post announcement to the end of the event window, and over the entire event window period (60 days prior to the end of the event window). The “High U-Index” sample outperformed the “Remaining U-Index” sample by 0.92% around the announcement date, and 3.32% over the entire event window period.

- In the 1-year "High U-Index" 250 trading day sample, CAARs were statistically significant at the 1% level around the announcement date (one day prior to one day after), and at the 5% level from 2 days post announcement to the end of the event window, and over the entire event window period (60 days prior to the end of the event window). The "High U-Index" sample outperformed the "Remaining U-Index" sample by 0.69% around the announcement date, and 7.54% over the entire event window period.
- In the 1-year "High U-Index" 720 trading day sample, CAARs were statistically significant at the 1% level around the announcement date (one day prior to one day after), and at the 5% level from 2 days post announcement to the end of the event window, and over the entire event window period (60 days prior to the end of the event window). The "High U-Index" sample outperformed the "Remaining U-Index" sample by 1.35% around the announcement date, and 2.77% over the entire event window period.

These results indicate that the modified Peyer and Vermaelen's (2009) U-Index was effective in identifying undervalued companies, which is evident in the enhanced positive excess returns or CAARs generated over various periods within the relevant event window. Furthermore, the effect of constraining the total sample companies to a single repurchase in a period of a calendar year was similar to before, namely that the CAARs generated were less significant and the t-statistics calculated were lower.

6.2. Implications of the Study and the Results

After conducting an event study to test whether the buyback anomaly survives on the Johannesburg Stock Exchange (JSE) when using the Fama and French (2015) five-factor model to predict expected returns, this study concludes that excess returns are both persistent and statistically significant in the long-term. Therefore, following a share repurchase announcement, an investor can invest in a repurchasing company's shares and expect to realise excess returns, regardless of whether the shares are held for three days around the announcement date, for up one year following the announcement date, or for up to three years following the announcement. The implications of these findings are that the JSE is an inefficient market with regards to share buybacks, that the buyback anomaly survives on the index even when using the Fama and French (2015) five-factor model as a predictor of expected returns, and that investing in companies listed on the JSE following a share repurchase announcement could be a robust and reliable investment strategy.

A second event study was conducted to test whether repurchasing companies identified as highly undervalued at the time of a share repurchase announcement generated additional excess returns when compared to companies identified as moderately undervalued, fairly valued or overvalued. Companies were scored on the degree of their shares' undervaluation using Peyer and Vermaelen's (2009) Undervaluation Index (U-Index). It was found that companies with U-Index score greater than 11 (highly undervalued shares) delivered additional statistically significant excess returns when compared to companies with a U-Index score less than 12 (moderately undervalued, fairly valued, and overvalued shares). These findings enhance the practical application of this study. Not only has a test of market efficiency been conducted on the Johannesburg Stock Exchange, indicating that abnormal returns can be generated when investing in company shares following a share repurchase announcement, but excess returns can be maximised by using Peyer and Vermaelen's (2009) Undervaluation Index to identify highly undervalued shares at the time of announcement.

6.3. Limitations

The following limitations and considerations were identified for this study:

- The 454 share repurchase announcements were identified manually from SENS using the Bloomberg database. Various keywords were used to streamline the results, and this is subject to error – there might have been better keywords than the ones used that would have identified additional share repurchase announcements. It is also possible that share repurchases announcements were omitted due to human error when manually identifying sample members.
- The sample size of 454 share repurchase announcements was relatively small when compared to previous studies conducted abroad in developed markets. This is largely due to share repurchases only being allowed in South Africa since 1999, and the overall market being smaller when compared to the United States, the United Kingdom etc.
- Share repurchases announced by companies listed on the Alternative Exchange (AltX) were removed from the total sample when calculating CAARs. This is due to different market exposures and limited disclosure with regards to past and present membership composition.
- When calculating the daily quintile values for each of the key variables used in the Undervaluation Index (U-Index), the composition of the FTSE/JSE All Share Index (ALSI) was determined by compiling a comprehensive list of all-time members using information from Refinitv Eikon. However, not all the data for these companies was available for the

dates required and therefore some share repurchases had to be removed from the U-Index sample.

- The U-Index score cut off points according to Peyer and Vermaelen (2009) and Evgeniou et al (2018) had to be adjusted due to a smaller sample size than the sample sizes used in studies conducted in larger markets such as the United States.

6.4. Suggestions for Future Research

Suggestions for future research which can build on the work of this study includes replicating its second part using the enhanced Undervaluation Index (U-Index) of Evgeniou et al (2018), consisting of combining Peyer and Vermaelen's (2009) U-Index with idiosyncratic volatility. This would assist in examining the relationship between undervaluation and volatility and would test whether the market timing hypothesis holds, namely that the option to take advantage of undervalued shares is more desirable when company value is more volatile or is more highly determined by company-specific information.

Secondly, the study can also be expanded to include more factor models, such as the Fama and French (1993) three-factor model and the Carhart (1997) four-factor model, to compare their efficacy versus the Fama and French (2015) five-factor model on the Johannesburg Stock Exchange (JSE).

Thirdly, a comparison between the CAARs generated following a share repurchase announcement and a rights issue announcement could be conducted, as well as an analysis of CAARs across sectors over time on the JSE.

Fourthly, Peyer and Vermaelen's (2009) Undervaluation Index (U-Index) could be used as a predictor of the likelihood that a company's management will choose to conduct an open market share repurchase programme. This is based on stock undervaluation and underperformance during the six months prior to a share repurchase announcement being the primary drivers behind a company's decision to conduct a share buyback (Peyer and Vermaelen, 2009).

Lastly, a comparison between the CAARs generated by small companies following a share repurchase and larger companies could be conducted. The market underreaction in small-cap equities was found to be stronger than in large-cap equities leading up to the announcement of a share repurchase programme (Peyer and Vermaelen, 2009).

References

*Alexander Forbes launches new money market indices.*2001. Available: https://www.itweb.co.za/content/6GxRKqY8NE9Mb3Wj [14 April 2022].

Andreou, P., Cooper, I. & de Olalla Lopez, I.G. 2018. Managerial overconfidence and the buyback anomaly. *Journal of Empirical Finance.* (49):142-156.

Asness, C.S. 1995. Variables that explain stock returns: Simulated and empirical evidence.

Babenko, I., Tserlukevich, Y. & Vedrashko, A. 2012. The Credibility of Open Market Share Repurchase Signaling. 47(5):1059-1088.

*To the Shareholders of Berkshire Hathaway Inc.*1984. Available: https://www.berkshirehathaway.com/letters/1984.html [22 August 2023].

Bester, P.G., Wesson, N. & Hamman, W.D. 2010. Share buy-backs for a selection of JSE-listed companies: An exploratory study. *South African Journal of Business Management.* 41(4):47-58.

Binder, J. 1998. The Event Study Methodology Since 1969. *Review of Quantitative Finance and Accounting.* 11(2):111-137. DOI:10.1023/A:1008295500105.

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

Chan, K., Ikenberry, D. & Wang, Y. 2010. Share repurchases as a potential tool to mislead investors. *Journal of Corporate Finance.* (16):137-158.

Chiah, M., Chai, D., Zhong, A. & Li, S. 2016. A Better Model? An empirical investigation of the Fama–French five-factor model in Australia. *International Review of Finance.* 16(4):595-638.

De Bondt, W.F. & Thaler, R. 1985. Does the stock market overreact? *The Journal of Finance.* 40(3):793-805.

Dittmar, A.K. 2000. Why Do Firms Repurchase Stock. *The Journal of Business (Chicago, Ill.).* 73(3):331-355. DOI:10.1086/209646

D'mello, R. & Shroff, P.K. 2000. Equity undervaluation and decisions related to repurchase tender offers: An empirical investigation. *The Journal of Finance.* 55(5):2399-2424.

Evgeniou, T., de Fortuny, E., Nassuphis, N. & Vermaelen, T. 2016. *Share Buyback and Equity Issue Anomalies Revisited.*

Evgeniou, T., de Fortuny, E.J., Nassuphis, N. & Vermaelen, T. 2018. Volatility and the buyback anomaly. *Journal of Corporate Finance.* (49):32-53.

Fama, E. 1998. Market efficiency, long-term returns, and behavioral finance. *Journal of Financial Economics.* (49):283-306.

Fama, E.F. 1970. Efficient capital markets: A review of theory and empirical work. *The Journal of Finance.* 25(2):383-417.

Fama, E.F. & French, K.R. 1996. Multifactor explanations of asset pricing anomalies. *The Journal of Finance.* 51(1):55-84.

Fama, E.F. & French, K.R. 2004. The capital asset pricing model: Theory and evidence. *Journal of Economic Perspectives.* 18(3):25-46.

Fama, E. & French, K. 2015. A five-factor asset pricing model. *Journal of Financial Economics.* (116):1-22.

Fama, E. & French, K. 2016. Dissecting Anomalies with a Five-Factor Model. *The Review of Financial Studies.* 29(1)

Firth, M., Leung, T.Y. & Rui, O. 2010. Double signals or single signal? An investigation of insider trading around share repurchases. *Journal of International Financial Market.* (20):376-388.

Flint, E., Seymour, A. & Chikurunhe, F. 2016. Factor Investing in South Africa. *Available at SSRN 2864484.*

Foye, J. 2018. A comprehensive test of the Fama-French five-factor model in emerging markets. *Emerging Markets Review.* 37:199-222.

Grullon, G. & Michaely, R. 2002. Dividends, Share Repurchases, and the Substitution Hypothesis. *The Journal of Finance.* 57(4)

Hao, Q. 2016. Is there information leakage prior to share repurchase announcements? Evidence from daily options trading. *Journal of Financial Markets.* (27):79-101.

Huang, C. 2015. Takeover vulnerability and the credibility of signaling: The case of open-market share repurchases. *Journal of Banking & Finance.* (58):405-417.

Ikenberry, D., Lakonishok, J. & Vermaelen, T. 1994. *Market Underreaction to Open Market Share Repurchases.* National Bureau of Economic Research.

Jagannathan, M., Stephens, C. & Weisbach, M. 2000. Financial flexibility and the choice between dividends and stock repurchases. *Journal of Financial Economics.* (57):355-384.

Jegadeesh, N. & Titman, S. 1993. Returns to buying winners and selling losers: Implications for stock market efficiency. *The Journal of Finance.* 48(1):65-91.

Jiang, Z., Kim, K., Lie, E. & Yang, S. 2013. Share repurchase, catering, and dividend substitution. *Journal of Corporate Finance.* (21):36-50.

JSE Limited Listing Requirements. 2017.

Kubota, K. & Takehara, H. 2018. Does the Fama and French five-factor model work well in Japan? *International Review of Finance.* 18(1):137-146.

Lambert, R.A., Lanen, W.N. & Larcker, D.F. 1989. Executive stock option plans and corporate dividend policy. *Journal of Financial and Quantitative Analysis.* 24(4):409-425.

Lintner, J. 1975. The valuation of risk assets and the selection of risky investments in stock portfolios and capital budgets. In *Stochastic optimization models in finance.* Elsevier. 131-155.

Mackey, A.M. & Bacon, F.W. 2017. Signaling with stock issues and repurchases: A test of semi-strong form market efficiency. *Journal of Business and Behavioral Sciences.* 29(1):34.

Mackey, A.M. & Bacon, F.W. 2017. Signaling with stock issues and repurchases: A test of semi-strong form market efficiency. *Journal of Business and Behavioral Sciences.* 29(1):34.

Malkiel, B.G. 1989. Efficient market hypothesis. In *Finance.* Springer. 127-134.

Malkiel, B.G. 2003. The efficient market hypothesis and its critics. *Journal of Economic Perspectives.* 17(1):59-82.

Mallikarjunappa, T. & Dsouza, J.J. 2013. A Study of Semi-Strong Form of Market Efficiency of Indian Stock Market. *Amity Global Business Review.* 8.

Manconi, A., Peyer, U. & Vermaelen, T. 2014. Buybacks around the world. *European Corporate Governance Institute (ECGI)-Finance Working Paper.* 436.

Manconi, A. & Vermaelen, T. 2013. *Buybacks Around the World.* Tilburg University.

Mishra, P.K. 2011. Weak form market efficiency: Evidence from emerging and developed world. *The Journal of Commerce.* 3(2):26.

Morris, R. 1987. Signalling, Agency Theory and Accounting Policy Choice. *Accounting and Business Research.* 18(69):47-56.

Nyanga, S. 2017. *Share repurchases announcement and the signalling effect in South Africa.* University of Pretoria.

*Peresec - South African Factor Data Library.*2021. Available: https://www.peresec.com/insights/ [25 September 2021].

Peyer, U. & Vermaelen, T. 2009. The Nature and Persistence of Buyback Anomalies. *Review of Financial Studies.*

Scholtz, H. & Smit, A. 2015. Factors influencing corporate governance disclosure of companies listed on the Alternative Exchange (AltX) in South Africa. *South African Journal of Accounting Research.* 29(1):29-50.

Semenya, L. & Dhliwayo, S. 2020. *Challenges of financing small and medium enterprises' growth through public equity in South Africa.* University of Johannesburg.

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

Stambaugh, R. & Yuan, Y. 2017. *Mispricing Factors.* University of Pennsylvania.

Steenkamp, G. 2020. *The relationship between share repurchases and share-based remuneration of executive directors of South African listed companies.* Stellenbosch University.

Steenkamp, G. & Wesson, N. 2020. Post-recession share repurchase behaviour by JSE-listed companies: transparent or not? *Journal of Accounting in Emerging Economies.* 10(3):465-486.

Tabtieng, N. 2013. Motivations for Share Repurchase Programs and the Effect of Share Prices on Managerial Decisions to End Share Repurchases Program in Thailand. *International Journal of Business and Social Science.* 4(10):257-266.

Vermaelen, T. & Lakonishok, J. 1990. Anomalous Price Behavior Around Repurchase Tender Offers. *The Journal.* 45(2):455-477.

Ward, M. & Muller, C. 2010. The long-term share price reaction to Black Economic Empowerment announcements on the JSE . *Investment Analysts Journal.* (71):27-36.

Wesson, N., Bruwer, B.W. & Hamman, W.D. 2015. Share repurchase and dividend payout behaviour: The South African experience. *South African Journal of Business Management.* (46):43-54.

Wesson, N., Muller, C. & Ward, M. 2014. Market underreaction to open market share repurchases on the JSE. *South African Journal of Business Management.* 45(4):59-69.

Wesson, N., Smit, E.v.d.M., Kidd, M. & Hamman, W.D. 2018. Determinants of the choice between share repurchases and dividend payments. *Research in International Business and Finance.* (45):180-196.

Wesson, N. 2015. No title. *An Empirical Model of Choice between Share Purchase and Dividends for Companies in Selected JSE Listed Sectors.*

Appendices

Appendix 1a: Copysheet5F Excel Macro

This appendix outlines the Microsoft Excel macro used to transport all daily average abnormal return (AAR) values for each repurchasing company within the relevant event window to a master sheet to calculate the sum of all AARs. The model used to calculate excess returns was the Fama and French (2015) five-factor model.

```
Sub CopySheet5F()
Application.ScreenUpdating = False
Dim ref As Integer
Dim start As Integer
Dim ticker As String
Dim time As String
Dim counter As Integer
Dim i As Integer
Dim Val As Integer
Dim paste As Integer

counter = 0
ref = 3
start = 5
paste = 3
Sheets("Companies Final").Select
Do Until IsEmpty(Cells(ref, 2))
    Sheets("Companies Final").Select
```

```
    counter = 0
    Do Until IsEmpty(Cells(ref, start + counter))
        ticker = Cells(ref, 2)
        time = Cells(ref, start + counter)

        Sheets("#1").Select
        Cells(1, 9).Value = ticker
        Cells(3, 9).Value = time

        Sheets("AAR's 5F").Select
        Cells(paste, 1).Value = ticker
        Cells(paste, 2).Value = time
        For i = 11 To 791
            Cells(paste, i - 8).Value = ThisWorkbook.Sheets("#1").Cells(i, 21)
        Next i

        counter = counter + 1
        paste = paste + 1
        Sheets("Companies Final").Select
    Loop
    ref = ref + 1
Loop

End Sub
```

Appendix 1b: CopysheetCAPM

This appendix outlines the Microsoft Excel macro used to transport all daily average abnormal return (AAR) values for each repurchasing company within the relevant event window to a master sheet to calculate the sum of all AARs. The model used to calculate excess returns was the Capital Asset Pricing Model (CAPM).

```
Sub CopySheetCAPM()
Application.ScreenUpdating = False
Dim ref As Integer
Dim start As Integer
Dim ticker As String
Dim time As String
Dim counter As Integer
Dim i As Integer
Dim Val As Integer
Dim paste As Integer

counter = 0
ref = 3
start = 5
paste = 3

Sheets("Companies Final").Select
Do Until IsEmpty(Cells(ref, 2))
    Sheets("Companies Final").Select
```

```
    counter = 0
    Do Until IsEmpty(Cells(ref, start + counter))
        ticker = Cells(ref, 2)
        time = Cells(ref, start + counter)

        Sheets("#1").Select
        Cells(1, 9).Value = ticker
        Cells(3, 9).Value = time

        Sheets("AAR's CAPM (All)").Select
        Cells(paste, 1).Value = ticker
        Cells(paste, 2).Value = time
        For i = 11 To 791
            Cells(paste, i - 8).Value = ThisWorkbook.Sheets("#1").Cells(i, 23)
        Next i

        counter = counter + 1
        paste = paste + 1
        Sheets("Companies Final").Select
    Loop
    ref = ref + 1
Loop

End Sub
```

Appendix 2a: Duplicates_Macro

This appendix outlines the Microsoft Excel macro used to delete all repeating values after a company has left the FTSE/JSE All Share Index (ALSI). If a company then re-joins the FTSE/JSE ALSI, the corresponding values will not be deleted thereafter.

```
Option Explicit
    Public dateRef As Integer              '(x,y) of starting values stored globally
    Public tickerRef As Integer

    Public dateList As Object              'List of joining dates for ticker
    Public diffList As Object              'List of differences with leaving date

Sub Duplicates_Macro()
    Dim ref As Integer                     'Index for list of leavers
    ref = 3
    Dim ticker As String                   'Name of ticker
    Dim leaveDate As Date                  'leaving date
    Dim joinDate As Date
    Dim temp As Integer                    'Stores temporary value of index output by function

    Set dateList = CreateObject("System.Collections.ArrayList")
    Set diffList = CreateObject("System.Collections.ArrayList")

    Sheets("Members").Select
```

```
For ref = 3 To 336                    'Repeat until end of list of leavers
    Sheets("Members").Select
    leaveDate = Cells(ref, 4).Value
    ticker = Cells(ref, 5).Value

    calcStart ticker, leaveDate       'Calculate (x,y) for ticker leave date (when to start deleting)
    Sheets("Members").Select

    If tickerRef = 381 Or dateRef = 5092 Then 'Skip this iteration if ticker or date wasn't found in spreadsheet
        GoTo NextIteration            'Done to save time
    Else
        temp = populateLists(ticker, leaveDate) 'Populates the lists and receive index

        If temp = -1 Then
            deleteUntilEnd "Prior Raw Return" 'Start deleting from all the sheets
            deleteUntilEnd "Market Cap"
            deleteUntilEnd "Total Return"
            deleteUntilEnd "Book To Market"
        Else
            joinDate = dateList(temp)
            deleteUntilPoint "Prior Raw Return", joinDate 'Start deleting from all the sheets
            deleteUntilPoint "Market Cap", joinDate
            deleteUntilPoint "Total Return", joinDate
```

```
            deleteUntilPoint "Book To Market", joinDate
        End If
    End If
NextIteration:
  Next ref
End Sub

Function populateLists(ticker, leaveDate) As Integer
  Dim ref As Integer                    'Index for traversing joiners
  ref = 3
  Dim tempDate As Date
  Dim tempDiff As Integer
  Dim tempMin As Long
  Dim i As Integer
  tempMin = 999999

  dateList.Clear                        'Clear arrays
  diffList.Clear

  Do Until Cells(ref, 2) = ticker       'Loop until we reach the right index
    If Cells(ref, 2).Text = "" Then     'If ticker never joined, then delete then return -1
      populateLists = -1                'to delete from the leave point onwards
      Exit Function
    End If
```

```
    ref = ref + 1
  Loop

  Do Until Cells(ref, 2) <> ticker          'Loop until doesn't equal ticker
    tempDate = Cells(ref, 1)
    dateList.Add tempDate

    tempDiff = DateDiff("d", leaveDate, tempDate)
    diffList.Add tempDiff

    ref = ref + 1
  Loop

  ref = 0

  For i = 0 To diffList.Count - 1
    If diffList.Item(i) >= 0 And diffList.Item(i) < tempMin Then  'Get smallest value and save
it's index
      tempMin = diffList.Item(i)
      ref = i
    End If
  Next i

  If tempMin = 999999 Then                  'If no smallest positive value return -1
    populateLists = -1                  'Else return index
```

```
        Exit Function
    End If
    populateLists = ref
End Function

Sub calcStart(ticker, leaveDate)
    dateRef = 6
    tickerRef = 2

    Dim low As Integer                  'Variables used in binary search
    low = 6
    Dim high As Integer
    high = 5091
    Dim middle As Integer
    Dim found As Boolean
    found = False

    Dim tempDate As Date
    Dim tempDiff As Long

    Sheets("Prior Raw Return").Select       'Selected sheet doesn't matter

    Do While low <= high                    'Binary search to find date
        middle = (low + high) / 2
```

```
        tempDate = Cells(middle, 1)
        tempDiff = DateDiff("d", leaveDate, tempDate)

        If tempDiff = 0 Then
            dateRef = middle + 1
            found = True
            Exit Do

        ElseIf tempDiff > 0 Then
            high = (middle - 1)
        Else
            low = (middle + 1)
        End If
    Loop

    If found = False Then                   'If date doesn't exist in data
        dateRef = 5092
    End If

    Do Until Cells(3, tickerRef) = ticker Or Cells(3, tickerRef).Text = ""
        tickerRef = tickerRef + 1
    Loop
End Sub
```

```
Sub deleteUntilPoint(bookName, joinDate)
    Dim row As Integer
    row = dateRef
    Sheets(bookName).Select

    Do Until Cells(row, 1).Value = joinDate Or Cells(row, 1).Text = ""
        Cells(row, tickerRef).ClearContents
        row = row + 1
    Loop
End Sub

Sub deleteUntilEnd(bookName)
    Dim row As Integer
    row = dateRef
    Sheets(bookName).Select

    Do Until IsEmpty(Cells(row, tickerRef))
        Cells(row, tickerRef).ClearContents
        row = row + 1
    Loop
End Sub
```

Appendix 2b: UIndex_Macro

This appendix outlines the Microsoft Excel macro used to assign Peyer and Vermaelen (2009) Undervaluation Index (U-Index) ranking element scores to each respective share repurchase at the time of an announcement.

```
Sub UIndex_Macro()


Application.ScreenUpdating = False
Dim tickerRef As Integer              'Index for current ticker
Dim dateCount As Integer              'Counts number of dates read for specific ticker
Dim outputRef As Integer              'Counts number of times pasted in the output sheet

Dim ticker As String                  'ticker name
Dim time As String                    'date

Dim MC As Integer
Dim BM As Integer
Dim PR As Integer
Dim total As Integer                  'total

dateCount = 0
tickerRef = 3
outputRef = 3

Sheets("Companies Final").Select

Do Until IsEmpty(Cells(tickerRef, 2))                    'repeat until no more tickers
    Sheets("Companies Final").Select
```

```
    dateCount = 0                                   'reset counter
    Do Until IsEmpty(Cells(tickerRef, 5 + dateCount))           'repeat until no more dates for ticker
        ticker = Cells(tickerRef, 2)
        time = Cells(tickerRef, 5 + dateCount)

        Sheets("#1").Select                         'get results
        Cells(1, 9).Value = ticker
        Cells(3, 9).Value = time

        If WorksheetFunction.IsNA(Cells(20, 2)) Or WorksheetFunction.IsNA(Cells(21, 2)) Or WorksheetFunction.IsNA(Cells(22, 2)) Or WorksheetFunction.IsNA(Cells(23, 2)) Then
            GoTo NextIteration
        End If

        MC = Cells(20, 2).Value
        BM = Cells(21, 2).Value
        PR = Cells(22, 2).Value
        total = Cells(23, 2).Value

        Sheets("U-Index Scores").Select             'output results
        Cells(outputRef, 1) = ticker
        Cells(outputRef, 2) = time

        Cells(outputRef, 3) = MC
```

```
        Cells(outputRef, 4) = BM
        Cells(outputRef, 5) = PR
        Cells(outputRef, 6) = total

NextIteration:

        dateCount = dateCount + 1                    'go to next date if available
        outputRef = outputRef + 1                    'go to next row when outputting
        Sheets("Companies Final").Select
    Loop
    tickerRef = tickerRef + 1                        'go to next ticker if available
Loop

End Sub
```

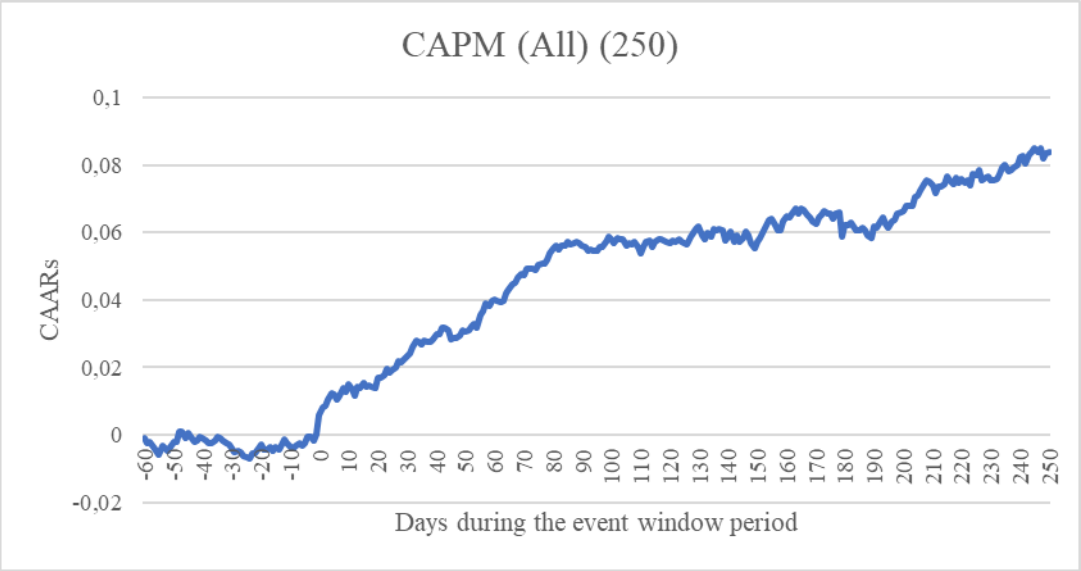
Appendix 3a: Capital Asset Pricing Model (CAPM) Cumulative Average Abnormal Return (CAARs) Graphs

This appendix shows the cumulative average abnormal returns (CAARs) generated by various samples using the Capital Asset Pricing Model (CAPM) as a predictor of expected returns. The

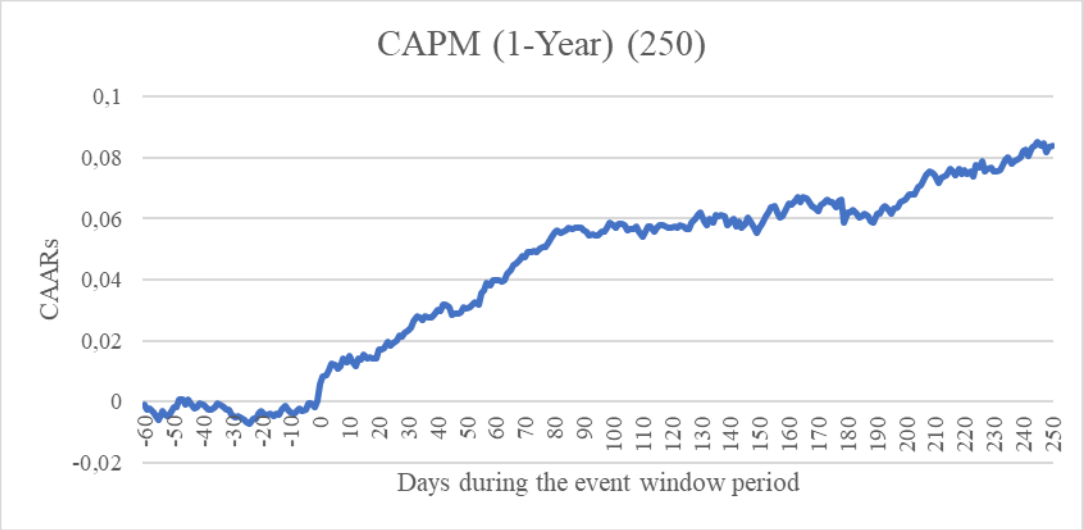
CAPM was used as a robustness test against the Fama and French (2015) five-factor model across all the event studies conducted.

The graph naming scheme is as follows,

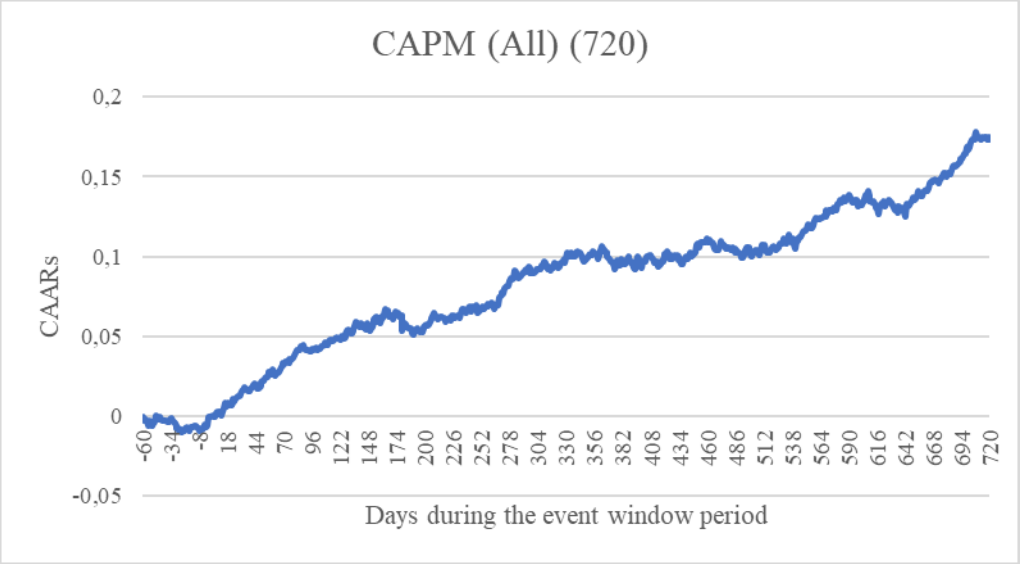
- ‘CAPM’ refers to the Capital Asset Pricing Model.
- ‘(All)’ refers to the total sample size.
- ‘(1-Year)’ refers to the constrained 1-year sample.
- ‘(250)’ refers to a 250 trading day event window period.
- ‘(720)’ refers to a 720 trading day event window period.
- ‘(High)’ refers to the ‘High U-Index’ sample.
- ‘(Remaining)’ refers to the ‘Remaining U-Index’ sample.



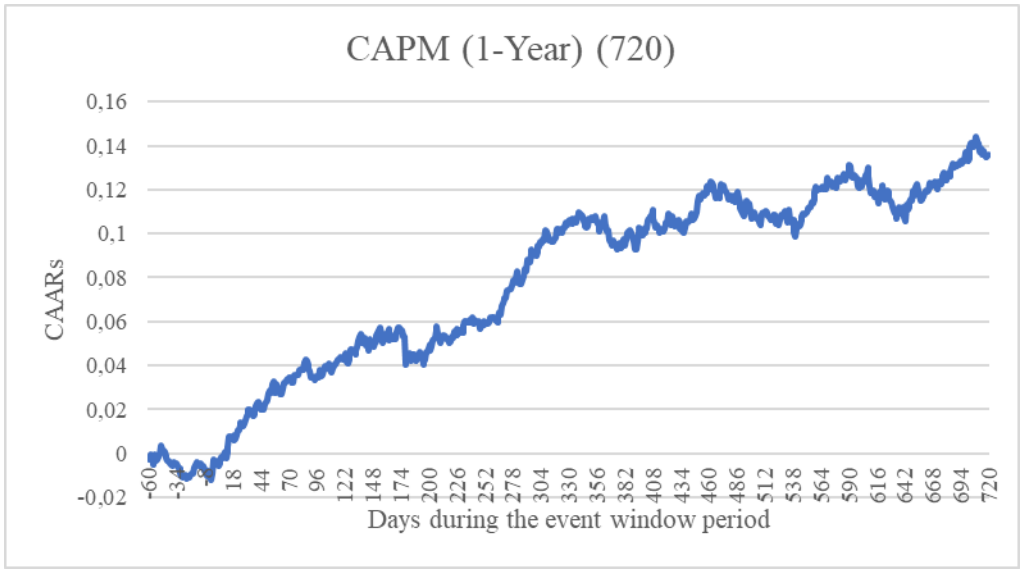
Appendix Figure 3.1: Total sample CAARs of the 250-day subsample generated according to the Capital Asset Pricing Model.



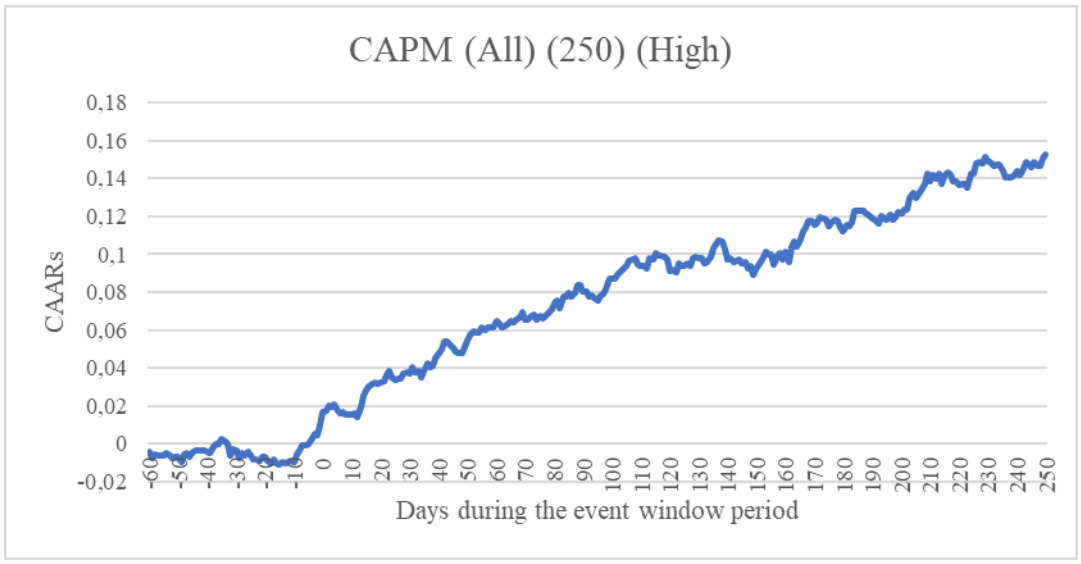
Appendix Figure 3.2: Constrained 1-Year sample CAARs of the 250-day subsample generated according to the Capital Asset Pricing Model.



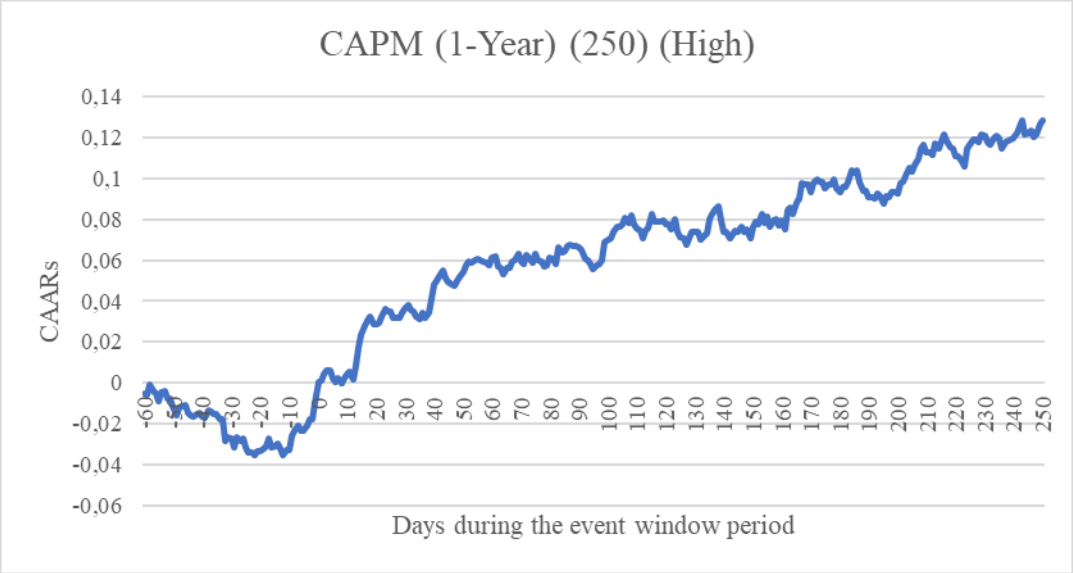
Appendix Figure 3.3: Total sample CAARs of the 720-day subsample generated according to the Capital Asset Pricing Model.



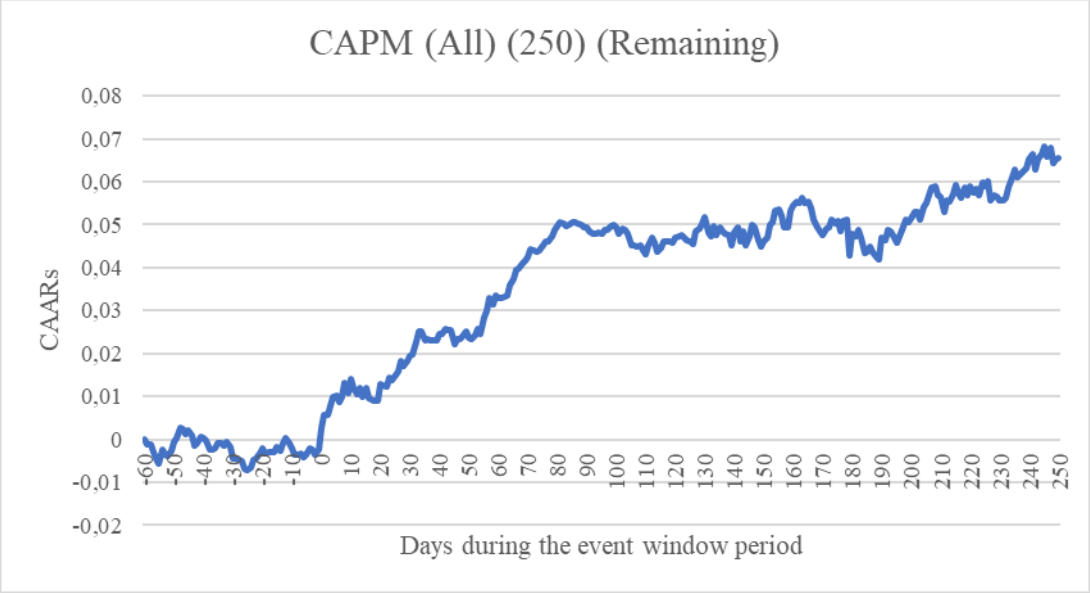
Appendix Figure 3.4: Constrained 1-Year sample CAARs of the 720-day subsample generated according to the Capital Asset Pricing Model.



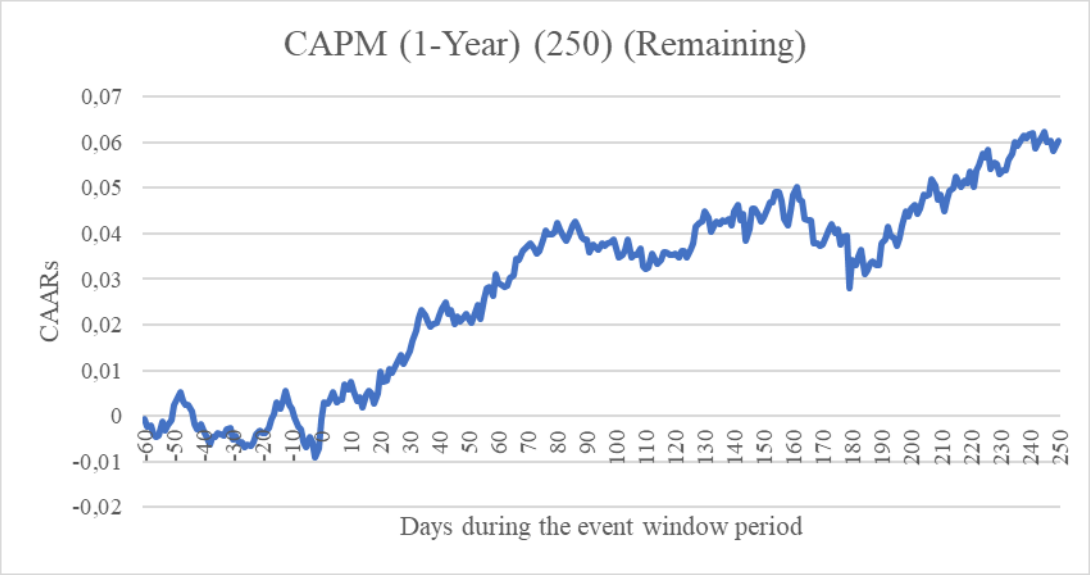
Appendix Figure 3.5: Total sample CAARs of the “High U-Index” 250-day subsample generated according to the Capital Asset Pricing Model.



Appendix Figure 3.6: Constrained 1-Year sample CAARs of the "High U-Index" 250-day subsample generated according to the Capital Asset Pricing Model.



Appendix Figure 3.7: Total sample CAARs of the "Remaining U-Index" 250-day subsample generated according to the Capital Asset Pricing Model.



Appendix Figure 3.8: Constrained 1-Year sample CAARs of the "Remaining U-Index" 250-day subsample generated according to the Capital Asset Pricing Model.

Appendix 4a: List of Share Repurchases Used in Total Sample.

The following list consists of companies that have announced a share repurchase programme/s via Stock Exchange News Service (SENS) between 1 January 2003 and 31 December 2021. This sample contains companies listed on the Alternative Exchange (AltX) that were later excluded from the study.

Ticker	Company Name	Number of Announcements
ACL	ArcelorMittal South Africa Limited	1
AER	Amalgamated Electronic Corporation Limited	1
AFE	AECI Limited	1
AFT	Afrimat Limited	20
AGL	Anglo American PLC	7
AIP	Adcock Ingram Holdings Limited	3
AME	African Media Entertainment Limited	2
AMS	Anglo American Platinum Limited	1
APF	Accelerate Property Fund Limited	1
APK	Astrapak Limited	1
APN	Aspen Pharmacare Holdings Limited	1
ARA	Astoria Investments Limited	1
ARL	Astral Foods Limited	3
ART	Argent Industrial Limited	28
ASR	Assore Limited	1
AVI	AVI Limited	2
AVV	Alviva Holdings Limited	7
AYO	Ayo Technology Solutions Limited	1
BAT	Brait SE	3
BAW	Barloworld Limited	1
BCF	Bowler Metcalf Limited	4
BCX	Business Connexion Group Limited	1
BHG	BHP Billiton PLC	4
BJM	Barnard Jacobs Mellet Holdings	5

BLU	Blue Label Telecoms Limited	1
BRC	Brandcorp Holdings Limited	1
BRT	Brimstone Investment Corporation Limited	2
BSR	Basil Read Holdings Limietd	1
BTI	British American Tobacco PLC	11
BVT	The Bidvest Group Limited	2
CAT	Caxton and CTP Publishers and Printers	5
CCO	Capital & Counties Properties PLC	1
CDZ	Cadiz Holdings Limited	1
CFR	Compagnie Financiere Richemont SA	6
CGN	Cognition Holdings Limited	1
CLS	Clicks Group Limited	9
CMH	Combined Motor Holdings Limited	1
CML	Coronation Fund Managers	3
CMP	Cipla Medpro South Africa Limited	1
CNL	Control Instruments	2
CPI	Capitec Bank Holdings Limited	10
CPT	Capital Alliance Holdings Limited	1
CSB	Cashbuild Limited	1
CTA	Capital Appreciation Limited	2
DCT	Datacentrix Holdings Limited	1
DGC	Digicore Holdings Limited	2
DRD	DRDGold Limited	1
DSY	Discovery Holdings Limited	1
DTC	Datatec Limited	11
ECO	Edgars Consolidated Stores Limited	1
ELH	Ellerine Holdings Limited	2
EMI	Emira Property Fund	2
EPE	EPE Capital Partners Limited	1
EXL	Excellerate Holdings Limited	1
EXX	Exxaro Resources Limited	2
FFA	Fortress Reit Limited	1

GIJ	Gijima AST Group Limited	2
GLN	Glencore PLC	3
GML	Gemfields Group Limited	1
GND	Grindrod Limited	3
GPL	Grand Parade Investments Limited	2
GRT	Growthpoint Properties Limited	1
GTR	Grit Real Estate Income Group Limited	1
HCI	Hosken Consolidated Investments Limited	2
HDC	Hudaco Industries Limited	1
HLM	Hulamin Limited	1
HMN	Hammerson PLC	2
HSP	Holdsport Limited	1
HUG	Huge Group Limited	8
HYP	Hyprop Investments Limited	3
ILA	Iliad Africa Limited	3
INM	Inmins Limited	1
INP	Investec Bank Limited	2
IPL	Imperial Logistics Limited	4
IQG	Iquad Group Limited	1
IRA	Infrasors Holdings Limited	5
ISB	Insimbi Industrial Holdings Limited	12
ITE	Italtile Limited	2
IVT	Invicta Holdings Limited	2
IWE	Interwaste Holdings Limited	2
JDG	JD Group Limited	1
JSC	Jasco Electronic Holdings Limited	1
KAP	Kap Industrial Holdings Limited	2
KDV	KayDav Group Limited	2
KEL	Kelly Group Limited	1
KIO	Kumba Iron Ore Limited	1
L4L	Long4Life Limited	4
LAN	LA Group Limited	2

LBR	Libstar Holdings Limited	1
LEW	Lewis Group Limited	10
LHG	Litha Health Group	1
MCG	Multichoice Group Limited	1
MFL	Metrofile Holdings Limited	1
MIX	Mix Telematics Limited	5
MNY	Moneyweb Holdings Limited	3
MOR	Morvest Business Group Limited	4
MPT	Mpact Limited	2
MRF	Merafe Resources Limited	1
MRP	Mr Price Group Limited	2
MST	Mustek Limited	18
MTA	Metair Investments Limited	1
MTH	Motus Holdings Limited	1
MTM	Metropolitan Holdings Limited	6
MUR	Murray & Roberts Holdings Limited	1
MVL	Mvelaphanda Group Limited	2
MZR	Mazor Group Limited	5
NED	Nedbank Limited	4
NPH	Northam Platinum Holdings Limited	1
NPK	Nampak Limited	1
NPN	Naspers Limited	1
NUT	Nutritional Holdings Limited	1
NVS	Novus Holdings Limited	1
NWL	Nu-World Holdings Limited	1
OCE	Oceana Group Limited	2
OLG	OneLogix Group Limited	7
OMU	Old Mutual Limited	6
PCN	Paracon	2
PIV	The Pivotal Fund Limited	1
PPR	Putprop Limited	2
PRX	Prosus N.V.	2

PSG	PSG Group Limited	7
QFH	Quantum Foods Holdings Limited	1
QLT	Quilter PLC	2
REM	Remgro Limited	2
RLO	Reunert Limited	1
RNI	Reinet Investments	4
RPL	RDI Reit PLC	1
SAR	Safari Investments Limited	1
SBP	Sabvest Limited	4
SEB	Sebata Holdings Limited	1
SLG	Salungano Group Limited	2
SNV	Santova Limited	3
SOL	Sasol Limited	4
SPG	Super Group Limited	1
SPP	The SPAR Group Limited	1
SSK	Stefanutti Stocks	1
SSW	Sibanye Stillwater Limited	1
SUR	Spur Corporation Limited	1
SVB	Silverbridge Holdings Limited	3
TBG	Tiso Blackstar Group SE	1
TBS	Tiger Brands Limited	1
TEX	Texton Property Fund Limited	2
TFG	The Foschini Group Limited	4
TKG	Telksom SA SOC Limited	4
TLM	Telemasters Holdings Limited	1
TMT	Trematon Capital Investments Limited	1
TPC	Transpaco Limited	2
TRE	Trencor Limited	2
TRL	Trellidor Holdings Limited	3
TRU	Truworths International Limited	11
TTO	Trustco Group Holdings Limited	4
TXT	Textainer Group Holdings Limited	1

UNI	Universal Industries Corportation Limited	1
VIL	Village Main Reef Limited	2
VOD	Vodacom Group Limited	1
VUN	Vunani Property Investment Fund Limited	1
WBO	Wilson Bayly Holmes-Ovcon Limited	1
WHL	Woolworths Holdings Limited	3
YRK	York Timber Holdings Limited	1
ZED	Zeder Investments Limited	2
	Total Number of Announcements	**454**

Appendix 4b: Undervaluation Index Scores

The following list consists of companies that were assigned with a score using Peyer and Vermaelen's (2009) Undervaluation Index (U-Index). Share repurchases with a U-Index score greater than 11 are classified as "High U-Index". Share repurchases with a U-Index score between 6 and 12 are classified as "Moderate U-Index". Share repurchases with a U-Index score lower than 7 are classified as "Low U-Index". Companies classified as "Low U-Index" and "Moderate U-Index" are combined into a "Remaining U-Index" subsample. Four share repurchases were assigned scores of zero due to insufficient data being available at the time of the announcement.

The undervaluation ranking element naming scheme is as follows,

- 'MC' refers to market capitalisation or firm size.
- 'BM' refers to book-to-market ratio.
- 'PR' refers to prior raw returns or the stock's 11-month return from 12 months prior to the announcement date up until 1 month prior to the announcement date.

Share Ticker	Date	MC	BM	PR	Total
NED	2021/11/24	5	5	5	15
MST	2017/10/19	5	5	5	15
MST	2017/06/21	5	5	5	15
ARA	2017/04/06	5	5	5	15
MST	2017/03/28	5	5	5	15
AME	2015/06/24	5	5	5	15
ISB	2014/08/29	5	5	5	15
MOR	2013/05/30	5	5	5	15
GIJ	2009/12/22	5	5	5	15
MTM	2007/11/05	5	5	5	15
LEW	2007/09/17	5	5	5	15
HCI	2007/06/12	5	5	5	15
MTM	2007/06/04	5	5	5	15
MVL	2007/05/15	5	5	5	15
MTM	2006/11/20	5	5	5	15
MTM	2006/07/19	5	5	5	15

BJM	2005/11/18	5	5	5	15
MTM	2005/11/14	5	5	5	15
MNY	2005/03/24	5	5	5	15
EXL	2005/01/04	5	5	5	15
BJM	2003/02/17	5	5	5	15
LEW	2021/11/26	5	4	5	14
LEW	2021/05/28	5	4	5	14
MST	2017/09/12	5	5	4	14
CPI	2017/04/24	5	5	4	14
CPI	2017/02/17	5	5	4	14
CPI	2015/11/06	5	5	4	14
AFE	2015/10/15	4	5	5	14
CPI	2015/08/04	5	5	4	14
CPI	2015/06/24	5	5	4	14
HYP	2015/06/22	5	4	5	14
IRA	2014/09/01	5	4	5	14
ISB	2014/03/03	5	5	4	14
IRA	2013/08/30	5	4	5	14
ISB	2013/08/30	5	5	4	14
ISB	2013/02/28	5	5	4	14
MOR	2012/11/30	5	5	4	14
CLS	2012/08/31	5	4	5	14
ISB	2012/08/30	5	5	4	14
AVI	2011/07/04	4	5	5	14
BTI	2011/07/01	5	4	5	14
GIJ	2009/06/30	5	5	4	14
NED	2006/09/29	4	5	5	14
PCN	2006/07/12	5	5	4	14
GND	2006/06/22	5	4	5	14
GRT	2003/12/23	5	5	4	14
MNY	2003/08/04	5	5	4	14
MNY	2003/07/17	5	5	4	14

AYO	2021/08/31	5	4	4	13
NED	2021/03/25	5	4	4	13
ITE	2018/03/08	5	3	5	13
CPI	2017/09/28	5	5	3	13
GPL	2017/03/28	5	5	3	13
CPI	2016/11/18	5	5	3	13
CPI	2016/10/03	5	5	3	13
MST	2016/09/07	5	4	4	13
NPK	2015/11/27	5	3	5	13
IRA	2015/08/31	5	3	5	13
IRA	2015/08/31	5	3	5	13
CPI	2014/07/25	5	3	5	13
BCX	2014/02/28	5	3	5	13
MOR	2012/05/31	5	3	5	13
BTI	2011/10/03	5	3	5	13
BAT	2010/09/06	5	4	4	13
CLS	2009/08/28	5	5	3	13
AVI	2008/03/12	5	5	3	13
ILA	2005/06/29	3	5	5	13
LAN	2005/01/20	5	5	3	13
MTM	2004/04/13	5	4	4	13
BAT	2003/11/17	4	4	5	13
BJM	2003/04/14	5	4	4	13
MIX	2021/12/06	5	3	4	12
L4L	2020/07/21	5	5	2	12
NPN	2020/01/22	5	5	2	12
LBR	2018/12/19	5	5	2	12
ISB	2018/03/01	4	5	3	12
MIX	2017/05/25	2	5	5	12
MST	2016/09/02	5	4	3	12
GPL	2016/07/29	5	3	4	12
CPI	2016/02/26	5	5	2	12

AFT	2014/02/28	5	2	5	12
EMI	2013/06/28	5	3	4	12
MRF	2012/12/12	3	5	4	12
MOR	2012/08/28	5	4	3	12
BTI	2012/07/02	5	3	4	12
AME	2012/03/02	5	2	5	12
ISB	2012/02/29	5	3	4	12
BTI	2011/04/01	5	4	3	12
CLS	2010/08/31	5	4	3	12
ILA	2008/05/26	5	5	2	12
ARL	2006/12/11	4	3	5	12
CML	2006/08/28	2	5	5	12
CML	2006/06/30	2	5	5	12
ARL	2006/06/01	4	3	5	12
ARL	2005/08/29	3	4	5	12
LAN	2004/06/10	5	5	2	12
GND	2003/11/13	5	5	2	12
CPT	2003/02/06	3	5	4	12
ART	2021/12/07	5	1	5	11
HMN	2021/12/06	5	1	5	11
SBP	2021/11/25	5	1	5	11
TTO	2021/08/31	5	1	5	11
AGL	2021/07/29	5	1	5	11
SSW	2021/06/01	5	1	5	11
SBP	2021/05/26	5	1	5	11
TRU	2021/05/04	5	1	5	11
TPC	2021/04/23	5	1	5	11
SVB	2021/03/26	5	1	5	11
L4L	2020/12/21	5	5	1	11
L4L	2020/12/07	5	5	1	11
ISB	2020/02/28	3	5	3	11
HLM	2020/01/22	4	3	4	11

L4L	2019/10/15	5	5	1	11
OMU	2019/09/02	5	5	1	11
OMU	2019/05/23	5	5	1	11
ISB	2018/09/03	4	4	3	11
AVV	2018/04/05	3	3	5	11
HSP	2017/06/06	5	1	5	11
PIV	2016/01/15	5	1	5	11
AFT	2015/08/31	5	2	4	11
IPL	2015/06/04	5	5	1	11
TFG	2014/09/01	5	1	5	11
CMH	2013/11/11	5	1	5	11
SEB	2013/07/30	5	1	5	11
HCI	2013/05/17	5	1	5	11
VIL	2012/12/28	5	1	5	11
CFR	2012/05/16	5	5	1	11
BTI	2012/04/02	5	4	2	11
SPG	2012/03/15	5	1	5	11
BLU	2011/11/29	1	5	5	11
MZR	2011/08/30	1	5	5	11
CLS	2011/08/17	5	4	2	11
WHL	2011/06/10	5	1	5	11
TRE	2010/11/22	5	1	5	11
WHL	2010/04/23	5	1	5	11
IQG	2010/04/07	5	1	5	11
CLS	2010/02/26	5	5	1	11
VOD	2010/02/10	5	1	5	11
AGL	2007/12/21	1	5	5	11
SOL	2007/10/05	5	1	5	11
OMU	2007/10/03	5	1	5	11
TFG	2007/09/18	5	1	5	11
BJM	2007/07/20	1	5	5	11
AGL	2007/06/28	1	5	5	11

TRU	2007/06/08	5	1	5	11
SOL	2007/05/04	5	1	5	11
EXX	2007/04/16	5	1	5	11
AGL	2007/02/21	1	5	5	11
BHG	2007/02/07	5	1	5	11
LEW	2006/07/28	5	5	1	11
TKG	2006/07/17	5	1	5	11
LEW	2006/03/20	5	5	1	11
TRU	2005/10/10	5	1	5	11
TBS	2005/02/10	5	1	5	11
APN	2004/06/24	5	1	5	11
TRU	2004/05/03	5	1	5	11
MST	2021/12/21	5	1	4	10
MST	2021/09/20	5	1	4	10
NPH	2021/09/20	5	2	3	10
GLN	2021/08/05	4	1	5	10
ART	2021/08/04	5	1	4	10
AVV	2021/05/27	3	2	5	10
PSG	2021/04/20	5	1	4	10
KAP	2021/03/12	5	2	3	10
LEW	2021/02/04	5	3	2	10
ITE	2020/12/30	5	3	2	10
INP	2020/10/07	5	3	2	10
INP	2020/09/28	5	3	2	10
MCG	2020/03/20	5	3	2	10
ASR	2020/03/09	5	2	3	10
OMU	2019/03/11	5	4	1	10
DTC	2018/09/20	5	2	3	10
LEW	2018/06/15	5	3	2	10
DTC	2018/01/23	5	2	3	10
TEX	2017/12/15	5	1	4	10
MUR	2017/06/30	5	1	4	10

MFL	2017/06/27	5	1	4	10
CAT	2016/11/23	3	2	5	10
DCT	2016/09/29	5	1	4	10
TEX	2016/09/08	5	1	4	10
BAT	2016/08/16	5	4	1	10
MST	2015/11/11	5	4	1	10
MIX	2015/09/11	2	5	3	10
MST	2015/05/20	5	4	1	10
MST	2014/12/15	5	4	1	10
CLS	2014/08/29	5	4	1	10
MST	2014/04/16	5	4	1	10
CLS	2014/02/28	5	4	1	10
IRA	2014/02/28	5	4	1	10
TTO	2014/01/31	5	1	4	10
VUN	2013/12/23	5	1	4	10
HYP	2013/12/12	5	4	1	10
BTI	2013/10/01	5	4	1	10
TFG	2013/09/30	5	1	4	10
AFT	2013/08/30	4	2	4	10
CLS	2013/08/30	5	4	1	10
TRU	2013/06/14	5	1	4	10
TFG	2013/03/28	5	1	4	10
TRU	2013/03/12	5	1	4	10
AFT	2013/02/28	4	2	4	10
CLS	2013/02/28	5	4	1	10
VIL	2013/01/18	5	1	4	10
SBP	2012/12/31	5	1	4	10
TRU	2012/12/14	5	1	4	10
BTI	2012/10/01	5	3	2	10
MST	2012/06/28	5	1	4	10
TRU	2012/06/15	5	1	4	10
AFT	2012/02/29	4	2	4	10

AER	2011/03/28	5	4	1	10
SSK	2010/08/02	5	1	4	10
CFR	2010/05/27	4	3	3	10
AFT	2010/02/25	4	2	4	10
OMU	2007/12/28	5	1	4	10
CML	2007/08/06	2	5	3	10
AGL	2006/08/04	1	4	5	10
REM	2006/02/08	5	1	4	10
REM	2005/07/20	5	1	4	10
TKG	2004/09/13	5	1	4	10
IVT	2004/07/07	2	5	3	10
TRU	2003/04/03	5	1	4	10
TRU	2003/04/03	5	1	4	10
BVT	2003/03/27	1	5	4	10
ECO	2003/01/28	5	1	4	10
PRX	2021/08/23	4	1	4	9
MST	2021/06/03	5	1	3	9
HUG	2021/03/17	1	3	5	9
LEW	2020/09/21	5	3	1	9
CGN	2020/03/11	5	2	2	9
DTC	2020/02/25	5	1	3	9
JSC	2020/01/29	4	1	4	9
SVB	2019/12/09	5	1	3	9
TRL	2019/12/03	5	1	3	9
DTC	2019/10/16	5	1	3	9
ISB	2019/08/30	3	4	2	9
SLG	2019/08/23	5	1	3	9
LEW	2019/08/06	5	3	1	9
AGL	2019/07/25	5	1	3	9
DTC	2019/07/17	5	1	3	9
SUR	2019/06/27	5	1	3	9
GML	2019/06/10	4	3	2	9

TRL	2019/06/05	5	1	3	9
MTH	2019/06/04	5	1	3	9
FFA	2019/05/30	5	2	2	9
ISB	2019/02/28	3	4	2	9
GLN	2019/02/20	2	2	5	9
DTC	2018/12/10	5	1	3	9
TRE	2018/12/10	5	1	3	9
EPE	2018/09/27	2	4	3	9
SAR	2018/09/06	5	1	3	9
HMN	2018/07/24	5	2	2	9
MST	2018/05/28	4	1	4	9
RPL	2018/05/09	5	1	3	9
AFT	2018/02/28	1	3	5	9
TKG	2018/02/19	5	1	3	9
OLG	2018/01/17	3	1	5	9
LEW	2017/10/02	5	3	1	9
QFH	2017/09/18	5	1	3	9
YRK	2016/06/09	5	1	3	9
WBO	2015/12/11	5	1	3	9
MZR	2015/02/16	1	4	4	9
ILA	2014/04/08	4	1	4	9
BTI	2014/04/01	5	3	1	9
BTI	2013/07/01	5	3	1	9
BTI	2013/04/02	5	3	1	9
AFT	2012/08/30	4	2	3	9
MVL	2012/08/21	5	3	1	9
TBG	2011/12/20	5	1	3	9
NED	2010/12/28	3	5	1	9
IPL	2010/12/23	5	2	2	9
ACL	2009/05/06	1	3	5	9
CFR	2008/05/22	5	1	3	9
TKG	2008/02/20	5	1	3	9

AGL	2006/12/22	1	5	3	9
BHG	2005/08/29	4	1	4	9
BHG	2004/09/16	3	1	5	9
OLG	2004/05/14	1	5	3	9
TPC	2003/05/12	5	1	3	9
AIP	2021/04/16	5	1	2	8
ART	2021/04/13	3	1	4	8
TMT	2021/01/18	5	1	2	8
SNV	2021/01/11	5	1	2	8
TLM	2020/12/30	5	1	2	8
TRL	2020/12/21	5	1	2	8
ZED	2020/12/03	5	1	2	8
NUT	2020/12/02	5	1	2	8
IPL	2020/09/25	5	1	2	8
AMS	2020/09/23	5	1	2	8
ISB	2020/08/31	2	5	1	8
SNV	2020/08/28	5	1	2	8
GND	2020/07/21	5	2	1	8
ZED	2020/07/10	5	1	2	8
TTO	2020/03/31	5	1	2	8
CTA	2020/03/20	5	1	2	8
SVB	2020/03/18	5	1	2	8
SNV	2020/03/05	5	1	2	8
CCO	2020/02/26	5	1	2	8
CAT	2019/12/11	3	2	3	8
TTO	2019/09/30	5	1	2	8
IPL	2019/09/18	5	2	1	8
TXT	2019/09/03	5	1	2	8
DTC	2019/08/29	5	1	2	8
BCF	2019/07/02	4	3	1	8
DTC	2019/06/25	5	1	2	8
DTC	2019/06/25	5	1	2	8

BCF	2019/05/30	4	3	1	8
DRD	2019/05/22	5	2	1	8
AVV	2019/03/22	4	3	1	8
DTC	2019/01/15	5	1	2	8
RNI	2018/11/19	5	1	2	8
NVS	2018/09/13	2	1	5	8
GLN	2018/07/05	1	2	5	8
IWE	2018/05/04	4	1	3	8
CAT	2017/12/07	3	1	4	8
AVV	2017/11/23	3	2	3	8
BSR	2017/09/27	5	1	2	8
AFT	2017/02/28	4	2	2	8
AFT	2016/02/29	4	2	2	8
CSB	2015/10/16	2	5	1	8
CFR	2014/05/15	5	1	2	8
MRP	2014/02/20	5	1	2	8
MRP	2013/03/08	5	1	2	8
EMI	2011/12/30	4	3	1	8
CMP	2011/11/30	3	1	4	8
AFT	2011/08/31	4	2	2	8
AFT	2011/02/28	4	2	2	8
MZR	2010/08/31	1	2	5	8
DSY	2009/03/20	4	2	2	8
AFT	2009/02/27	5	1	2	8
MZR	2009/02/27	1	3	4	8
OMU	2008/04/16	5	1	2	8
CNL	2007/12/18	2	2	4	8
OCE	2007/11/09	2	1	5	8
ELH	2007/03/02	2	1	5	8
OLG	2004/04/19	1	5	2	8
BRC	2003/10/01	2	2	4	8
MST	2003/06/24	5	1	2	8

IVT	2003/05/27	3	3	2	8
MST	2003/05/26	5	1	2	8
BRT	2021/06/30	1	1	5	7
PSG	2021/01/19	5	1	1	7
HDC	2020/11/30	5	1	1	7
AVV	2020/11/23	3	2	2	7
PRX	2020/11/23	4	1	2	7
PPR	2020/09/15	5	1	1	7
OCE	2020/03/30	2	4	1	7
AIP	2020/03/20	5	1	1	7
QLT	2020/03/11	5	1	1	7
QLT	2020/01/02	5	1	1	7
SBP	2019/12/10	5	1	1	7
PSG	2019/10/17	5	1	1	7
RNI	2019/09/06	5	1	1	7
AVV	2019/08/16	3	3	1	7
BCF	2019/08/07	3	3	1	7
RNI	2019/06/14	5	1	1	7
RNI	2019/02/06	5	1	1	7
APF	2018/09/27	4	1	2	7
AFT	2018/08/31	1	3	3	7
MZR	2018/06/05	1	5	1	7
CFR	2017/05/12	5	1	1	7
EXX	2017/01/17	5	1	1	7
AFT	2016/08/31	4	2	1	7
HYP	2015/12/11	5	1	1	7
BRT	2015/12/07	5	1	1	7
BTI	2014/07/01	5	1	1	7
CDZ	2014/06/11	2	3	2	7
HUG	2013/12/20	1	1	5	7
OLG	2013/09/25	4	1	2	7
BVT	2011/04/07	1	1	5	7

PCN	2010/08/25	5	1	1	7
HUG	2010/06/21	1	1	5	7
HUG	2010/02/09	1	1	5	7
SLG	2009/01/09	5	1	1	7
UNI	2008/12/04	5	1	1	7
NWL	2008/11/27	5	1	1	7
SOL	2008/10/30	5	1	1	7
TRU	2008/10/21	5	1	1	7
SPP	2008/09/30	5	1	1	7
SOL	2008/09/22	5	1	1	7
WHL	2008/07/25	5	1	1	7
BJM	2008/03/25	1	5	1	7
APK	2007/08/14	1	1	5	7
BAW	2006/06/20	1	1	5	7
BHG	2003/08/21	2	1	4	7
INM	2003/05/12	2	2	3	7
ART	2021/03/08	3	1	2	6
MPT	2021/01/27	1	3	2	6
MPT	2020/10/20	1	3	2	6
BCF	2020/06/30	3	2	1	6
OLG	2020/04/02	2	1	3	6
AFT	2019/08/30	1	3	2	6
ART	2019/08/26	3	1	2	6
ART	2019/07/15	3	1	2	6
ART	2019/03/28	3	1	2	6
CAT	2019/03/25	3	1	2	6
ART	2019/01/16	3	1	2	6
MST	2018/10/18	4	1	1	6
ART	2018/10/09	3	1	2	6
PPR	2018/06/29	4	1	1	6
GTR	2018/03/02	4	1	1	6
IWE	2017/11/15	4	1	1	6

AVV	2017/09/07	3	2	1	6
AFT	2017/08/31	4	1	1	6
ART	2017/08/22	2	1	3	6
ART	2016/09/02	2	1	3	6
KDV	2011/12/23	2	2	2	6
PSG	2010/02/25	1	1	4	6
KEL	2008/07/17	2	2	2	6
PSG	2003/06/24	1	1	4	6
ELH	2003/05/30	1	1	4	6
CAT	2020/12/08	3	1	1	5
ART	2020/10/12	2	1	2	5
ART	2020/04/09	3	1	1	5
AFT	2020/02/28	1	2	2	5
KAP	2020/02/25	1	2	2	5
HUG	2020/01/15	1	1	3	5
HUG	2020/01/15	1	1	3	5
MIX	2019/08/14	3	1	1	5
ART	2018/12/12	2	1	2	5
ART	2018/11/20	2	1	2	5
CTA	2018/02/05	3	1	1	5
ART	2018/01/22	3	1	1	5
ART	2016/08/10	2	1	2	5
OLG	2011/11/30	2	1	2	5
OLG	2011/11/30	2	1	2	5
AIP	2008/09/22	2	2	1	5
JDG	2008/07/29	1	3	1	5
HUG	2008/07/03	1	2	2	5
PSG	2004/11/03	1	1	3	5
PSG	2003/06/02	1	1	3	5
DGC	2003/05/14	1	1	3	5
ART	2020/12/14	2	1	1	4
ART	2020/11/20	2	1	1	4

AFT	2020/08/31	1	2	1	4
AFT	2019/02/28	1	2	1	4
ART	2018/07/17	2	1	1	4
ART	2018/03/23	2	1	1	4
ART	2018/02/23	2	1	1	4
ART	2017/12/05	2	1	1	4
ART	2017/10/09	2	1	1	4
ART	2017/09/29	2	1	1	4
ART	2016/02/16	2	1	1	4
ART	2015/12/14	2	1	1	4
ART	2015/09/21	2	1	1	4
KDV	2009/09/18	2	1	1	4
HUG	2009/01/06	1	2	1	4
DGC	2004/06/14	1	1	2	4
KIO	2010/12/30	1	1	1	3
RLO	2010/12/08	1	1	1	3
LHG	2009/08/21	1	1	1	3
DTC	2008/02/22	1	1	1	3
MTA	2018/10/28	0	0	0	0
MIX	2015/11/15	0	0	0	0
CFR	2011/05/29	0	0	0	0
CNL	2007/12/08	0	0	0	0

Appendix 5: Sample Creation Process

The following key words were used to help in searching for only open market share repurchase announcements made by publicly listed companies over the period January 2003 to December 2021:

Headings:

- Include: ‘repurchase’, ‘buyback’, ‘buy-back’, ‘buy back’
- Exclude: ‘update’, ‘notice’

Entire article (including headings):

- Include: ‘repurchase programme’, ‘repurchase program’, ‘buyback programme’, ‘buyback program’, ‘buy-back programme’, ‘buy-back program’
- Exclude: ‘financial statement’, ‘financial results’

A list of 2297 SENS announcements was produced after using the above key words to screen for open market share repurchases made by publicly listed companies. 575 of these SENS announcements officially indicated that a share repurchase program would be conducted by the company. 121 open market share repurchases were eliminated from the sample due to there being insufficient historical asset price data. The remaining 454 open market share repurchases were used in the final event study sample. The table below shows all 575 share repurchases – the 121 share repurchases that were eliminated from the sample are highlighted in red.

Open Market Share Repurchases			
Ticker	**Short Name**	**Long Name**	**Date**
MST	Mustek	Mustek Limited	2021/12/21
ART	Argent	Argent Industrial Limited	2021/12/07
HMN	Hammerson	Hammerson PLC	2021/12/06
MIX	Mix	Mix Telematics	2021/12/06
LEW	Lewis	Lewis Group Limited	2021/11/26
SBP	Sabvest	Sabvest Limited	2021/11/25
NED	Nedbank	Nedbank Limited	2021/11/24
MST	Mustek	Mustek Limited	2021/09/20
NPH	Northam	Northam Platinum Holdings Limited	2021/09/20
TTO	Trustco	Trustco Group Holdings Limited	2021/08/31

AYO	Ayo	Ayo Technology Solutions Limited	2021/08/31
PRX	Prosus	Prosus N.V.	2021/08/23
GLN	Glencore	Glencore PLC	2021/08/05
ART	Argent	Argent Industrial Limited	2021/08/04
AGL	Anglo	Anglo American PLC	2021/07/29
BRT	Brimstone	Brimstone Investment Corporation Limited	2021/06/30
MST	Mustek	Mustek Limited	2021/06/03
SSW	Sibanye	Sibanye Stillwater Limited	2021/06/01
NVE	NVEST	NVEST Financial Holdings Limited	2021/05/31
LEW	Lewis	Lewis Group Limited	2021/05/28
AVV	Alviva	Alviva Holdings Limited	2021/05/27
SBP	Sabvest	Sabvest Limited	2021/05/26
TRU	Truworths	Truworths International Limited	2021/05/04
AHB	Arrowhead B	Arrowhead Properties Limited	2021/04/30
TPC	Transpaco	Transpaco Limited	2021/04/23
PSG	PSG	PSG Group Limited	2021/04/20
AIP	Adcock	Adcock Ingram Holdings Limited	2021/04/16
ART	Argent	Argent Industrial Limited	2021/04/13
SVB	Silverbridge	Silverbridge Holdings Limited	2021/03/26
NED	Nedbank	Nedbank Limited	2021/03/25
HUG	Huge	Huge Group Limited	2021/03/17
KAP	Kap	Kap Industrial Holdings Limited	2021/03/12
ART	Argent	Argent Industrial Limited	2021/03/08
LEW	Lewis	Lewis Group Limited	2021/02/04
MPT	Mpact	Mpact Limited	2021/01/27
PSG	PSG	PSG Group Limited	2021/01/19
TMT	Trematon	Trematon Capital Investments Limited	2021/01/18
SNV	Santova	Santova Limited	2021/01/11
TLM	Telemasters	Telemasters Holdings Limited	2020/12/30
ITE	Italtile	Italtile Limited	2020/12/30
L4L	Long4Life	Long4Life Limited	2020/12/21
TRL	Trellidor	Trellidor Holdings Limited	2020/12/21

ART	Argent	Argent Industrial Limited	2020/12/14
CAT	Caxton	Caxton and CTP Publishers and Printers	2020/12/08
L4L	Long4Life	Long4Life Limited	2020/12/07
ZED	Zeder	Zeder Investments Limited	2020/12/03
NUT	Nutritional	Nutritional Holdings Limited	2020/12/02
HDC	Hudaco	Hudaco Industries Limited	2020/11/30
PRX	Prosus	Prosus N.V.	2020/11/23
AVV	Alviva	Alviva Holdings Limited	2020/11/23
ART	Argent	Argent Industrial Limited	2020/11/20
MPT	Mpact	Mpact Limited	2020/10/20
ART	Argent	Argent Industrial Limited	2020/10/12
INP	Investec	Investec Bank Limited	2020/10/07
INP	Investec	Investec Bank Limited	2020/09/28
IBRP1	Investec	Investec Bank Limited	2020/09/25
IPL	Imperial	Imperial Logistics Limited	2020/09/25
AMS	Anglo	Anglo American PLC	2020/09/23
LEW	Lewis	Lewis Group Limited	2020/09/21
PPR	Putprop	Putprop Limited	2020/09/15
AFT	Afrimat	Afrimat Limited	2020/08/31
ISB	Insimbi	Insimbi Industrial Holdings Limited	2020/08/31
SNV	Santova	Santova Limited	2020/08/28
IDQ	Indequity	Indequity Group Limited	2020/07/24
GND	Grindrod	Grindrod Limited	2020/07/21
L4L	Long4Life	Long4Life Limited	2020/07/21
ZED	Zeder	Zeder Investments Limited	2020/07/10
BCF	Bowler	Bowler Metcalf Limited	2020/06/30
SCP	Stellar	Stellar Capital Partners Limited	2020/06/04
RED	Redink	Redink Rental Limited	2020/04/15
ART	Argent	Argent Industrial Limited	2020/04/09
OLG	OneLogix	OneLogix Group Limited	2020/04/02
SCP	Stellar	Stellar Capital Partners Limited	2020/04/01
TTO	Trustco	Trustco Group Holdings Limited	2020/03/31

OCE	Oceana	Oceana Group Limited	2020/03/30
MCG	Multichoice	Multichoice Group Limited	2020/03/20
AIP	Adcock	Adcock Ingram Holdings Limited	2020/03/20
CTA	Capital	Capital Appreciation Limited	2020/03/20
SVB	Silverbridge	Silverbridge Holdings Limited	2020/03/18
CGN	Cognition	Cognition Holdings Limited	2020/03/11
QLT	Quilter	Quilter PLC	2020/03/11
ASR	Assore	Assore Limited	2020/03/09
SNV	Santova	Santova Limited	2020/03/05
ISB	Insimbi	Insimbi Industrial Holdings Limited	2020/02/28
AFT	Afrimat	Afrimat Limited	2020/02/28
CCO	Capital & Counties	Capital & Counties Properties PLC	2020/02/26
KAP	Kap	Kap Industrial Holdings Limited	2020/02/25
DTC	Datatec	Datatec Limited	2020/02/25
JSC	Jasco	Jasco Electronic Holdings Limited	2020/01/29
NPN	Naspers	Naspers Limited	2020/01/22
HLM	Hulamin	Hulamin Limited	2020/01/22
IDQ	Indequity	Indequity Group Limited	2020/01/22
HUG	Huge	Huge Group Limited	2020/01/15
HUG	Huge	Huge Group Limited	2020/01/15
QLT	Quilter	Quilter PLC	2020/01/02
CAT	Caxton	Caxton and CTP Publishers and Printers	2019/12/11
SBP	Sabvest	Sabvest Limited	2019/12/10
SVB	Silverbridge	Silverbridge Holdings Limited	2019/12/09
TRL	Trellidor	Trellidor Holdings Limited	2019/12/03
SCP	Stellar	Stellar Capital Partners Limited	2019/10/24
PSG	PSG	PSG Group Limited	2019/10/17
DTC	Datatec	Datatec Limited	2019/10/16
L4L	Long4Life	Long4Life Limited	2019/10/15
TTO	Trustco	Trustco Group Holdings Limited	2019/09/30
IPL	Imperial	Imperial Logistics Limited	2019/09/18

RNI	Reinet	Reinet Investments	2019/09/06
TXT	Textainer	Textainer Group Holdings Limited	2019/09/03
OMU	Old Mutual	Old Mutual Limited	2019/09/02
AFT	Afrimat	Afrimat Limited	2019/08/30
ISB	Insimbi	Insimbi Industrial Holdings Limited	2019/08/30
DTC	Datatec	Datatec Limited	2019/08/29
ART	Argent	Argent Industrial Limited	2019/08/26
SLG	Salungano	Salungano Group Limited	2019/08/23
AVV	Alviva	Alviva Holdings Limited	2019/08/16
MIX	Mix	Mix Telematics	2019/08/14
BCF	Bowler	Bowler Metcalf Limited	2019/08/07
LEW	Lewis	Lewis Group Limited	2019/08/06
AGL	Anglo	Anglo American PLC	2019/07/25
DTC	Datatec	Datatec Limited	2019/07/17
ADI	Adapt IT	Adapt IT Holdings Limited	2019/07/15
ART	Argent	Argent Industrial Limited	2019/07/15
BCF	Bowler	Bowler Metcalf Limited	2019/07/02
SUR	Spur	Spur Corporation Limited	2019/06/27
DTC	Datatec	Datatec Limited	2019/06/25
DTC	Datatec	Datatec Limited	2019/06/25
RNI	Reinet	Reinet Investments	2019/06/14
GML	Gemfields	Gemfields Group Limited	2019/06/10
TRL	Trellidor	Trellidor Holdings Limited	2019/06/05
MTH	Motus	Motus Holdings Limited	2019/06/04
BCF	Bowler	Bowler Metcalf Limited	2019/05/30
FFA	Fortress	Fortress Reit Limited	2019/05/30
LTE	Lighthouse	Lighthouse Capital Limited	2019/05/28
OMU	Old Mutual	Old Mutual Limited	2019/05/23
DRD	DRDGold	DRDGold Limited	2019/05/22
RED	Redink	Redink Rental Limited	2019/04/03
ART	Argent	Argent Industrial Limited	2019/03/28
CAT	Caxton	Caxton and CTP Publishers and Printers	2019/03/25

AVV	Alviva	Alviva Holdings Limited	2019/03/22
OMU	Old Mutual	Old Mutual Limited	2019/03/11
AFT	Afrimat	Afrimat Limited	2019/02/28
ISB	Insimbi	Insimbi Industrial Holdings Limited	2019/02/28
GLN	Glencore	Glencore PLC	2019/02/20
ING	Ingenuity	Ingenuity Property Investments Limited	2019/02/15
ADI	Adapt IT	Adapt IT Holdings Limited	2019/02/07
ADI	Adapt IT	Adapt IT Holdings Limited	2019/02/07
RNI	Reinet	Reinet Investments	2019/02/06
ART	Argent	Argent Industrial Limited	2019/01/16
DTC	Datatec	Datatec Limited	2019/01/15
IDQ	Indequity	Indequity Group Limited	2019/01/11
LBR	Libstar	Libstar Holdings Limited	2018/12/19
ART	Argent	Argent Industrial Limited	2018/12/12
DTC	Datatec	Datatec Limited	2018/12/10
TRE	Trencor	Trencor Limited	2018/12/10
PGR	Peregrine	Peregrine Holdings Limited	2018/12/05
ART	Argent	Argent Industrial Limited	2018/11/20
RNI	Reinet	Reinet Investments	2018/11/19
MTA	Metair	Metair Investments Limited	2018/10/28
MST	Mustek	Mustek Limited	2018/10/18
ART	Argent	Argent Industrial Limited	2018/10/09
EPE	EPE Capital	EPE Capital Partners Limited	2018/09/27
APF	Accelerate	Accelerate Property Fund Limited	2018/09/27
DTC	Datatec	Datatec Limited	2018/09/20
NVS	Novus	Novus Holdings Limited	2018/09/13
SAR	Safari	Safari Investments Limited	2018/09/06
ISB	Insimbi	Insimbi Industrial Holdings Limited	2018/09/03
AFT	Afrimat	Afrimat Limited	2018/08/31
HMN	Hammerson	Hammerson PLC	2018/07/24
ART	Argent	Argent Industrial Limited	2018/07/17
GLN	Glencore	Glencore PLC	2018/07/05

MMI	MMI	MMI Holdings Limited	2018/07/05
ADI	Adapt IT	Adapt IT Holdings Limited	2018/07/03
PPR	Putprop	Putprop Limited	2018/06/29
LEW	Lewis	Lewis Group Limited	2018/06/15
MZR	Mazor	Mazor Group Limited	2018/06/05
LTE	Lighthouse	Lighthouse Capital Limited	2018/05/31
GRP	Greenbay	Greenbay Properties Limited	2018/05/31
MST	Mustek	Mustek Limited	2018/05/28
RPL	RDI	RDI Reit PLC	2018/05/09
IWE	Interwaste	Interwaste Holdings Limited	2018/05/04
AVV	Alviva	Alviva Holdings Limited	2018/04/05
VLE	Value	Value Group Limited	2018/03/27
ART	Argent	Argent Industrial Limited	2018/03/23
ITE	Italtile	Italtile Limited	2018/03/08
GTR	Grit	Grit Real Estate Income Group Limited	2018/03/02
ISB	Insimbi	Insimbi Industrial Holdings Limited	2018/03/01
AFT	Afrimat	Afrimat Limited	2018/02/28
ART	Argent	Argent Industrial Limited	2018/02/23
IDQ	Indequity	Indequity Group Limited	2018/02/21
TKG	Telkom	Telksom SA SOC Limited	2018/02/19
IDQ	Indequity	Indequity Group Limited	2018/02/07
CTA	Capital Appreciation	Capital Appreciation Limited	2018/02/05
DTC	Datatec	Datatec Limited	2018/01/23
ART	Argent	Argent Industrial Limited	2018/01/22
OLG	OneLogix	OneLogix Group Limited	2018/01/17
ELR	ELB	ELB Group Limited	2018/01/12
TEX	Texton	Texton Property Fund Limited	2017/12/15
CAT	Caxton	Caxton and CTP Publishers and Printers	2017/12/07
ART	Argent	Argent Industrial Limited	2017/12/05
VMK	Verimark	Verimark Holdings Limited	2017/11/30
AVV	Alviva	Alviva Holdings Limited	2017/11/23

IWE	Interwaste	Interwaste Holdings Limited	2017/11/15
MST	Mustek	Mustek Limited	2017/10/19
ART	Argent	Argent Industrial Limited	2017/10/09
IDQ	Indequity	Indequity Group Limited	2017/10/05
LEW	Lewis	Lewis Group Limited	2017/10/02
ART	Argent	Argent Industrial Limited	2017/09/29
CPI	Capitec	Capitec Bank Holdings Limited	2017/09/28
BSR	Basil	Basil Read Holdings Limietd	2017/09/27
QFH	Quantum	Quantum Foods Holdings Limited	2017/09/18
MST	Mustek	Mustek Limited	2017/09/12
AVV	Alviva	Alviva Holdings Limited	2017/09/07
AFT	Afrimat	Afrimat Limited	2017/08/31
ART	Argent	Argent Industrial Limited	2017/08/22
MUR	Murray & Roberts	Murray & Roberts Holdings Limited	2017/06/30
MFL	Metrofile	Metrofile Holdings Limited	2017/06/27
MST	Mustek	Mustek Limited	2017/06/21
HSP	Holdsport	Holdsport Limited	2017/06/06
MIX	Mix	Mix Telematics Limited	2017/05/25
BSS	BSI Steel	BSI Steel Limited	2017/05/22
CFR	Companie	Companie Financiere Richemont SA	2017/05/12
CPI	Capitec	Capitec Bank Holdings Limited	2017/04/24
ARA	Astoria	Astoria Investments Limited	2017/04/06
GPL	Grand Parade	Grand Parade Investments Limited	2017/03/28
MST	Mustek	Mustek Limited	2017/03/28
AFT	Afrimat	Afrimat Limited	2017/02/28
CPI	Capitec	Capitec Bank Holdings Limited	2017/02/17
EXX	Exxaro	Exxaro Resources Limited	2017/01/17
CAT	Caxton	Caxton and CTP Publishers and Printers	2016/11/23
CPI	Capitec	Capitec Bank Holdings Limited	2016/11/18
PNC	Pinnacle	Pinnacle Holdings Limited	2016/10/03
CPI	Capitec	Capitec Bank Holdings Limited	2016/10/03
DCT	Datacentrix	Datacentrix Holdings Limited	2016/09/29

TEX	Texton	Texton Property Fund Limited	2016/09/08
MST	Mustek	Mustek Limited	2016/09/07
MST	Mustek	Mustek Limited	2016/09/02
ART	Argent	Argent Industrial Limited	2016/09/02
AFT	Afrimat	Afrimat Limited	2016/08/31
BAT	Brait	Brait SE	2016/08/16
ART	Argent	Argent Industrial Limited	2016/08/10
GPL	Grand Parade	Grand Parade Investments Limited	2016/07/29
STP	Stenpop	Stenpop Limited	2016/06/30
YRK	York	York Timber Holdings Limited	2016/06/09
ART	Argent	Argent Industrial Limited	2016/04/18
AFT	Afrimat	Afrimat Limited	2016/02/29
CPI	Capitec	Capitec Bank Holdings Limited	2016/02/26
ART	Argent	Argent Industrial Limited	2016/02/16
NT1	Net 1	Net 1 UEPS Technologies Inc	2016/02/04
PIV	Pivotal	The Pivotal Fund Limited	2016/01/15
CPI	Capitec	Capitec Bank Holdings Limited	2016/01/13
ART	Argent	Argent Industrial Limited	2015/12/14
WBO	Wilson Bayly	Wilson Bayly Holmes-Ovcon Limited	2015/12/11
HYP	Hyprop	Hyprop Investments Limited	2015/12/11
BRT	Brimstone	Brimstone Investment Corporation Limited	2015/12/07
NPK	Nampak	Nampak Limited	2015/11/27
MIX	Mix	Mix Telematics Limited	2015/11/15
MST	Mustek	Mustek Limited	2015/11/11
CPI	Capitec	Capitec Bank Holdings Limited	2015/11/06
CSB	Cashbuild	Cashbuild Limited	2015/10/16
AFE	AECI	AECI Limited	2015/10/15
ART	Argent	Argent Industrial Limited	2015/09/21
MIX	Mix	Mix Telematics Limited	2015/09/11
IRA	Infrasors	Infrasors Holdings Limited	2015/08/31
AFT	Afrimat	Afrimat Limited	2015/08/31
IRA	Infrasors	Infrasors Holdings Limited	2015/08/31

CPI	Capitec	Capitec Bank Holdings Limited	2015/08/04
CPI	Capitec	Capitec Bank Holdings Limited	2015/06/24
AME	African Media	African Media Entertainment Limited	2015/06/24
HYP	Hyprop	Hyprop Investments Limited	2015/06/22
EQS	Eqstra	Eqstra Holdings Limited	2015/06/04
IPL	Imperial	Imperial Holdings Limited	2015/06/04
MST	Mustek	Mustek Limited	2015/05/20
CMH	Combined	Combined Motor Holdings Limited	2015/04/21
VLE	Value	Value Group Limited	2015/03/03
MZR	Mazor	Mazor Group Limited	2015/02/16
MST	Mustek	Mustek Limited	2014/12/15
IRA	Infrasors	Infrasors Holdings Limited	2014/09/01
AFT	Afrimat	Afrimat Limited	2014/09/01
TFG	Foschini	The Foschini Group Limited	2014/09/01
VLE	Value	Value Group Limited	2014/08/29
CLS	Clicks	Clicks Group Limited	2014/08/29
ISB	Insimbi	Insimbi Industrial Holdings Limited	2014/08/29
SOV	Sovereign	Sovereign Food Investments Limited	2014/08/29
SOV	Sovereign	Sovereign Food Investments Limited	2014/08/29
GLN	Glencore	Glencore PLC	2014/08/20
CPI	Capitec	Capitec Bank Holdings Limited	2014/07/25
BTI	BAT	British American Tobacco PLC	2014/07/01
PNC	Pinnacle	Pinnacle Holdings Limited	2014/06/30
CDZ	Cadiz	Cadiz Holdings Limited	2014/06/11
CFR	Compagnie	Compagnie Financiere Richemont SA	2014/05/15
MST	Mustek	Mustek Limited	2014/04/16
ILA	Iliad	Iliad Africa Limited	2014/04/08
BTI	BAT	British American Tobacco PLC	2014/04/01
BSS	BSI Steel	BSI Steel Limited	2014/03/26
ISB	Insimbi	Insimbi Industrial Holdings Limited	2014/03/03
AFT	Afrimat	Afrimat Limited	2014/02/28
IRA	Infrasors	Infrasors Holdings Limited	2014/02/28

SOV	Sovereign	Sovereign Food Investments Limited	2014/02/28
CLS	Clicks	Clicks Group Limited	2014/02/28
BCX	Business	Business Connexion Group Limited	2014/02/28
MRP	Mr Price	Mr Price Group Limited	2014/02/20
TTO	Trustco	Trustco Group Holdings Limited	2014/01/31
VUN	Vunani	Vunani Property Investment Fund Limited	2013/12/23
HUG	Huge	Huge Group Limited	2013/12/20
HYP	Hyprop	Hyprop Investments Limited	2013/12/12
CMH	Combined	Combined Motor Holdings Limited	2013/11/11
COM	Comair	Comair Limited	2013/11/06
BTI	BAT	British American Tobacco PLC	2013/10/01
TFG	Foschini	The Foschini Group Limited	2013/09/30
OLG	OneLogix	OneLogix Group Limited	2013/09/25
SOV	Sovereign	Sovereign Food Investments Limited	2013/08/30
AFT	Afrimat	Afrimat Limited	2013/08/30
ISB	Insimbi	Insimbi Industrial Holdings Limited	2013/08/30
CLS	Clicks	Clicks Group Limited	2013/08/30
IRA	Infrasors	Infrasors Holdings Limited	2013/08/30
IDQ	Indequity	Indequity Group Limited	2013/08/16
SEB	Sebata	Sebata Holdings Limited	2013/07/30
BTI	BAT	British American Tobacco PLC	2013/07/01
EMI	Emira	Emira Property Fund	2013/06/28
SOV	Sovereign	Sovereign Food Investments Limited	2013/06/18
TRU	Truworths	Truworths International Limited	2013/06/14
MOR	Morvest	Morvest Business Group Limited	2013/05/30
EQS	Eqstra	Eqstra Holdings Limited	2013/05/17
HCI	Hosken	Hosken Consolidated Investments Limited	2013/05/17
BTI	BAT	British American Tobacco PLC	2013/04/02
TFG	Foschini	The Foschini Group Limited	2013/03/28
BSS	BSI Steel	BSI Steel Limited	2013/03/19
TRU	Truworths	Truworths International Limited	2013/03/12
MRP	Mr Price	Mr Price Group Limited	2013/03/08

SOV	Sovereign	Sovereign Food Investments Limited	2013/02/28
ISB	Insimbi	Insimbi Industrial Holdings Limited	2013/02/28
AFT	Afrimat	Afrimat Limited	2013/02/28
CLS	Clicks	Clicks Group Limited	2013/02/28
VIL	Village Main	Village Main Reef Limited	2013/01/18
SBP	Sabvest	Sabvest Limited	2012/12/31
SAC	SA Corportate	SA Corportate Real Estate Fund	2012/12/28
VIL	Village Main	Village Main Reef Limited	2012/12/28
TRU	Truworths	Truworths International Limited	2012/12/14
MRF	Merafe	Merafe Resources Limited	2012/12/12
MOR	Morvest	Morvest Business Group Limited	2012/11/30
SOV	Sovereign	Sovereign Food Investments Limited	2012/11/02
BTI	BAT	British American Tobacco PLC	2012/10/01
EQS	Eqstra	Eqstra Holdings Limited	2012/09/14
CLS	Clicks	Clicks Group Limited	2012/08/31
ISB	Insimbi	Insimbi Industrial Holdings Limited	2012/08/30
AFT	Afrimat	Afrimat Limited	2012/08/30
MOR	Morvest	Morvest Business Group Limited	2012/08/28
MVL	Mvelaphanda	Mvelaphanda Group Limited	2012/08/21
BTI	BAT	British American Tobacco PLC	2012/07/02
EQS	Eqstra	Eqstra Holdings Limited	2012/06/29
MST	Mustek	Mustek Limited	2012/06/28
TRU	Truworths	Truworths International Limited	2012/06/15
MOR	Morvest	Morvest Business Group Limited	2012/05/31
CFR	Compagnie	Compagnie Financiere Richemont SA	2012/05/16
BTI	BAT	British American Tobacco PLC	2012/04/02
SPG	Super	Super Group Limited	2012/03/15
AME	African Media	African Media Entertainment Limited	2012/03/02
ISB	Insimbi	Insimbi Industrial Holdings Limited	2012/02/29
AFT	Afrimat	Afrimat Limited	2012/02/29
MTL	Mercantile	Mercantile Bank Holdings Limited	2012/02/15
EMI	Emira	Emira Property Fund	2011/12/30

KDV	KayDav	KayDav Group Limited	2011/12/23
BCK	Blackstar	Blackstar Group SE	2011/12/20
OLG	OneLogix	OneLogix Group Limited	2011/11/30
OLG	OneLogix	OneLogix Group Limited	2011/11/30
CMP	Cipla	Cipla Medpro South Africa Limited	2011/11/30
BLU	Blue Label	Blue Label Telecoms Limited	2011/11/29
PNC	Pinnacle	Pinnacle Holdings Limited	2011/10/27
BTI	BAT	British American Tobacco PLC	2011/10/03
AFT	Afrimat	Afrimat Limited	2011/08/31
MZR	Mazor	Mazor Group Limited	2011/08/30
CLS	Clicks	Clicks Group Limited	2011/08/17
AVI	AVI	AVI Limited	2011/07/04
BTI	BAT	British American Tobacco PLC	2011/07/01
ASO	Austro	Austro Group Limited	2011/06/23
WHL	Woolworths	Woolworths Holdings Limited	2011/06/10
CFR	Compagnie	Compagnie Financiere Richemont SA	2011/05/29
BVT	Bidvest	The Bidvest Group Limited	2011/04/07
BTI	BAT	British American Tobacco PLC	2011/04/01
AER	Amalgamated	Amalgamated Electronic Corporation Limited	2011/03/28
AFT	Afrimat	Afrimat Limited	2011/02/28
KIO	Kumba	Kumba Iron Ore Limited	2010/12/30
NED	Nedbank	Nedbank Limited	2010/12/28
IPL	Imperial	Imperial Holdings Limited	2010/12/23
ASO	Austro	Austro Group Limited	2010/12/14
POY	Poynting	Poynting Holdings Limited	2010/12/13
RLO	Reunert	Reunert Limited	2010/12/08
SBG	Simeka	Simeka Business Group Limited	2010/11/30
TRE	Trencor	Trencor Limited	2010/11/22
BAT	Brait	Brait SE	2010/09/06
MZR	Mazor	Mazor Group Limited	2010/08/31
CLS	Clicks	Clicks Group Limited	2010/08/31

ING	Ingenuity	Ingenuity Property Investments Limited	2010/08/30
PCN	Paracon	Paracon	2010/08/25
SSK	Stefanutti	Stefanutti Stocks	2010/08/02
HUG	Huge	Huge Group Limited	2010/06/21
CFR	Compagnie	Compagnie Financiere Richemont SA	2010/05/27
WHL	Woolworths	Woolworths Holdings Limited	2010/04/23
IQG	Iquad	Iquad Group Limited	2010/04/07
CLS	Clicks	Clicks Group Limited	2010/02/26
AFT	Afrimat	Afrimat Limited	2010/02/25
PSG	PSG	PSG Group Limited	2010/02/25
VOD	Vodacom	Vodacom Group Limited	2010/02/10
HUG	Huge	Huge Group Limited	2010/02/09
GIJ	Gijima	Gijima AST Group Limited	2009/12/22
BSS	BSI Steel	BSI Steel Limited	2009/09/30
KDV	KayDav	KayDav Group Limited	2009/09/18
CLS	Clicks	Clicks Group Limited	2009/08/28
LHG	Litha	Litha Health Group	2009/08/21
GIJ	Gijima	Gijima AST Group Limited	2009/06/30
CAE	Cape Empowerment	Cape Empowerment Trust Limited	2009/06/18
ACL	ArcelorMittal	ArcelorMittal South Africa Limited	2009/05/06
CAE	Cape Empowerment	Cape Empowerment Trust Limited	2009/04/24
UCS	UCS	UCS Group Limited	2009/04/01
BSS	BSI Steel	BSI Steel Limited	2009/03/25
DSY	Discovery	Discovery Holdings Limited	2009/03/20
AFT	Afrimat	Afrimat Limited	2009/02/27
MZR	Mazor	Mazor Group Limited	2009/02/27
DTH	Dynamic	Dynamic Technology Holdings	2009/02/19
SLG	Salungano	Salungano Group Limited	2009/01/09
HUG	Huge	Huge Group Limited	2009/01/06
ERM	Enterprise	Enterprise Risk Management	2008/12/10

EUR	Eureka	Eureka Industrial Limited	2008/12/08
UNI	Universal	Universal Industries Corportation Limited	2008/12/04
SBG	Simeka	Simeka Business Group Limited	2008/11/28
NWL	Nu-World	Nu-World Holdings Limited	2008/11/27
SOL	Sasol	Sasol Limited	2008/10/30
TRU	Truworths	Truworths International Limited	2008/10/21
SPP	Spar	The SPAR Group Limited	2008/09/30
BSS	BSI Steel	BSI Steel Limited	2008/09/30
AIP	Adcock	Adcock Ingram Holdings Limited	2008/09/22
SOL	Sasol	Sasol Limited	2008/09/22
VLE	Value	Value Group Limited	2008/08/29
NCL	New Clicks	New Clicks Holdings Limited	2008/08/29
JDG	JD Group	JD Group Limited	2008/07/29
WHL	Woolworths	Woolworths Holdings Limited	2008/07/25
KEL	Kelly	Kelly Group Limited	2008/07/17
HUG	Huge	Huge Group Limited	2008/07/03
ACE	Accentuate	Accentuate Limited	2008/07/02
ILA	Iliad	Iliad Africa Limited	2008/05/26
CFR	Compagnie	Compagnie Financiere Richemont SA	2008/05/22
OMU	Old Mutual	Old Mutual Limited	2008/04/16
MKL	Makalani	Makalani Holdings Limited	2008/04/14
BJM	Barnard	Barnard Jacobs Mellet Holdings	2008/03/25
AVI	AVI	AVI Limited	2008/03/12
VLE	Value	Value Group Limited	2008/02/28
NCL	New Clicks	New Clicks Holdings Limited	2008/02/27
DTC	Datatec	Datatec Limited	2008/02/22
TKG	Telkom	Telksom SA SOC Limited	2008/02/20
OMU	Old Mutual	Old Mutual Limited	2007/12/28
AGL	Anglo	Anglo American PLC	2007/12/21
CNL	Control	Control Instruments	2007/12/18
CNL	Control	Control Instruments	2007/12/08
NCL	New Clicks	New Clicks Holdings Limited	2007/11/27

IDQ	Iquad	Iquad Group Limited	2007/11/22
OCE	Oceana	Oceana Group Limited	2007/11/09
MET	Metropolitan	Metropolitan Holdings Limited	2007/11/05
SOL	Sasol	Sasol Limited	2007/10/05
OMU	Old Mutual	Old Mutual Limited	2007/10/03
FOS	Foschini	The Foschini Group Limited	2007/09/18
LEW	Lewis	Lewis Group Limited	2007/09/17
NCL	New Clicks	New Clicks Holdings Limited	2007/08/29
APK	Astrapak	Astrapak Limited	2007/08/14
CML	Coronation	Coronation Fund Managers	2007/08/06
BJM	Barnard	Barnard Jacobs Mellet Holdings	2007/07/20
AGL	Anglo	Anglo American PLC	2007/06/28
NCL	New Clicks	New Clicks Holdings Limited	2007/06/19
HCI	Hosken	Hosken Consolidated Investments Limited	2007/06/12
TRU	Truworths	Truworths International Limited	2007/06/08
MET	Metropolitan	Metropolitan Holdings Limited	2007/06/04
NCL	New Clicks	New Clicks Holdings Limited	2007/05/18
MVL	Mvelaphanda	Mvelaphanda Group Limited	2007/05/15
SOL	Sasol	Sasol Limited	2007/05/04
EXX	Exxaro	Exxaro Resources Limited	2007/04/16
ELH	Ellerines	Ellerine Holdings Limited	2007/03/02
AGL	Anglo	Anglo American PLC	2007/02/21
BIL	BHP	BHP Billiton PLC	2007/02/07
AGL	Anglo	Anglo American PLC	2006/12/22
ARL	Astral	Astral Foods Limited	2006/12/11
MET	Metropolitan	Metropolitan Holdings Limited	2006/11/20
NCL	New Clicks	New Clicks Holdings Limited	2006/11/15
MKL	Makalani	Makalani Holdings Limited	2006/11/10
QUY	Quyn	Quyn Holdings Limited	2006/10/20
NED	Nedbank	Nedbank Limited	2006/09/29
CML	Coronation	Coronation Fund Managers	2006/08/28
AGL	Anglo	Anglo American PLC	2006/08/04

LEW	Lewis	Lewis Group Limited	2006/07/28
MET	Metropolitan	Metropolitan Holdings Limited	2006/07/19
QUY	Quyn	Quyn Holdings Limited	2006/07/18
TKG	Telkom	Telksom SA SOC Limited	2006/07/17
PCN	Paracon	Paracon	2006/07/12
CML	Coronation	Coronation Fund Managers	2006/06/30
GND	Grindrod	Grindrod Limited	2006/06/22
BAW	Barloworld	Barloworld Limited	2006/06/20
ARL	Astral	Astral Foods Limited	2006/06/01
LEW	Lewis	Lewis Group Limited	2006/03/20
REM	Remgro	Remgro Limited	2006/02/08
UTR	Unitrans	Unitrans Limited	2005/12/15
BJM	Barnard	Barnard Jacobs Mellet Holdings	2005/11/18
MET	Metropolitan	Metropolitan Holdings Limited	2005/11/14
SER	Seardel	Seardel Investment Corporation Limited	2005/11/07
ERP	ERP.com	ERP.com Holdings Limited	2005/10/19
TRU	Truworths	Truworths International Limited	2005/10/10
BIL	BHP	BHP Billiton PLC	2005/08/29
ARL	Astral	Astral Foods Limited	2005/08/29
REM	Remgro	Remgro Limited	2005/07/20
ILA	Iliad	Iliad Africa Limited	2005/06/29
PNC	Pinnacle	Pinnacle Holdings Limited	2005/06/09
SER	Seardel	Seardel Investment Corporation Limited	2005/05/16
CCT	Connection	Connection Group Holdings Limited	2005/04/21
BSB	Busby	The House of Busby Limited	2005/04/05
MNY	Moneyweb	Moneyweb Holdings Limited	2005/03/24
TBS	Tiger Brands	Tiger Brands Limited	2005/02/10
LAN	LA Group	LA Group Limited	2005/01/20
EXL	Excellerate	Excellerate Holdings Limited	2005/01/04
NCL	New Clicks	New Clicks Holdings Limited	2004/12/03
PSG	PSG	PSG Group Limited	2004/11/03
VNF	VenFin	VenFin Limited	2004/10/07

SER	Seardel	Seardel Investment Corporation Limited	2004/10/06
BIL	BHP	BHP Billiton PLC	2004/09/16
TKG	Telkom	Telkom SA SOC Limited	2004/09/13
NCL	New Clicks	New Clicks Holdings Limited	2004/07/19
IVT	Invicta	Invicta Holdings Limited	2004/07/07
APN	Aspen	Aspen Pharmacare Holdings Limited	2004/06/24
VNF	VenFin	VenFin Limited	2004/06/22
DGC	Digicore	Digicore Holdings Limited	2004/06/14
LAN	LA Group	LA Group Limited	2004/06/10
PGR	Peregrine	Peregrine Holdings Limited	2004/06/07
DAW	Distribution	Distribution and Warehousing Network Limited	2004/05/18
OLG	OneLogix	OneLogix Group Limited	2004/05/14
VNF	VenFin	VenFin Limited	2004/05/03
TRU	Truworths	Truworths International Limited	2004/05/03
OLG	OneLogix	OneLogix Group Limited	2004/04/19
MET	Metropolitan	Metropolitan Holdings Limited	2004/04/13
RCH	Richemont	Richemont Securities AG	2004/02/25
GRT	Growthpoint	Growthpoint Properties Limited	2003/12/23
BRAIT	Brait	Brait SE	2003/11/17
GND	Grindrod	Grindrod Limited	2003/11/13
BRC	Brandcorp	Brandcorp Holdings Limited	2003/10/01
CCN	CCN	CCN Holdings Limited	2003/09/30
SCN	Schamin	Scharrig Mining Limited	2003/09/17
VNF	VenFin	VenFin Limited	2003/09/12
BIL	BHP	BHP Billiton PLC	2003/08/21
PGR	Peregrine	Peregrine Holdings Limited	2003/08/20
GLL	Global Village	Global Village Holdings Limited	2003/08/15
MNY	Moneyweb	Moneyweb Holdings Limited	2003/08/04
MNY	Moneyweb	Moneyweb Holdings Limited	2003/07/17
PSG	PSG	PSG Group Limited	2003/06/24

MST	Mustek	Mustek Limited	2003/06/24
PGR	Peregrine	Peregrine Holdings Limited	2003/06/23
IMR	IMR	IMR Investments Limited	2003/06/03
PSG	PSG	PSG Group Limited	2003/06/02
ABL	African Bank	African Bank Investments Limited	2003/06/02
CCT	Connection	Connection Group Holdings Limited	2003/05/30
ELH	Ellerines	Ellerine Holdings Limited	2003/05/30
IVT	Invicta	Invicta Holdings Limited	2003/05/27
MST	Mustek	Mustek Limited	2003/05/26
DGC	Digicore	Digicore Holdings Limited	2003/05/14
INM	Inmins	Inmins Limited	2003/05/12
TPC	Transpaco	Transpaco Limited	2003/05/12
DAW	Distribution	Distribution and Warehousing Network Limited	2003/05/08
DAW	Distribution	Distribution and Warehousing Network Limited	2003/05/08
CCN	CCN	CCN Holdings Limited	2003/05/02
DEC	Decillion	Decillion Limited	2003/04/29
BJM	Barnard	Barnard Jacobs Mellet Holdings	2003/04/14
AFI	African Life	African Life Assurance Co Limited	2003/04/07
TRU	Truworths	Truworths International Limited	2003/04/03
TRU	Truworths	Truworths International Limited	2003/04/03
BVT	Bidvest	The Bidvest Group Limited	2003/03/27
RBV	Rebserv	Rebserv Holdings Limited	2003/03/24
UCS	UCS	UCS Group Limited	2003/02/27
BJM	Barnard	Barnard Jacobs Mellet Holdings	2003/02/17
ARC	Arcay	Arcay Group Limited	2003/02/10
CPT	Capital Alliance	Capital Alliance Holdings Limited	2003/02/06
ECO	Edgars	Edgars Consolidated Stores Limited	2003/01/28
UCS	UCS	UCS Group Limited	2003/01/13