Opportunity Trading of Short Run Reversals – Evidence from the JSE

by

Shane Serebro
1430275

&

Marc Labe
1445149

BCOM HONOURS (FINANCE)

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at the

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Supervisor: MR D. McClelland

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1 Introduction

1.1 Background and Motivation

The Efficient Market Hypothesis (EMH) states that equity markets are informationally efficient, in that the markets already price all available information into the price of stocks. Thus, there is no possibility of achieving excess abnormal returns (Zhang & Skiena, 2010). However, promising research has shown that the EMH does not always hold strictly true, but rather there is a level of market underreaction to good news and overreaction to bad news, thus pricing may not fully reflect all available information.

De Bondt and Thaler (1985) challenge the EMH in their seminal work by suggesting that equities that undergo a large price movement will subsequently be followed by price movements in the opposite direction and that the magnitude of the original price movement influences the magnitude of the ensuing change. Hence, according to De Bondt and Thaler (1985), the weak form of the EMH cannot strictly hold.

Following the work of De Bondt and Thaler (1985), there has been considerable research recently in the area of reversals of stock price performance. This substantial amount of literature can be categorised according to the term studied. The first category of research focuses on the short-term price reversals (i.e. those that rebound over a few days) such as Bremer and Sweeney (1991), Cox and Peterson (1994) and Renshaw (1984). The second category as seen in Jegadeesh (1990), refers to the intermediate-term price reversals consisting of weeks or months. Finally, the category in which this research falls involves stock rebounds over the long-term (i.e. Years) and follows on the works of De Bondt and Thaler (1987) and Ball and Kothari (1989).

1.2 Core Research Question

In essence, this paper sets out to answer the following question: Do shares that experience a sudden and significant change in price undergo a reversal in the short-term?

1.3 Research Objectives

This proposed research paper, aims to determine whether investing in a company that experiences a large share price movement is a profitable investment strategy for the active trader.

Moreover, it sets out to assess:

- The factors that influence the reversal in the short-term.

- Whether investing in shares that undergo large price drops prove profitable investments.

1.4 Importance and Benefits of The Proposed Study

Firms that experience large negative price shocks are often deemed to be bad investments in the short run owing to investor sentiment and increased volatility in the period after such price shock. However, this may not necessarily be the case as seen in Bremer and Sweeney (1991). Moreover, shares that experience positive price shocks are often considered good investments as many believe this trend will continue for the foreseeable future. In this study, an assessment is carried out to determine whether these firms experience share price reversals and therefore can be traded opportunistically and profitably.

Furthermore, this study will add to the existing literature with regards to whether the EMH holds in the Johannesburg Stock Exchange (JSE) or does the overreaction hypothesis postulated by De Bondt and Thaler (1985) serve as a better explanation of share price movements. If the EMH does indeed hold true on the JSE, abnormal profits can not be obtained from trading on significant price movements whereas these profits are obtainable if evidence of the overreaction hypothesis can be found on the JSE.

The sections that follow will delimit the boundaries of our study and define all relevant key terms, abbreviations and acronyms. Additionally, a review of pertinent literature will be conducted to evaluate previous studies carried out on similar subject matters. Further, an outline of the data collection and sampling procedures as well as the methodology that will be used in conducting the empirical study to follow will be set out presented.

1.5 Delimitations

The scope of this research shall be limited to the constituents of the JSE All Share Index (ALSI).

1.6 Definition of Key Terms

- The Overreaction hypothesis states that shares that have underperformed the market over a given time frame will subsequently outperform the market over a similar time frame (Clare & Thomas, 1995).
- The Efficient Market Hypothesis (EMH) states that capital markets are efficient if they fully and correctly reflect all relevant information in determining security prices (Malkiel, 1992).

2 Literature Review

There has been extensive empirical research on the overreaction hypothesis and the underreaction hypothesis. However, while both the overreaction and underreaction hypothesis lean towards the inaccuracy of the efficient market hypothesis, a third theory which keeps the efficient market hypothesis relevant is the uncertain information hypothesis (Himmelman *et al.,* 2010). The uncertain information hypothesis was developed by Brown, Harlow and Tinic (1988) where they stated that rational, risk-averse investors are seen to overreact to bad new and underreact to good news. This occurs when new information received does not reveal its true nature until a later stage.

Brown, Harlow, and Tinic (1988) attempted to test for the reversal phenomenon and through their results they found that the reversal phenomenon does indeed exist. Brown *et al.* (1988) found, when using a -2.5 percent trigger on residuals from daily market model regressions, a reversal of only 0.045 percent on the first day and 0.112 percent on the second day. The reversal increases to 0.532 percent by day sixty.

In their seminal study on long term reversals, De Bondt and Thaler (1985) developed their overreaction hypothesis, which says that if a stock prices decreases too much as a result of new information released relating to the stock, the price will eventually return to its fundamental value as investors realise that they have overreacted. De Bondt and Thaler (1985) tested this by creating winner and loser portfolios and they found that over a three-year period, the loser portfolios outperformed the market by 19.6 percent on average. Winner portfolios meanwhile earned approximately 5 percent less than that of the market. The authors concluded that these results are consistent with their overreaction hypothesis.

Like the overreaction and the uncertain information hypothesis, reversal literature as a whole has been widely documented in a broad amount of context whether it be intraday reversals or even weekly, monthly or long term (over a year) reversals. Following this, the rest of this literature review will go through some of the most followed studies and empirical work on reversals in a similar fashion as to what was seen in the previous few paragraphs.

In their 1990 study, Atkins and Dyl (1990) attempt to establish whether the stock market overreacts in the short run. For firms that have large one day price declines, they do indeed find significant reversal patterns. Nonetheless, the overreaction hypothesis falls away when transaction costs are considered.

Four years later, Cox and Peterson (1994) also examined short terms price reversals three days subsequent to a large one-day price drop of at least 10 percent. They tried to use the role of the bid ask bounce, market liquidity as well as the overreaction hypothesis in order to explain any reversals found. By using daily returns from the NYSE, AMEX and National Market System (NMS) firms listed on the Centre for Research in Security Prices (CRSP), they found significant positive average cumulative abnormal returns (CAR) for the 3 days following the decline. They do note however that the degree of the reversals lowered over time, signifying that the supposed recovery itself reversed.

Bremer and Sweeney (1991) examine large daily stock price decreases for CRSP firms. They report that the reversal period for stock prices is around two days. The authors used a trigger value of -10% and they found the first day average reversal is 1.77 percent and the cumulative average second day reversal is 2.2 percent. Bremer and Sweeney (1991) contend that two days is too long to be consistent with the efficient market hypothesis. They say that illiquidity is one possible reason for these unusually large returns. Their findings also stay consistent after using different trigger values. Choi and Jayaraman (2009) also found patterns of overreaction for NYSE and AMEX firms after a large price decrease. However, these were only for nonoptional shares.

In a study which looked at weekly returns on the NYSE and AMEX during the period between 1963 and 1981, Howe (1986) found that during the 10 weeks subsequent to the original price change, the prior loser portfolio outperformed the market by 13.8 percent and the prior winner portfolio underperformed the market by 13 percent. Howe (1986) stated that most of the reversals happened early on. Lehmann (1990) reported that portfolios that include stocks with positive returns in one week usually experience negative returns in the subsequent week. The portfolios which include stocks with negative returns in one week will generally show positive returns in the next.

Chopra, Lakonishok, and Ritter (1992) performed an extensive test of the overreaction hypothesis. The calculated abnormal returns using the price beta of risk as well as an extensive adjustment for price. Their results show an economically significant overreaction effect which cannot be a result of either beta or size. Their results also show that the size of the overreaction effect is much larger for small firms than large firms. This goes to show that individuals, who predominantly hold shares in smaller firms, overreact to a greater extent than institutions, who hold shares of larger companies.

Baytas and Cakici (1999) tested the overreaction hypothesis on listed firms in the US, UK, Canada, Italy, Germany, Japan and France based on past performance, price and size. Their results showed evidence for the overreaction theory in each country except the United States. Additionally, their findings indicated that long-term strategies centred around price and size outperformed those based

on past performance. They argued that as losers are low in value and price while the opposite is true for winners, price reversals may be as a result of price and size effect. This is consistent with Atkins and Dyl (1990) and Zarowin (1990) whose results show that the overreaction hypothesis is as a result of the size effect. However, results in contrast to this say that long-term reversals are due to errors in the measurement of risk (Chan, 1988; Ball & Kothari, 1989).

Benou and Richie (2003) examined long-term price reversal patterns for large firms in the US who experienced price decreases of more than 20 percent in a given month. They found that their results are mostly consistent with the overreaction hypothesis as well as being of a larger magnitude than research has reported in the past. They reported that large firms earned around 4 and 12 percent over what was expected, 6 and 12 months after the original price decrease respectively. They stated that the size of the reversal differed quite substantially based on the industry. Technological firms experienced the greatest reversal patterns and manufacturing shares were second, while the service industry performed the worst.

In terms of research which has been conducted in South Africa, Page and Way (1992) tested for overreaction on the cross-section of Johannesburg Stock Exchange (JSE) shares between 1974 to 1989 using De Bondt and Thaler's (1985) methodology. They found that loser portfolios reached average CARs of 14.5 percent 36 months after development over the winner portfolio. Muller (1999) also conducted detailed research of overreaction and long-run reversals on the JSE using the largest 200 shares by market capitalization. He found strong evidence of the overreaction hypothesis as his results showed that loser portfolios yielded excess returns greater than that of the winner portfolios as well as the market benchmark.

More recently, Frisch *et al*. (2014) analysed cumulative abnormal returns for the South African FTSE/JSE Top 40 index subsequent to large price increases and decreases from January 2003 to December 2011. They identified events using a trigger value of ±20%. They found that large price decreases are followed by smaller but still positive average cumulative abnormal returns (ACAR). They stated that these ACARs are statistically significant in the term from the beginning of the third month following the original event, ending up to 24 months later. Additionally, Britten, Page and Auret (2016) analysed monthly prices of all JSE shares. Their findings show that profits owing to winner portfolios decrease while loser portfolios generate returns in excess of the winners as the holding period extends over 12 months. They found that high value, high momentum was the best performing portfolio.

3 Methodology

3.1 Sampling and Data Collection

This paper will make use of data collected from the Findata@Wits database of the University of the Witwatersrand. Daily closing prices, daily trading volumes and daily market capitalisation were extracted from the database for the period 1 January 1998 to 31 December 2018 (i.e. 20 years) – the Findata@Wits database only contains data from 1998. This period shall allow for a large dataset to be collected and analysed to further the significance and credibility of the results obtained. The selection of the equities was conducted as follows: The stocks selected were constituents of the JSE All Share Index (ALSI) at least once during the period analysed. Firms with a share price of less than 100 ZAr (South African Cents) were excluded owing to the increased variability of these small shares – for example, a 50 ZAr price drop of equity with a share price of 100 ZAr experiences a price decline of 50 percent which is not a true representation of the actual monetary effect of the decrease and can therefore not be considered a "price shock". Moreover, to remove price shocks owing to a sudden increase of trading volume, shares are excluded that have not been traded (i.e. bought or sold) once per day for three out of the five preceding trading days before the event date. As per De Bondt and Thaler (1985), firms must have at least 12 months of return data available (i.e. must be listed for at least one year) to extract the increased volatility experienced by newly listed firms – this differs from De Bondt and Thaler's (1985) 85-month requirement owing to the short-term nature of this study.

3.2 Description of Overall Research Design

The overall aim of this study is to determine whether equities that experience price shocks are good investment opportunities in the short-term. Should investors go long in firms that experience negative price shocks (i.e. a large decrease in share price) to take advantage of short-run price reversals? To test this, an event study will be carried out on the performance of stocks that have experienced either positive or negative price shocks to determine whether these shares undergo any short-run reversals – and therefore are sound investments for the opportunity trader.

3.2.1 Trigger Values

In many previous studies, the definition of a price shock has varied in its classification. Bremer and Sweeney (1991) use a trigger value of 10 percent whereas Brown, Harlow and Tinic (1988) use a trigger value of 2.5 percent in their study. This can be contrasted once again by Howe (1986) who uses a relatively large trigger value of 50 percent and Benou and Richie (2003) and Ising *et al.* (2006) who use a trigger of 20 percent. It is important to note the varying time frames studied with some

authors using monthly, weekly or annual data. To try and encompass as many of these previous papers – thereby allowing for comparisons – as well as accounting for the daily data and short-term nature of this study, the trigger value for return changes that will be used in performing the analysis is ±10 percent.

3.2.2 Methodology

Return values that will be compared against the trigger are calculated using drawdowns and drawups. Returns are calculated, per equation 1 below, for every share in the sample every day.

$$R_{it} = \frac{S_{it} - S_{it-1}}{S_{it-1}} \quad (1)$$

With:

- R_{it} return of share i at time t
- S_{it} share price of share i at time t

Drawdowns and drawups are then calculated using these returns. Drawdowns refer to the decline of returns from the peak within the period to the trough in that same period. The reverse is true for a drawup, which measures the increase of returns within the test period from its trough to its peak. As such, equations 2 and 3 detail the calculation of Drawdowns and Drawups respectively.

$$DD_{i[t-5;t]} = min\left(R_{i(t-5)}, R_{i(t-1)}\right) - max\left(R_{i(t-5)}, R_{i(t-1)}\right) \quad (2)$$

$$DU_{i[t-5;t]} = max\left(R_{i(t-5)}, R_{i(t-1)}\right) - min\left(R_{i(t-5)}, R_{i(t-1)}\right) \quad (3)$$

The drawdowns and drawups are then compared to their particular trigger values, -10% and +10% respectively, and this allows an event date to be defined – event dates (t) are defined as one day after the 5 day calculation period [-5; -1] drawdown or drawup that exceeds the trigger value (e.g. If $DD_{it} < -10\%$, day t becomes the event date).

Cumulative Average Abnormal Returns (CARs) are then calculated for three separate periods: 5 days after the event date [1; 5], 10 days after the event date [1;10] and 21 days after the event date [1;21] to measure the performance of the shares *ex-post* any share price shock. These periods were selected as they represent one trading week, two trading weeks and one trading month respectively.

The CARs are calculated as per equation 4 below:

$$CAR_{i[t;T]} = \sum_{t=1}^{T}(R_{it} - E(R_{it})) = \sum_{t=1}^{T} AR_{it} \quad (4)$$

With:

- $E(R_{it})$ is the expected return of stock i at time t
- AR_{it} is the abnormal return of stock i at time t

The expected returns will be calculated using the Van Rensburg and Robertson (2003) model which is an adjusted version of the Fama and French (1992) model for the style characteristics of the JSE. The model is as follows in equation 5:

$$E(R_{it}) = R_f + \beta(R_m - R_f) + \beta_{SIZE} SIZE + \beta_{\frac{P}{E}} \frac{P}{E} + \varepsilon \quad (5)$$

With:

- R_f is the risk-free rate
- β is the sensitivity of the return to the specific factor
- $(R_m - R_f)$ is the market risk premium
- $SIZE$ refers to the natural logarithm of the firm's market capitalisation and it adjusts the returns of the model for any size effects
- $\frac{P}{E}$ is the Price-to-Earnings ratio and is a measure of relative value
- ε is the error term

3.2.3 Statistical Significance Testing

To determine whether the CARs obtained above are statistically significant, we will perform a t-test on the results. As such, these findings will show whether the trading of price shock effected shares is a profitable and sustainable investment strategy.

3.2.4 Regression Analysis

The factors that determine whether decline-reversals (i.e. share price drops that lead to a subsequent recovery) and increase-reversals (i.e. share price increases that are followed by a subsequent decline) take place will be regressed using the model as set out in equation 6:

$$R_{it} = VOL_i + BTM_i + SIZE_i + \varepsilon$$

VOL is the daily trading volume which measures the trading activity on each share surrounding the price shock. The factor BTM is the book-to-market ratio and is used as a proxy for perceived market risk as per Auret and Sinclaire (2006). SIZE, as above, is used to determine whether there is any size effect that effects the returns after the shock.

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