Overreaction in the Financial Times Stock Exchange (FTSE)

Yusuke Ewan Tanaka Legard

Professor Emma Rasiel, Faculty Advisor

Professor Kent Kimbrough, Honors Seminar Instructor

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Abstract

The Overreaction Hypothesis suggests that investors overreact to unexpected news in the financial world, which leads to a mispricing of equities. This paper investigates the presence of overreaction in the Financial Times Stock Exchange (FTSE) between 1995 and 2018. The empirical methodology studies the monthly returns of equities in the FTSE 100. The empirical results are consistent with the overreaction hypothesis and indicate the presence of overreaction within the FTSE. Furthermore, the results highlight whether the information revolution has exacerbated or lessened overreaction. The results suggest that investor overreaction has not altered, for better or worse, since the information revolution.

JEL Classification: E7; E70; D83

Keywords: Behavioral Finance: Overreaction Hypothesis; Technology: Information Revolution

1. Introduction

Traditional equity pricing models – such as the Efficient Market Hypothesis (EMH) – assume a common factor; humans are rational decision makers who wish to maximize their personal utility. Decision Science has developed theories beginning in the late 1900s which better explain how humans make decisions: we are irrational decision makers who fail to fully maximize personal utility. Since then, Decision Science has evolved to develop a branch of research specifically related to financial decision making: Behavioral Finance. "Behavioral Finance is the study of the influence of psychology on the behavior of financial practitioners and the subsequent effect on markets. Behavioral Finance helps explain why and how markets might be inefficient" (Chaundhary, 2013). Jack Bogle (2017) believes in "The Four E's" – "The greatest Enemies of the Equity investor are Expenses and Emotion". Hence, elite investors around the world agree that emotions create inefficiencies in the financial market, and all investors are susceptible to suboptimal decision making.

There are a variety of different physiological and behavioral factors that play a strong role in personal financial decisions (Kahneman, 2015). Anchoring, for example, is a common mistake that investors are susceptible to each day. This is the inclination for humans to fixate on a starting number and estimate the value of an investment opportunity by simply adjusting from that initial figure. In many cases, the adjustment from the starting value is not enough, and an incorrect value is concluded (Thaler, 1988).

However, the behavioral finance hypothesis that I will investigate is overreaction by investors to the latest news and how this challenges the EMH. In particular, I plan to investigate whether there is overreaction in the Financial Times Stock Exchange (FTSE) from 1995 to December 2018. FTSE stocks are all traded on the London Stock Exchange (LSE).

It could be argued that technology may exacerbate human overreaction due to the speed that information can travel, as well as through the use of social media. As a result of the increased speed that information travels, investors will be overloaded with the most recent information and, as a result, may be more likely to overweight the latest developments leading to greater overreaction in equity prices. On the other hand, opponents to this theory believe that technology will quell investor overreaction, as they have access to a greater number of sources. Thus, the greater exposure to information may lead to investors weighting all information accurately, leading to better decisions. A secondary consideration in this paper is to evaluate whether increased volume and speed of information dissemination since 2002 has exacerbated investor overreaction.

The EMH states, "security prices fully reflect all available information" (Fama, 1991). In other words, the price of an equity will correctly weigh the magnitude of both past and current information. Thus, it is assumed that if new information emerges about a company, the gravity of the new information – positive or negative – will be reflected almost immediately in the company's stock price. For example, if negative news about a company is reported, it should lead to a fall in its stock price directly proportional to the impact the new development has upon the firm. Subsequently, the price should remain steady until new information about the firm is reported (Idiosyncratic news), or until new macro information that could have an impact on the firm is revealed (Systematic news). Hence, there is no arbitrage available for investors to exploit from the under/over-valuation of equities as the prices reflect their true value. EMH uses Bayes' Theorem to identify the appropriate reaction to new information. Bayes' Theorem assumes that all investors are rational and weigh both new and past information of equities using conditional probability:

$$P(A|B) = \frac{P(B|A) * P(A)}{P(B)}$$

The Overreaction hypothesis challenges this belief, stating that, “extreme movements in stock prices will be followed by subsequent price movements in the opposite direction” (De Bondt & Thaler, 1985). De Bondt & Thaler (1985) argue that these extreme movements in equity prices are due to investors overreacting to the most recent information, which is accredited to the Availability Heuristic. Amos Tversky defines this heuristic as judging “the frequency of a class or the probability of an event by the ease with which instances or occurrences can be brought to mind” (1974). To paraphrase, people overweigh the significance of recent news in their decisions making, and underweight prior (base) information when revising their beliefs of an equity. A simple example of the heuristic is seen in people’s increased fear of air travel after hearing news of a recent plane crash. In their minds, the probability of dying in a plane crash has become very high. As a result, they will avoid air travel for a period or be very cautious when boarding a plane. According to Haltiwanger (2015), this is illogical considering, “the odds of a plane crash are one for every 1.2 million flights, with odds of dying one in 11 million.” Thus, people tend to overreact after seeing news of a plane crash. After time has passed and the news of a plane crash is no longer recent, the fear will lessen.

Therefore, any newly formed decision regarding an equity will be biased towards the latest information. This creates an inefficiency in the market. If equity prices are overvalued, or undervalued, due to investors overreacting to the latest developments, it would suggest that an arbitrage will be available if other investors accurately weigh all information available. However, in reality, it is hard to take advantage of a potential arbitrage. If the market as a whole has overreacted and overvalued a particular stock, it would not be as simple as shorting the equity and gaining a riskless profit. There is no predicting when the market will recognize its valuation error and that the value of an equity will align with the true valuation. Thus, to hold a short position can be costly due to borrowing costs and the possibility that the stocks will be recalled. (Shleifer et al.,1997).

In 1985, De Bondt & Thaler pioneered the overreaction hypothesis. The majority of subsequent research in this area was conducted prior to the information revolution and has not analyzed investor overreaction since the turn of the century.

Various studies have been conducted on the US stock market, such as those within the New York Stock Exchange (NYSE). Alternative international markets have been subject to limited studies. There have been two significant studies that examine the overreaction hypothesis in the United Kingdom (UK): Clare & Thomas (1995) & Mazouz & Li (2007). Since the conclusion of these two studies, 2002 was the final year to be analyzed. A great deal has taken place in the sixteen years since 2002 to the present day. For example, technology has exponentially improved; therefore, there is a large time period of unexplored data that has yet to be examined. Thus, I plan to investigate whether there is overreaction in the FTSE and study the period from January 1st, 1995 – starting prior to the events of the dot-com bubble – to December 31st, 2018.

My paper is organized as follows: in Section 2, I will discuss previous literature that has analyzed evidence of overreaction in various global stock markets. I will then explain the empirical methodology of my paper, as well as the data that will be studied. Section 4 provides discussion of the results of my investigation. The empirical results are consistent with the overreaction hypothesis and indicate for the presence of overreaction. Furthermore, the evidence indicates that the revolution in information technology has done little to either exacerbate or lessen overreaction. Finally, the conclusion of this paper will focus on how this research could be taken further.

2. Literature Review

In 1985, Werner De Bondt and Richard Thaler studied whether the US stock market overreacts. They investigated the returns of equities on the New York Stock Exchange from 1930 to 1977. Primarily using three-year periods – starting from 1930 – they ranked the Cumulative Excess Returns of each equity during this time. They selected the thirty-five highest returning equities and the thirty-five lowest returning equities and placed them in two separate portfolios – a ‘winner’ portfolio for the highest performing equities and a ‘loser’ portfolio for the lowest. They then compared the Cumulative Average Residual returns of all the equities in the portfolios against a market index over the ensuing three-year period.

EMH predicts that the Average Cumulative Returns of the winner portfolio ($\overline{ACUR_w}$) and the Average Cumulative Returns of the loser portfolio ($\overline{ACUR_l}$) to both be equal to zero and for there to be no relationship between the two (Fama, 1970). Thus, if the authors observed this, they would be able to conclusively determine that overreaction was not present (De Bondt et al., 1985).

Thus, De Bondt & Thaler defined the overreaction hypothesis to be present if there is a statistically significant difference between the returns of the two portfolios:

$$(\overline{ACUR_l} - \overline{ACUR_w}) > 0$$

$$H_0 = (\overline{ACUR_l} - \overline{ACUR_w}) \leq 0$$

$$H_A = (\overline{ACUR_l} - \overline{ACUR_w}) > 0$$

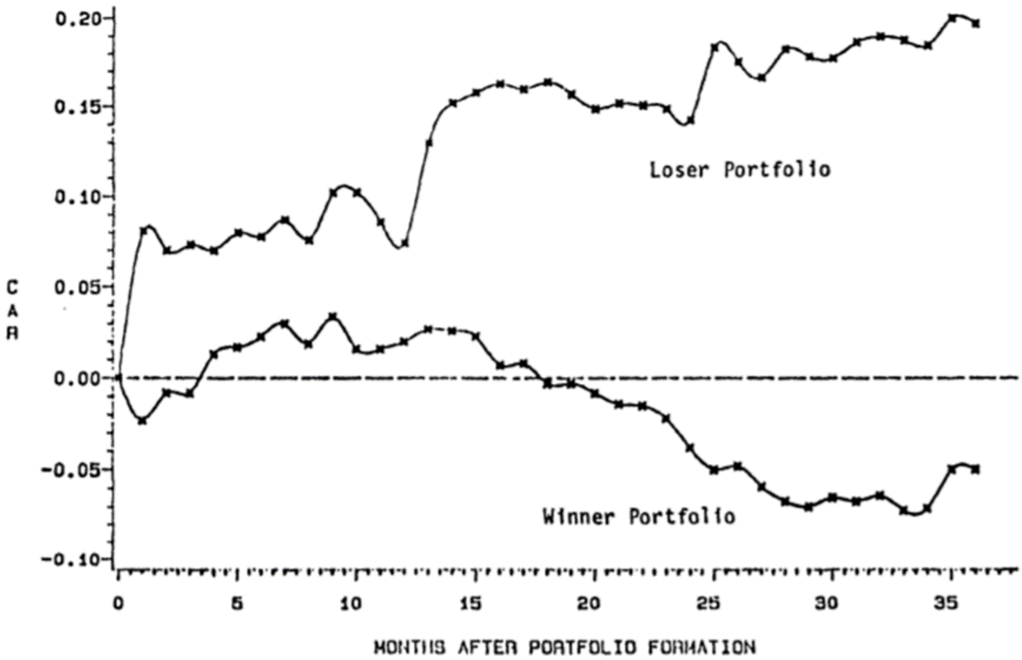

Figure 1: Monthly Cumulative Average Residual Returns of the two portfolios against a NYSE market index after portfolio formation. The portfolio formation period was 3 years and a further 3 years for the portfolio investigation period. (De Bondt et al., 1985).

De Bondt & Thaler (1985) additionally believed that if overreaction was not present, there would not be a statistically significant difference between the average return of the loser portfolio and that of the winners.

They found that on average the loser portfolio outperformed the market by 19.6% (cumulative), whilst the winner portfolio returned 5% less than the market (Figure 1). Hence, the loser portfolio maintained greater earnings than the winner portfolio over the three-year period after the formation.

From this aggregate difference of 24.6% between the portfolios and residual analysis, the authors concluded that ‘winning’ equities are significantly risker than ‘losing’ equities. The stark difference in returns occurred because investors overreacted, in opposite ways, to news regarding equities in either portfolio. When positive news of equities in the winner portfolio emerged, investors overacted and drove the equity prices of those companies up. After some time, investors later realized their enthusiasm had led to these equities to become overvalued, and the price fell to its true valuation. When negative news of equities in the loser portfolio appeared, investors once again overreacted and instead drove the equity prices down – leading to those companies to become undervalued. This undervaluation resulted in the equity prices of those in the 'loser' portfolio to later rebound.

Other studies have been conducted testing the overreaction hypothesis in both the US economy and alternate global markets. Brown & Harlow (1988) tested the overreaction hypothesis in the NYSE over the period of 1946-1983. Their findings aligned to those of De Bondt & Thaler (1985) and provided evidence which supported the overreaction theory.

Alonso & Rubio (1990) investigated whether the overreaction hypothesis was present in the Spanish stock market. They drew their data from the time period of 1965-1984 and employed the same methodology as De Bondt & Thaler (1985). They also used three-year non-overlapping portfolio formation and investigation periods. Their findings were consistent to those of De Bondt & Thaler's (1985) and found that the loser outperformed the winner portfolio by 24.5%.

Gunaratne & Yonesawa (1997) examined the overreaction hypothesis in the Japanese stock market. Investigating the period between 1955-1990 and, using 4-year non-overlapping portfolio periods, they found that the loser portfolio on average outperformed the winner portfolios by 11% per annum. Hence, there was statistically significant evidence to conclude that overreaction is present in the Japanese stock market.

Da Costa (1994) tested the overreaction hypothesis in the Brazilian stock market. He studied the returns of equities spanning from 1970-1989. He used two-year non-overlapping portfolio formation and investigation periods and found that his results were consistent with the US findings of De Bondt & Thaler (1985). The loser portfolio outperformed the market returns by 17.63% whilst the winner portfolio underperformed the market by 20.25%.

Chin et al. (2002) found that there was significant evidence to support the presence of the overreaction hypothesis in the New Zealand stock exchange. They tested over the period of 1988-1995.

Wang et al. (2004) investigated the overreaction hypothesis in the Shanghai and Shenzehen from 1994 to 2000. With the different structure to the stock market they elected to use weekly-returns for 244 A shares and 57 B shares[1]. They found that A shares tended to overreact more than the B shares.

Additionally, Brailsford (1992) conducted a study using De Bondt & Thaler's (1985) methodology, to test for overreaction in the Australian market. After extracting the data on monthly returns of equities from 1958-1987, Brailsford also used three-year non-overlapping portfolio formation and investigation periods. However, unlike the studies mentioned above, he did not find any significant evidence that supported the overreaction theory. Although he did find that the winner portfolio underperformed the market during the testing period – like De Bondt & Thaler (1985) – he did not observe any price reversal of the loser portfolio, and there was no statistical significance between the returns of the two portfolios. Following the conclusion of his study, Brailsford (1992) does not mention why he believes the overreaction hypothesis was not observed in the Australian market.

Gaunt (2000) also tested for overreaction in the Australian stock market and while using a slightly different test period (1974-1997). His results were consistent with that of Brailsford (1992) and did not find significant evidence to be able to conclude that the overreaction hypothesis was present in the Australian market. Gaunt (2000) states that the difference

[1] A shares are only open to local Chinese investors, B shares are open to foreign investors

between to the two portfolios was so minimal that there was no arbitrage available for investors to exploit.

While this paper focuses on overreaction, it is important to consider whether the opposite occurs and if investors underreact to breaking news. Jiang & Zhu (2017) conducted a study to test for investor underreaction and found that the main reason why underreaction may be present in stock markets is because investors have simply failed to allocate enough attention to their investments and have therefore become sluggish in attending to them. Thus, underreaction is simply a result of investor inertia.

There have been several studies conducted that test for the overreaction hypothesis in the UK. Mazouz & Li (2007) used monthly returns data for all shares in the FTSE All Shares market index from 1972 to 2002 and had portfolio formation and testing of three-year non-overlapping periods. They found that the loser portfolio on average outperformed the winner portfolio by 16.4%. Hence, they concluded that overreaction was present in the London Stock Exchange (LSE).

Clare & Thomas (1995) used monthly return data for the top 1000 companies in the UK over the period of 1955-1990 and employed a three-year non-overlapping portfolio formation and testing period. However, they found that the average returns of loser portfolios only exceed that of the winner portfolios by 1.7% per annum. Clare & Thomas (1997) credit this limited overreaction to the size effect – the idea that the relative advantage the size of a company affects its returns.

Overall, the results of De Bondt & Thaler (1985) were significant for field of behavioral finance. Nonetheless, the majority of work was published prior to the turn of the century. This leaves sixteen years of data from the FTSE that has yet to be analyzed following the study by Clare & Thomas (1995) in conjunction with Mazouz, K. & Li, X. (2007). Hence, with a technological revolution taking place between these two time periods, overreaction in investors may have changed. My hypothesis is that information technology will augment investor overreaction. This is because technological advances, such as social media, can overload investors with breaking and current news. This will lead to investors to become more susceptible to the Availability Heuristic leading them to further overweight current information and underweight past information. Ultimately, this may lead to greater overreaction in the stock market.

The methodology that De Bondt & Thaler (1985) employed for their research has been replicated by all the previous studies discussed above. There are minor alterations between each study, such as number of equities in each portfolio. Hence, with De Bondt & Thaler's (1985) methodology commonly used, I plan to base my empirical methodology around their work. I will expand upon this in the Empirical Methodology section of this paper.

3. Data and Empirical Methodology

I will conduct my research upon the FTSE 100, which represents over 80% of the value on the LSE. My analysis period will begin in 1995 – before the revolution in computers and information technology – and conclude in 2018 – when the information revolution is entrenched in society. Societal norms have changed since previous authors published their respective works – such as the prevalence of social media. My research will contribute to the field of behavioral finance with an updated analysis of the overreaction hypothesis, by investigating the degree to which overreaction of investors is present with new developments in society.

This section explains how I will statistically test for overreaction in the FTSE. My method is similar to that of De Bondt & Thaler (1985) and has been employed multiple times in previous literature, as demonstrated by the formerly discussed authors. To test for the overreaction hypothesis, I will focus on equities that have experienced either extreme capital gains or losses.

3.1 Data

My analysis for the overreaction hypothesis will be centered around the FTSE 100 – 80% of the LSE. First, I will use the Historical Addition and Deletions documentation of the FTSE 100 from FTSERussell and construct lists of previous constituents as of January 1st of each year from 1995 until the present. Then using my newly constructed constituents list, the monthly returns of these equities listed on the FTSE 100 range from January 1995 until December 2018 will be extracted from Bloomberg. Monthly returns are used to avoid problems that may arise from microstructure effect such as liquidity issues or bid ask bounce.

To be selected for analysis, equities did not have to have posted returns from 1995 all the way till the present. Rather, equities must be included in the FTSE 100 index at the beginning of the portfolio formation period and have monthly returns until the conclusion of the investigation period. Several equities have been excluded from the data sets due to mergers, takeovers, bankruptcy, or being delisted from the FTSE.

3.2 Methodology

Winners are defined as equities that have performed the best over the set formation period for the portfolio. Losers are equities that have performed poorly in relation over the same time period. Thus, portfolios are created solely based on prior performance over specified duration.

The monthly returns of stock, j, in the data is computed as the difference between the natural logarithms of two monthly-ending close prices. The majority of statistical methodology assumes a normal distribution. The natural logarithm is used, as it eliminates the positive bias when arithmetic returns are utilized. Furthermore, by calculating monthly returns in the log plane, it is normalized to the log normal.

The monthly-market adjusted returns are calculated using the following equation:

$$U_{j,t} = R_{j,t} - R_{m,t}$$

$U_{j,t}$ is the market adjusted return of stock j in month t. $R_{j,t}$ is the monthly returns of stock j, and $R_{m,t}$ is the return of the equally-weighted index of the FTSE 100. Equally-weighted market indexes are used in the methodology of previous studies that test the overreaction hypothesis.

3.3 Portfolio formation

For each portfolio formations period, I will compute the cumulative excess return of all stocks using the following formula:

$$CU_j = \sum_{t=1}^{T} U_{j,t}$$

CU_j is the cumulative excess return of stock j. t refers to the first month of the portfolio formation period, whilst T is the final month of the portfolio formation period. At the end of the portfolio formation period – for example three non-overlapping years – the cumulative excess returns of all equities will be ranked from highest to lowest. All portfolios are equally weighted, in the same manner that the market indexes will be created.

The top 20% performing and lowest 20% performing equities will be selected for the winner and loser portfolio respectively. The 20% cut-off have been frequently used in previous methodology, and with only 100 stocks to analyze in each portfolio, 20% allows me to focus solely on the extreme performing equities.

3.4 Portfolio Investigation

The portfolio investigation period is the same time duration to that of the formation period but starts immediately after the conclusion of the formation period. This criteria regarding symmetrical formation and investigation periods have been employed in previous literature.

The Cumulative Mean Returns ($\overline{CUR}$) month t after of each portfolio is calculated during the portfolio investigation period as follows:

$$\overline{CUR_w} = \sum_{t=t}^{T} \left(\frac{\sum_{j=j}^{N} U_{j,t})}{N}\right)$$

$$\overline{CUR_l} = \sum_{t=t}^{T} \left(\frac{\sum_{j=j}^{N} U_{j,t})}{N}\right)$$

$\overline{CUR_w}$ represents the $\overline{CUR}$ of the winner portfolio, whilst $\overline{CUR_l}$ is the $\overline{CUR}$ of the loser portfolio. In this calculation, t is the first month of the portfolio investigation period, and T is the final month. $U_{j,t}$ represents the market adjust returns of stock j in the portfolio. Finally, N represents the number of stocks in the portfolio in question. As can be seen in the equations above, all $\overline{CUR}$'s are equally weighted through the division by N.

Then for each portfolio type – winner and loser – I will calculate the overall Average Cumulative Returns ($\overline{ACUR}$) across the entire time period that has been analyzed:

$$\overline{ACUR_w} = \frac{\sum_{n=1}^{N}(\overline{CUR_{w,n}})}{N}$$

$$\overline{ACUR_l} = \frac{\sum_{n=1}^{N}(\overline{CUR_{l,n}})}{N}$$

$\overline{ACUR_w}$ is the Average Cumulative Returns of all the winner portfolios formed, whilst $\overline{ACUR_l}$ is the Average Cumulative Returns of all the loser portfolios formed. N represents the number of winner (or loser) portfolios that have been formed over the duration of the study. $\overline{ACUR}$'s will be reported as annualized returns.

3.5 Statistical Methodology

The following are my null and alternative hypothesis to test for the overreaction hypothesis in the FTSE:

$$H_0 = (\overline{ACUR_l} - \overline{ACUR_w}) \leq 0$$

$$H_A = (\overline{ACUR_l} - \overline{ACUR_w}) > 0$$

3.5.1 Test

I will test whether the difference in the Average Cumulative Returns of the two portfolios is statistically significant. The first step in this analysis is to find the population variance (S_t^2) of the cumulative average return:

$$S_t^2 = [\sum_{n=1}^{N}(\overline{CUR_{w,n,t}} - \overline{ACUR_{w,t}})^2 + \sum_{n=1}^{N}(\overline{CUR_{l,n,t}} - \overline{ACUR_{l,t}})^2] \,/\, 2(N-1)$$

Where N is the total number of portfolios created, and t represents the month since the start of the portfolio investigation period.

Using this, the variance of the mean of the two portfolios is:

$$(2 * S_t^2)/N$$

Thus, the T-statistic can be calculated using the previous two equations as follows:

$$T_t = [\overline{ACUR_{l,t}} - \overline{ACUR_{w,t}}]/\sqrt{(2 * S_t^2)/N}$$

Testing at the 0.05 level, I will be able reject or fail to reject the null and thus, determine if there is overreaction in the FTSE.

3.5.2 Technological Difference Test?

To compare whether the introduction of technology has magnified or nullified overreaction in a financial setting, I will compare the differences in returns between the two portfolios prior to and post the dot-com bubble, which I will assume is the end of 2002. (Taffler, 2018).

I will use the data accumulated from the one-year, two-year and four-year portfolios to conduct the analysis. This is due to the fact that all three periods include portfolios that conclude at the end of 2002, unlike the three-year periods. Hence, returns prior to the substantial rise of technology can be successfully compared. Just like the statistical methodology described above, I will average the difference in portfolio returns prior to and after 2002 and conduct a two-tailed t-test at the 0.05 significant level. The results will reveal whether there are significant differences in returns before and after the information revolution. Ultimately, this will indicate the impact technology has caused upon overreaction in the FTSE.

4. Results

4.1 Portfolio Formation and Investigation Periods

Portfolio Selection	23 one-year periods	11 two-year periods	7 three-year periods	5 four-year periods
Average Number of Stocks/Portfolio	18	17	16	15
(ACUR) Winner: Annualized	3.4%	-2.3%	-0.3%	-2.7%
(ACUR) Loser: Annualized	-3.6%	-1.9%	2.4%	1.6%
Loser ACUR - Winner ACUR: Annualized	-7.0%	0.4%	2.8%	4.3%
T-Statistic	-2.95	0.24	1.39	3.18

Table 1: Annualized Average Cumulative Returns ($\overline{ACUR}$) & Statistical Analysis of FTSE 100 between January 1st, 1995 and December 31st, 2015.

Starting January 1st, 1995 and using one, two, three & four-year non-overlapping periods, I created winner and loser portfolios. The Average Cumulative Returns ($\overline{ACUR}$) of the Winner Portfolios, Loser Portfolios and the difference between the two (Loser – Winner) can be seen in Table 1. All returns are annualized. Table 1 also reports the T-statistic, which represents the significance of the loser portfolios outperforming the winner portfolios.

In the one-year periods, an outperformance by the winner portfolio over the negative portfolio (7%) is consistent with that of previous research – such as in Mazouz & Li (2007). This is evidence that over a one-year time period, overreaction has not taken place. The main difference, relative to former research, is that the t-stat in this scenario is statistically significant at the 5% level. Furthermore, the returns of the winner portfolio were 3% higher than the market, which equates to the large outperformance than investors seek.

In both the two-year and three-year portfolio periods, the loser portfolios outperformed the winner portfolios (annually 0.4% & 2.8%, respectively); and in the three-year case, they also outperformed the market. However, these results are not statistically significant, therefore we cannot reject the null hypothesis that there is overreaction. De Bondt & Thaler (1985) were consistent in most respects as they also found the returns of the loser portfolios to be greater than the winner portfolios for both two-year and three-year periods, and in the three-year setting, they also outperformed the market. However, unlike our study, their result was statistically significant over three years.

For four-year periods, the loser annually outperformed the winner portfolios by 4.3%, whilst also outperforming the market by 1.6%. This outperformance by the loser portfolios over the winner portfolios is statistically significant at the 0.05 level (t-stat = 3.18). Furthermore, there is sufficient evidence to conclude for the presence of overreaction in the FTSE over four-year periods. This aligns with the results found in De Bondt & Thaler (1985) who found that over extended time periods, investors are able to correct for previous overreactions in equity pricing.

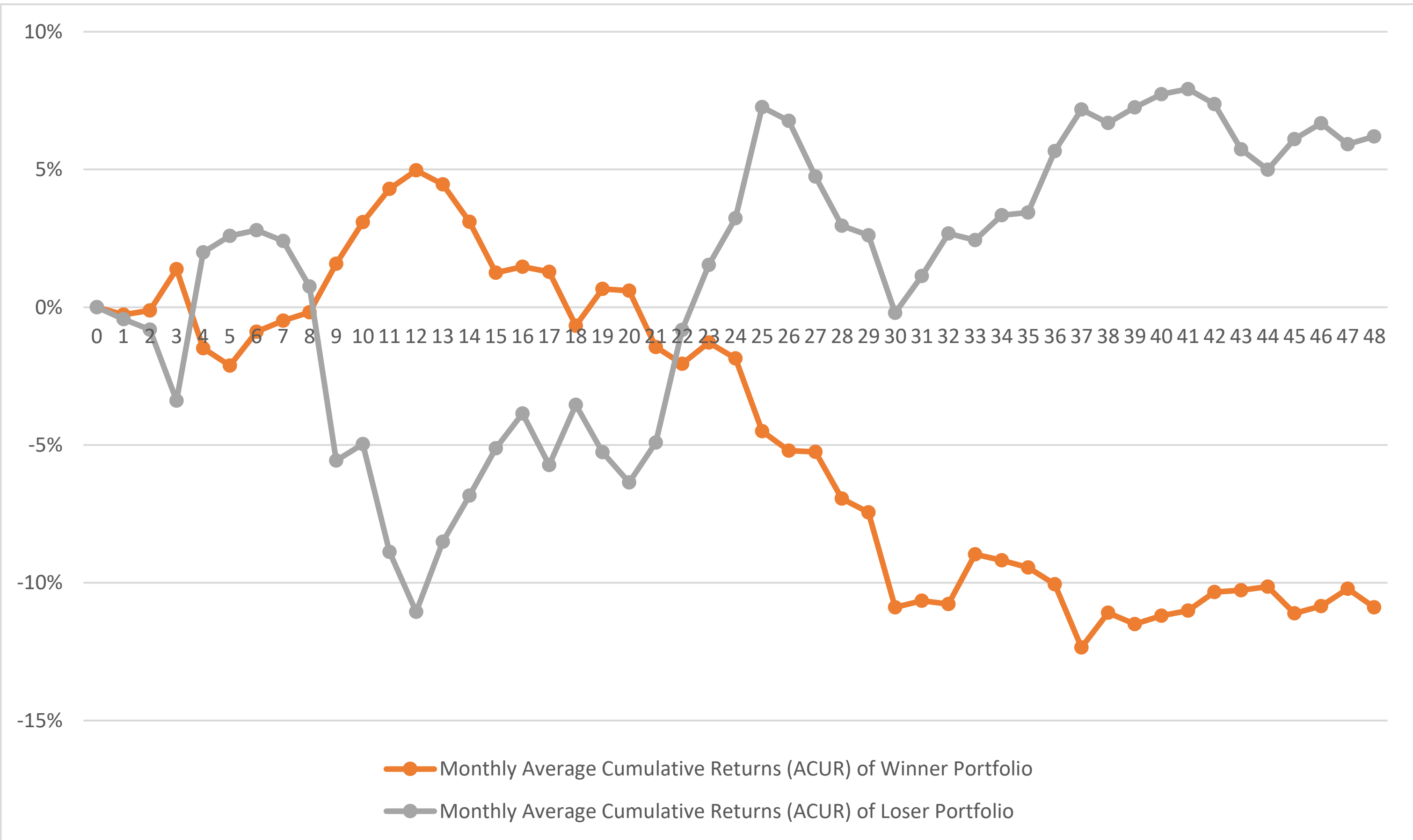

Figure 2: Monthly Average Cumulative Returns ($\overline{ACUR}$) of the two portfolios against the FTSE 100 index (1-48 months into the investigation period). The portfolio formation period was 4 years and a further 4 years for the portfolio investigation period.

In Figure 2, the Monthly Average Cumulative Returns($\overline{ACUR}$) of the four-year winner and loser portfolios can be seen. The results are consistent with the results discussed earlier in this section. We see at the twelve-month mark (one-year) that winner portfolios return higher than loser portfolios (by 16%). However, at the 24-month mark (two-year) the opposite is true, and the loser portfolios outperform the winner portfolios by 5%. Furthermore, at the 36-month mark (three-year) the difference of outperformance by the loser portfolios over the winner portfolios has increased to 16%. Ultimately, at the 48-month mark (four-year) this difference has grown to 17%. These results align with De Bondt & Thaler (1985) (Figure 1) – as time increases, the margin of outperformance by the loser portfolios over the winner portfolios also increases.

A relative difference can be seen between these results and those found in De Bondt & Thaler (1985). In Figure 2, the winners outperformed the losers at the twelve-month mark. However, in Figure 1, De Bondt & Thaler (1985) found that loser portfolios outperformed winner portfolios in all months following the portfolio formation period. Furthermore, De Bondt & Thaler (1985) found that the loser portfolios outperformed the market index whilst the winner portfolios only slightly underperformed the market. Here, the opposite is true, and the difference in returns of the portfolios lies in the fact that the winners greatly underperformed the market, whilst the losers slightly overperformed it.

The shorter portfolio periods do not provide enough evidence to conclude that there has been overreaction in the FTSE; however, the longer periods indicate otherwise. Previous literature has found that the margin by which the loser portfolios outperform the winner portfolios increase in a positive direction as time lengthens. This is also reflected in the t-statistics as there is a reversal in sign from one-year to two-year. However, this outperformance is not significant until the four-year scenario. Furthermore, it aligns with a statement by De Bondt & Thaler (1985) that, “the interval required for a substantial under and over evaluation to correct itself averages approximately one and a half to two and a half years." Thus, it is possible that during the shorter time interval portfolios, not enough time has passed for overreaction to correct itself.

Alternative portfolios were created using the top and lowest 10% and the top and lowest 15% but similar results were found.

There is survivorship bias present in this methodology. Companies that merge or fail have been excluded from analysis. This is highlighted by the fact that, as the portfolio periods increased, the number of average equities per portfolio decreased. Thus, one extreme average return for an equity may have a more significant impact on the returns of the portfolio and the results.

4.2 Information Technology change

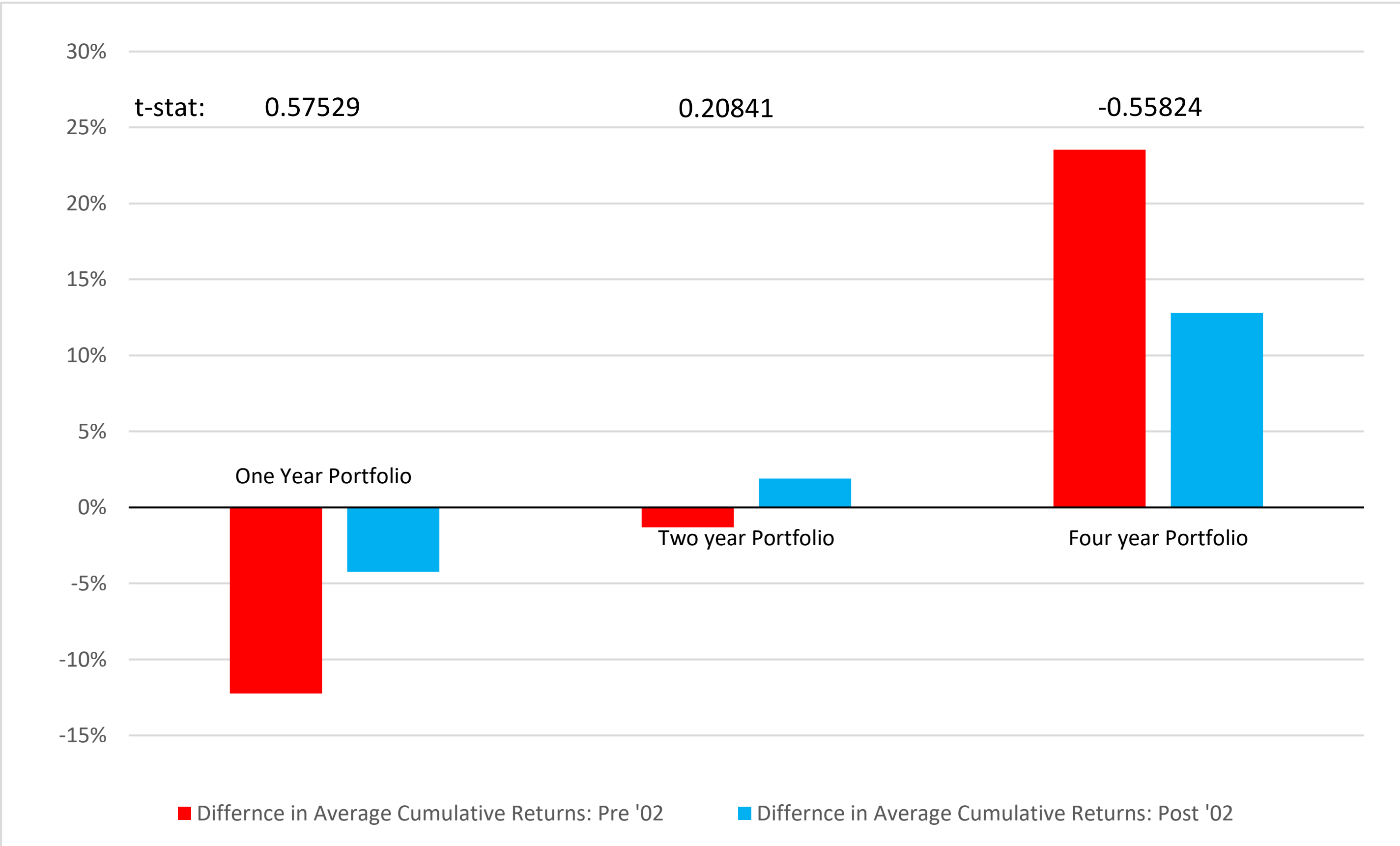

Figure 3: Comparison of difference in $\overline{ACUR}$ Prior to and Post 2002.

In Figure 3, we can see the results of the statistical analysis conducted upon the average difference in returns of the portfolios before and after 2002. We find that for the one-year periods, the loser portfolios were outperformed by a lesser extent after 2002. In the two-year scenarios, the loser portfolios outperformed the winner portfolios by a greater margin after 2002. In the four-year scenario, the opposite outcome was true.

The t-statistics represent the significance of the change in the Average Cumulative Returns between the lower portfolios and winner portfolios, before and after 2002. Overall, none of the t-statistics were significant. From this there is not enough evidence to conclude that the evolution in information technology has magnified or lessened investor overreaction in any significant way.

5. Conclusion

It may appear that the overreaction hypothesis leads to an arbitrage opportunity for investors to invest in a portfolio of the worst performing stocks. However, the main issue with this is that a certain number of the worst performing stocks during the portfolio formation period were not eligible for analysis because they did not post returns during the investigation period. This may be due to acquisitions or bankruptcy. While the some of the results of this research indicate loser stocks will outperform the winner stocks, it is not easy to determine which of those loser portfolios will outperform the market, or worse yet, be available on the FTSE in the following years.

Ultimately, the results from my research will progress this field of behavioral finance, as little work has been done to test for overreaction since the turn of the century. Further, I hope that my results focusing on the revolution of information technology will begin the discussion of the extent to which it has affected investor emotion. Based on my analysis there is little evidence that technology has affected investor overreaction; however, I do find evidence for the presence of overreaction, consistent with the results of De Bondt & Thaler (1985), and Mazou & Li (2007) in the FTSE, which is in contradiction to Clare & Thomas's FTSE analysis (1995). Future papers could evaluate the evidence of overreaction in other international equity markets since the information revolution.

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