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Overreaction Effect in the Tunisian Stock Market

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Abstract

In this paper, we examine the existence of the overreaction effect in the Tunisian stock market over the period January 1999 to December 2013 and we try to explain this phenomenon. Using the methodology of De Bondt and Thaler (1985), we report evidence in favour of the overreaction effect. Securities which have underperformed the market over the past three years will outperform the market over the following three years. Also, we find that the overreaction is not a manifestation of the January effect. The excess returns of the loser portfolios are not realized in January. Furthermore, we document that the difference in performance between the loser and winner portfolios is not attributed to the size effect. However, we find that the overreaction effect in the TSE can be explained by the differences in risk.

1. INTRODUCTION

Since the eighties, many studies have provided evidence about the existence of anomalies in stock markets. The most prevalent of these anomalies appear to be the overreaction effect. This anomaly suggests that previous losers outperformed previous winners. The overreaction effect was first noted by De Bondt and Thaler (1985) who found, employing US data between 1926 and 1982, that securities which have underperformed the market over the past three to five years will outperform the market over the following three to five years. Several researchers suggested that the overreaction effect is inconsistent with the efficient market hypothesis and the rationality of market participants. De Bondt and Thaler (1985) noted that the overreaction occur when investors, in revising their beliefs, tend to give excessive weight to recent information and underweight past information. Moreover, De Bondt and Thaler (1985, 1987), Chopra *et al.* (1992) and Bildik and Gulay (2007) argued that investors can realize profits by adopting the contrarian investment strategy (buying past losers and selling past winners). However, others authors argued that the overreaction effect is attributed to risk mismeasurement (Chan, 1988; Ball and Kothari, 1989) or bid ask errors (Kaul and Nimalendrum, 1990; Conrad and Kaul, 1993).

With the surge of institutional interest in emerging stock markets of Africa, it is essential to know how well these markets work. Indeed, little attention has been concentrated on the informational efficiency of stock markets in African countries. For

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example, in the context of the Tunisian stock exchange (TSE), there are a few studies examining the overreaction effect. Dhouib and Abaoub (2007) using data from 1997 to 2005, reported that stocks with high or low performance over the past period of three years show low or high performance during the following period. Moreover, Trabelsi (2008) found evidence of the overreaction effect in the TSE over a period from 1991 to 1999. These two studies have tested the presence of the overreaction effect without trying to explain this effect. Therefore, the objectives of this paper are to investigate the existence of the overreaction effect in the TSE over the period January 1999 to December 2013 and to try to explain this phenomenon.

Using the methodology of De Bondt and Thaler (1985), we report evidence in favour of the overreaction effect. Thirty-six months after portfolio formation, losers win 25.89% more than winners. Also, we find that the overreaction is not a manifestation of the January effect. The excess returns of the loser portfolios are not realized in January. Furthermore, we document that the difference in performance between the loser and winner portfolios is not attributed to the size effect. However, we find that the overreaction effect in the TSE can be explained by the differences in risk. The rest of the paper proceeds as follows. Section 2 gives a brief literature review. Section 3 deals with the data and methodology. Section 4 reports empirical results and section 5 concludes the paper.

2. BRIEF LITERATURE REVIEW

The overreaction effect has examined in various stock markets. In the US, UK and Canada, numerous studies reported evidence in favour of the overreaction effect. They found that the contrarian strategies (buying past losers and selling past winners) yield abnormal returns (Chopra *et al.*, 1992; Campbell and Limmack, 1997; Lee and Swaminathan, 2002; Assoé and Sy, 2004; Ma *et al.*, 2005; Harger *et al.*, 2012; Fabozzi *et al.*, 2013). For the Japanese stock market, Chang *et al.* (1995) and Lihara *et al.* (2004) found that previous losers outperformed previous winners. For European countries, Alonso and Rubio (1990), Mai (1995) and Mengoli (2004) also documented a significant overreaction effect in the Spanish, French and Italian stock markets, respectively. For emerging markets, Da Costa (1994); Dhouib and Abaoub (2007) and Bildik and Gulay (2007) showed the overreaction effect in Brazilian, Tunisian and Istanbul stock markets, respectively, while Foster and Kharazi (2008) reported no overreaction effect in Tehran stock exchange.

Two explanations for the overreaction effect have been proposed. The first is that the profitability of contrarian strategies is a fair compensation for the risk. Zarowin (1990), Clare and Thomas (1995), Gaunt (2000) and Fernandes and Ornelas (2008) found that the contrarian profits can be explained by the size effect. They showed that there is no significant difference in performance between the loser and winner portfolios, when size is controlled. However, De Bondt and Thaler (1985) reported that firm size cannot explain the overreaction effect. Fama and French (1996), Galariotis *et al.* (2007), Chou *et al.* (2007) and Clements *et al.* (2009) found that the Fama-French Three-factor model can fully capture contrarian profits. However, Assoé and Sy (2004) and Bildik and Gulay (2007) reported that the Fama-French Three-factor model cannot explain contrarian profits. The second explanation is that the profitability of contrarian strategies is due to investor behavior. De Bondt and Thaler (1985) noted that contrarian profit is attributed to expectations errors made by investors. Investors overreact to news, and their excessive optimism or pessimism causes asset prices to diverge from their equilibrium values, and that the overreaction is corrected in a following period. Schiereck *et al.* (1999) and Lihara *et al.* (2004) showed that investor overreaction may be a possible explanation for the performance of contrarian strategies in the German and Japanese stock markets, respectively.

3. DATA AND METHODOLOGY

3.1 Data

Our data include daily closing prices and dividends for all firms listed on the TSE

from January 1999 to December 2013. These data are obtained from the Tunis Stock Exchange. Return on a risk free asset is estimated from the TMM (monthly money market rate) and collected from the central bank of Tunisia.

4. METHODOLOGY

To examine the overreaction effect in the TSE, we use the methodology of De Bondt and Thaler (1985). It first involves identifying non-overlapping 36-month periods. All Tunisian securities with a complete set of returns for the period 1999-2001 (rank period) are used and their performance relative to the performance of the market over that period is calculated employing a non-risk adjusted model.

$$U_{i,t} = R_{i,t} - R_{m,t} \quad \ldots\ldots\ldots\ldots\ldots (1)$$

Where $U_{i,t}$ is the market adjusted abnormal return of security i in month t; $R_{i,t}$ is the return on security i in month t; and $R_{m,t}$ is the return on the market in month t.
The monthly return of security i is given by:

$$R_{i,t} = \frac{P_{i,t}+DIV_{i,t}-P_{i,t-1}}{P_{i,t-1}} \quad \ldots\ldots\ldots\ldots\ldots (2)$$

Where $P_{i,t}$ is the average closing price of security i over month t, $P_{i,t-1}$ is the average closing price of security i over month t-1 and $DIV_{i,t}$ is the dividend distributed by security i for month t.
The market return on month t $(R_{m,t})$ is given by:

$$R_{m,t} = \sum_{i=1}^{N} \frac{R_{i,t}}{N} \quad \ldots\ldots\ldots\ldots\ldots (3)$$

Where N is the number of companies listed on month t.
These stocks are then ranked on the basis of their cumulative abnormal return (CAR) over the rank period.

$$CAR_t = \sum_{t=-35}^{0} U_{i,t} \quad \ldots\ldots\ldots\ldots\ldots (4)$$

Where CAR_t is the cumulative market adjusted abnormal return for security i over the period from 36 months prior to the start of the test period.

The top five* securities were assigned to the winner portfolio W; and the bottom five securities to the loser portfolio L.
The performance of each portfolio, relative of the performance of the market over the next 36 months (the test period is thus 2002 to 2004), is then calculated as:

$$CAR_{P,z,t} = \sum_t \left[\left(\frac{1}{N}\right)\sum_{i=1}^{N} U_{i,t}\right] \quad \ldots\ldots\ldots (5)$$

Where $CAR_{P,z,t}$ the cumulative average market is adjusted abnormal return in month t of the period z for portfolio p, and N is the number of securities in each portfolio.

This procedure is repeated for each non-overlapping 3-year period. That is subsequent rank periods are 2002-2004, 2005-2007, 2008-2010. Their matching test periods are 2005-2007, 2008-2010, 2011-2013.

The portfolio CARs are then averaged across the four† test periods:

$$ACAR_{P,t} = \frac{\sum_{z=1}^{Z} CAR_{P,z,t}}{Z} \quad \ldots\ldots\ldots\ldots (6)$$

Where $ACAR_{P,t}$ is the average CAR across the Z (4) test periods for each portfolio, P, across each month t of the test period.

The overreaction hypothesis predicts that, for t > 0, $ACAR_{W,t} < 0$ and $ACAR_{L,t} > 0$. Alternatively, the null hypothesis can be written as $\left[ACAR_{L,t} - ACAR_{W,t}\right] > 0$. In order to examine whether, at any period t, there is a statistically significant difference in investment performance, a pooled estimate of the population variance in CAR_t is needed. The actual estimate will be given, as in De Bondt and Thaler (1985) by:

* We use portfolios of five stocks because the number of stocks with complete set of returns for both the rank and test periods is small. Indeed, the number of stocks is equal to 20, 27, 29 and 36 between 1999-2004, 2002-2007, 2005-2010 and 2008-2013 respectively. Moreover, Alonso and Rubio (1990) defined winners and losers as being the best and worst five performing stocks over their rank period respectively.

† Alonso and Rubio (1990) and Dhouib and Abaoub (2007) used three and two non-overlapping three-year periods respectively.

$$S_t^2 = \frac{\left[\sum_{z=1}^{Z}\left(CAR_{W,z,t} - ACAR_{W,t}\right)^2 + \sum_{z=1}^{Z}\left(CAR_{L,z,t} - ACAR_{L,t}\right)^2\right]}{2(Z-1)} \quad \ldots (7)$$

And the t-statistics is therefore given by:

$$t_t = \frac{\left[ACAR_{L,t} - ACAR_{W,t}\right]}{\sqrt{\frac{2S_t^2}{Z}}} \quad \ldots (8)$$

In order to test whether the $ACAR_{L,t}$ and $ACAR_{W,t}$ are significantly different from zero, we calculate the test statistics:

$$t_{L,t} = \frac{ACAR_{L,t}}{\frac{S_L}{\sqrt{Z}}} \quad \ldots (9)$$

And

$$t_{W,t} = \frac{ACAR_{W,t}}{\frac{S_W}{\sqrt{Z}}} \quad \ldots (10)$$

Where S_L and S_W are the sample standard deviation of the loser and winner portfolio, respectively.

5. EMPIRICAL RESULTS

5.1 The overreaction hypothesis

The differences in average cumulative average market adjusted abnormal returns (*ACAR*) between the loser and winner portfolios for selected months of the test period are presented in table 1. The results suggest that there is a significant overreaction effect in the TSE over the period January 1999 to December 2013. In months t=30, t= 33 and t=36, the differences in *ACAR* between the loser and winner portfolios are positive and statistically significant. From this table, we see also that, as we move through the test period, the difference in *ACAR* between the loser and winner portfolios is augmented. Twenty-four months after portfolio formation, the difference between the loser and winner portfolios is equal to 3.12% (t-statistic=0.26) and thirty-six months after portfolio formation, the difference become 25.89% (t-statistic=2.73). Our results are consistent with the U.S. findings of De Bondt and Thaler (1985). They found that the overreaction effect mostly occurred during the second and third year of the test period.

Table 1: Differences in average cumulative average market adjusted abnormal returns (*ACAR*) between the loser and winner portfolios at 1, 12, 18, 24, 27, 30, 33 and 36 months into the test period. Three-year formation-test period with four independent replications

Months after portfolio formation	Difference in *ACAR* (t-statistics)
1	-0.0232 (-1.32)
12	-0.0679 (-0.77)
18	-0.0986 (-0.91)
24	0.0312 (0.26)
27	0.0992 (0.71)
30	0.3335* (2.44)
33	0.2346* (2.23)
36	0.2589* (2.73)

* Significant at 10% level

Figure 1 shows the movement of the *ACAR* for the loser and winner portfolios as we progress through the test period. From this figure, we see that the Tunisian stock market overreaction is asymmetric. From months 30 to 36, we find that the absolute value of the average cumulative average market adjusted abnormal return from the winner portfolios ($ACAR_W$) is much larger than the absolute value of the average cumulative average market adjusted abnormal return from the loser portfolios($ACAR_L$). In months t=30, t=33 and t=36, the $ACAR_L$ is respectively 11.43% (t-statistic=1.06); 3.51% (0.79), and 3.49% (0.51). On the other hand, the $ACAR_W$ is respectively -21.92% (-2.60); -19.94% (-1.66), and -22.39% (-3.39). Our findings are in line with Da Costa (1994) but are in contrast with De Bondt and Thaler (1985). They found that the overreaction effect in the US market was much larger for losers than winners.

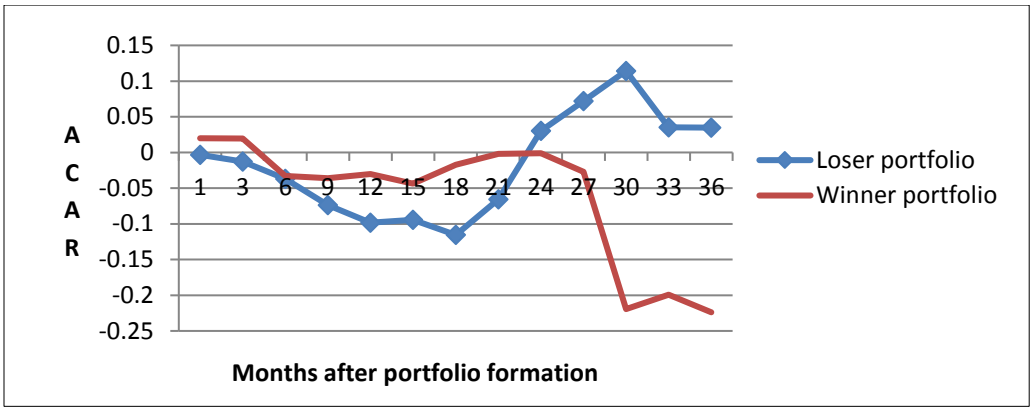

Figure 1: Average cumulative average market adjusted abnormal return (ACAR)

5.2 Seasonality and overreaction effect

Many authors (e.g. De Bondt & Thaler, 1985, 1987; Zarowin, 1990; Bildik & Gulay, 2007) have reported that the excess returns realized by the loser portfolios come from January. Their findings are consistent with the tax-loss-selling hypothesis. This hypothesis posits that at the end of year, investors sell poorly performing stocks in order to gain a tax benefit and at the beginning of the new tax year, investors buy those stocks to re-establish their portfolios. However, contrary to the results presented by these authors, we find that the excess returns of the loser portfolios are not realized in January[*]. In months t=1, t=13 and t=25, the loser portfolio earns excess returns of, respectively, 0.05% (t-statistic=0.18); -0.64% (-1.59), and 1.31% (1.05). None of them are statistically significant. Our findings are in line with Alonso and Rubio (1990) and Clare and Thomas (1995). Alonso and Rubio (1990) argued that the overreaction effect observed in the Spanish stock market can hardly be a phenomenon related to the size effect since the size effect is primarily due to January.

5.3 Size and overreaction effect

Zarowin (1990), among others, argued that the overreaction effect is a manifestation of the well-known size effect, i.e. that losers tend to be small and that small companies outperform large companies. However, Brailsford (1992) claimed that the difference in performance between the loser and winner portfolios is not attributed to the size effect. He argued that losers tend to be larger than winners.

Table 2 presents the size of the loser and winner portfolios for each independent rank/test period at the last month of the rank period. The results suggest that firm size cannot explain the overreaction effect observed in the TSE over the period January 1991 to December 2013. We find that, in December 2001 and December 2007, the loser portfolio is smaller than the winner portfolio. However, in December 2004 and December 2010, the loser portfolio is larger than the winner portfolio.

Table 2: The size of the loser and winner portfolios in million dinars for each independent rank/test period at the last month of the rank period

Portfolio	December 2001	December 2004	December 2007	December 2010
Loser	133.01	103.32	66.13	538.40
Winner	145.54	94.40	255.58	205.084

Size: the market capitalisation in million dinars

5.4 Risk and overreaction effect

In order to assess whether the difference between the returns of the loser and winner portfolios can be explained by the differential risk (beta), we follow the methodology of Chan (1988). We regress the return on an arbitrage portfolio against the market risk premium for each of the 4 three-year test periods, ie., $R_{L,t} - R_{W,t} = \alpha_A + \beta_A(R_{m,t} - R_{f,t}) + \varepsilon_{A,t}$, where $R_{L,t}$ and $R_{W,t}$ are the returns on the loser and winner portfolios, respectively; $R_{m,t}$ is the monthly

[*] In Tunisia, the fiscal year starts on 1 January and ends on 31 December.

market return and $R_{f,t}$ is the risk-free rate in month t. we find that the average Jensen performance index, $\overline{\alpha_A}$= 0.0042 with an average t-statistic of 0.38. Then, the overreaction effect in the TSE can be explained by the differences in risk. Our results are consistent with the efficient market hypothesis and the rationality of market participants.

6. CONCLUSIONS

In this paper, we test the existence of the overreaction effect in the TSE over the period January 1999 to December 2013 and we try to explain this phenomenon. Using the methodology of De Bondt and Thaler (1985), we report evidence in favour of the overreaction effect. Thirty-six months after portfolio formation, losers win 25.89% more than winners. Also, we find that the overreaction is not a manifestation of the January effect. The excess returns of the loser portfolios are not realized in January. Furthermore, we document that the difference in performance between the loser and winner portfolios is not attributed to the size effect. However, we find that the overreaction effect in the TSE can be explained by the differences in risk. The average Jensen performance index is statistically insignificant. Our results are consistent with the efficient market hypothesis and the rationality of market participants.

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