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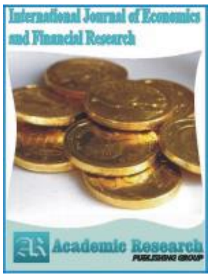

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Are Size and January Effects Related? Evidence from the Tunisian Stock Exchange

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Abstract: In this paper, we examine the existence of the size effect in the Tunisian stock exchange (TSE) over the period January 2008 to December 2013 and we test the relationship between size and January effects. The findings reveal that there is a size effect in the TSE. However, we report that size and January effects are separate anomalies. More specifically, we document that average returns are found to increase with decreases in size. However, we find that small firms don't significantly outperform large firms in January.
Keywords: Tunisian stock exchange; Firm size; Beta; January effect.
JEL Classification: G11; G14

Contents

1. Introduction

Since the eighties, numerous studies in financial economics have provided evidence about the existence of anomalies in stock markets. The most prevalent of these anomalies appear to be the size effect. This anomaly suggests that small stocks have higher average returns than large stocks. The size effect was first documented by Banz (1981) and Reinganum (1981) who found a significant negative relation between average returns to stocks and the market value of stocks after controlling for risk in the NYSE and NYSE-AMEX markets, respectively. Keim (1983) reported that size effect is a manifestation of the January effect documented by Rozeff and Kinney (1976). He found that the average risk-adjusted return to a portfolio of small firm's stocks is high in January and much smaller for the rest of the year. None of the attempts to account for transaction costs (Al-Rjoub and Hassan (2004); (Stoll and Whaley 1983)), tax-loss selling (Berges *et al.*, (1984); (Reinganum 1983)) and information effects Barry and Brown (1984); Zang (2006) has provided a complete explanation of the size anomaly.

A size effect for foreign markets also has been found. The international evidence gives insight into the size anomaly because the foreign markets differ from the American market in institutional, regulatory, and tax environments. For example, Brown *et al.*, (1983) provided evidence of January-size effect in the Australian stock market, even though the beginning of the tax-year is in July. They suggested that something other than tax-loss selling drives the January-size effect. (Kato and Schallheim 1985) reported a January-size effect in the Japanese stock market, where no capital gains tax exists. They indicated that the size and January effects are interrelated. (Berges *et al.*, 1984) found a January-size effect in the Canadian market prior 1972, when there was no tax on

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capital gains. They noted that tax-loss selling hypothesis is not an adequate explanation of the January-size effect. (Chen and Chien 2011) reported a January-size effect in the Taiwan stock market. They attributed this anomaly to the structure of this stock market.

Previous studies on size effect have mainly concentrated on developed markets. However, in recent years, there has been increasing attention being paid to the emerging stock markets of Africa[1] since these markets have started to attract investors around the world. The increased interest in African stock markets is attributed to their low correlation with the rest of the world and to their remarkable performance in the past. (Giovannetti and Velucchi 2013) find that the Tunisian and Ghana stock markets provide benefits of portfolio diversification as they have low correlation with developed markets. Moreover, every year since 1995, there has been at least one African stock market in the top ten best-performing markets in the world. In 2005, for example, three African countries (Egypt, Zambia and Uganda) were among the world's five best-performing stock markets. In the context of the Tunisian Stock Exchange (TSE), there is no published study examining the size effect. Therefore, the objectives of this study are to investigate the existence of the size effect in the TSE over the period January 2008 to December 2013 and to examine the relationship between size and January effects.

Our findings reveal that there is a size effect in the TSE. However, we report that size and January effects are separate anomalies. More specifically, we document that average returns are found to increase with decreases in size. However, we find that small firms don't significantly outperform large firms in January.

The remainder of this paper is organized as follows: Section 2 presents the data used in this study. Section 3 reports tests and results and section 4 offers brief conclusions.

2. Data

Our data include daily closing prices, dividends and market values for companies listed on the TSE from January 2008 to December 2013. During this study period, we have thirty six[2] companies with complete data. These data are obtained from the web page of the TSE (www.bvmt.com.tn). Return on a risk free asset is estimated from the monthly money market rate (TMM) and collected from the central bank of Tunisia.
The monthly return of security i is given by:

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

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:

$$R_{m,t} = \sum_{i=1}^{n} \frac{R_{i,t}}{n} \qquad (2)$$

Where n is the number of companies listed on month t.

3. Tests and Results

3.1. Portfolio Formation

The portfolio formation method is analogous to that of (Fama and French 1992). Naturally, the Tunisian sample is much smaller than that of the United States and, consequently, fewer delineations of portfolios can be made. We want to form enough portfolios on the basis of size and beta that provide sufficient variation in size and beta, diminish the correlation between size and beta, and, at the same time, provide sufficient numbers of companies in each portfolio. Thus, we rank companies into one of three size portfolios. Companies in each of the three size portfolios are further subdivided into low and high beta groups, for a total of six portfolios. The number of companies in the three size portfolios is twelve, while the number of companies in the six size-beta portfolios is six. In more detail, for each month, companies are assigned to one of three portfolios according to the previous end-of-month market value (MV). For each month, the sample of Tunisian companies is ranked on size and segmented into thirds, with companies in the bottom third grouped in portfolio MV1, the middle third grouped in portfolio MV2, and the largest third grouped in portfolio MV3. Then, for each month and for each size portfolio, companies are subdivided into low and high beta portfolios according to betas calculated in the previous twenty four months. A company with a beta below (above) the median beta of its size portfolio is classified in the low (high) beta group. Returns are equally-weighted within each portfolio to derive monthly portfolio returns. This process provides six portfolios for each month spanning the forty eight month period January 2010 to December 2013.

[1] See Bundoo (2006) ; Hearn *et al.*,(2010) and Acheampong *et al.*,(2014) .
[2] By increasing the period of study, we risk that the number of companies with complete data decreases. Moreover, Herrera and Lackwood (1994) used a study period of six years to examine the size effect in the Mexican stock market.

3.2. Preliminary Findings

Table 1 reports the descriptive statistics for the portfolios. This table presents data, first, for the entire sample, and, then, for portfolios MV1, MV2, MV3. The columns provide results for all beta, low beta, and high beta groups, respectively. The return, beta, and size data reported in the table are time-series averages of the monthly portfolio values for each portfolio computed over January 2010 to December 2013. The number of companies (n) in each portfolio is listed at the bottom of each section of the table.

Using the portfolios segmented on size alone, we see that there is no relationship between average returns and beta. However, average returns are found to increase with decreases in size. For portfolios MV1, MV2, MV3, respectively, average monthly returns are -0.048%, -0.564%, and -1.515%, betas are 1.132, 0.842, and 1.059, and sizes are 35.785, 154.456 and 655.949 million Tunisian dinars.

Results for the portfolios segmented by both size and beta are more revealing. Findings reveal that average returns for both the low and high beta groups decrease as size increases. For the low beta group, average monthly returns are 0.210%, -0.463% and -1.831%, for MV1, MV2, MV3, respectively. For the high beta group, average monthly returns are -0.310%, -0.666%, and -1.200%, for MV1, MV2, MV3, respectively. Thus, average returns and size exhibit a negative relationship within both low and high beta groups.

Findings also reveal that there is no relationship between average returns for each size portfolio and beta. Average monthly returns for low versus high beta groups are 0.210% versus -0.310% for MV1, -0.463% versus -0.666% for MV2, and -1.831% versus -1.200% for MV3.

Using the portfolios segmented on size alone and the portfolios segmented by both size and beta, our preliminary findings suggest that there is a size effect on average returns for Tunisian companies over the sample period. However, we find that there is no a beta effect. Our findings are in line with (Fama and French 1992) and (Morelli 2007) but in contrast with (Herrera and Lackwood 1994).

3.3. Regression Analysis

To examine size effect more formally, the following regression is estimated:

$$R_{i,t} - R_{f,t} = \alpha_0 + \alpha_1 \ln MV_{i,t} + \varepsilon_{i,t} \qquad (3)$$

Where $R_{i,t}$ is the return of security i on month t; $R_{f,t}$ is the risk-free-rate on month t; $\ln MV_{i,t}$ is the natural logarithm of the market value of the company i at the end of the previous month; α_0 and α_1 are the parameters to be estimated, and $\varepsilon_{i,t}$ is an error term.

The presence of a negative and statistically significant α_1 coefficient would be indicative of size effect.

Table 2 provides the results of the estimation of regression (3). From this table, we see that the coefficient α_1 is negative and statistically significant at the 5% level, indicating the presence of the size effect in TSE. This finding confirms our preliminary judgment that average return and size are negatively related.

3.4. Size Effect and Seasonality

In order to examine the relationship between size and January effects which has been documented in many stock markets, the following regression is estimated:

$$R_{A,t} = \beta_1 D_{1,t} + \beta_2 D_{2,t} + \cdots + \beta_{11} D_{11,t} + \beta_{12} D_{12,t} + \varepsilon_t \qquad (4)$$

Where $R_{A,t} = R_{MV1,t} - R_{MV3,t}$ is the difference in returns between the MV1 and MV3 portfolios on month t; $D_{1,t}$ through $D_{12,t}$ are dummy variables for each month of the year. $D_{1,t}$ takes the value 1, if t is January and zero otherwise; $D_{2,t}$ takes the value 1, if t is February and zero otherwise and so on. The parameters β_1 to β_{12} indicate the estimate of the mean differences in returns between the MV1 and MV3 portfolios for January though December respectively and ε_t is an error term.

The null hypothesis tested is:

$$H_0: \beta_1 = \beta_2 = \cdots = \beta_{11} = \beta_{12}$$

Against the alternative that all β are not equal. If the mean differences in returns between the MV1 and MV3 portfolios is the same of each month, the estimates of β_1 though β_{12} should be equal, and the *F*-statistic should be insignificant.

The results of the estimation of regression (4) are presented in table 3. The coefficients for all dummy variables except April and June are statistically insignificant. Also, we note that the parametric F-statistic is significant. Then, the null hypothesis that all months of the year have the same mean differences in returns between the MV1 and MV3 portfolios is rejected at 10% significance level. The table shows that the highest mean differences in returns between the MV1 and MV3 portfolios are observed on June, followed by April. However, the lowest mean differences in returns are produced during January, followed by September. Our results are in contrast with many authors[3] who

[3] See Keim (1983) , Brown *et al.*,(1983) , Kato and Schallheim (1985) , Berges *et al.*,(1984) and Jacobsen *et al.*,(2005).

reported that the size effect is a manifestation of the January effect. The presence of a June and an April effects can be attributed to the reporting time in the TSE.

4. Conclusions

In this paper, we test the existence of the size effect in the TSE over the period January 2008 to December 2013 and we examine the relationship between size and January effects. The findings reveal that there is a size effect in the TSE. We document that average returns are found to increase with decreases in size. Our results are in line with Fama and French (1992) and Morelli (2007) but in contrast with Herrera and Lackwood (1994). However, we report that size and January effects are separate anomalies. We find that small firms significantly outperform large firms only in June and April. The presence of a June and an April effects can be attributed to the reporting time in the TSE.

The existence of the size effect should not necessarily imply that abnormal profit can be made in the TSE, at least for some investors that are subject to borrowing constraints and high transactions costs.

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Table-1. Descriptive statistics for portfolios formed on firm size and pre-ranking beta for Tunisian companies using data from January 2008 to December 2013. This table reports descriptive statistics for Tunisian companies for six portfolios consisting of a small, medium, and large company portfolio each of which is further segmented into thirds, with companies in the bottom third grouped in portfolio MV1, the middle third grouped in portfolio MV2, and the largest third grouped in portfolio MV3. Then, for each month and for each size portfolio, companies are subdivided into low and high beta portfolios according to betas estimated in the previous twenty four months. A company with a beta below (above) the medium beta of its size portfolio is classified in the low (high) beta group. The portfolio return for month is computed as the equal-weighted average return of the companies classified in the portfolio during month t. the average return, beta, and size statistics reported in the table are time-series averages of the monthly portfolio values of these variables for each portfolio. Size is reported in Tunisian dinars in millions. The data presented for average returns are percentage. The number of companies (n) in each portfolio is reported at the bottom of each section.

	All	**Low beta**	**High beta**
All			
Return	-0.709	-0.865	-0.554
Beta	1.011	0.432	1.590
Size	282.064	264.339	299.788
n	36	18	18
Small-MV1			
Return	-0.048	0.210	-0.310
Beta	1.132	0.500	1.766
Size	35.785	31.079	40.492
n	12	6	6
MV2			
Return	-0.564	-0.463	-0.666
Beta	0.842	0.506	1.177
Size	154.456	168.753	140.158
n	12	6	6
Large-MV3			
Return	-1.515	-1.831	-1.200
Beta	1.059	0.345	1.773
Size	655.949	619.639	692.260
N	12	6	6

Table- 2. Results of the estimation of regression (3)

Regression (3): $R_{i,t} - R_{f,t} = \alpha_0 + \alpha_1 \ln MV_{i,t} + \varepsilon_{i,t}$	
α_0	0.012
***T*-stat**	(1.19)
α_1	-0.004**
***T*-stat**	(-2.40)

Note: ** denotes test statistic significance at the 5% level

Table- 3. Results of the estimation of regression (4)

	Mean	***T*-stat**	***F*-stat**
January	-0.025	-1.13	1.97
February	0.013	0.59	
March	0.014	0.63	
April	0.067*	3.07	
May	0.035	1.63	
June	0.069*	3.20	
July	-0.009	-0.44	
August	-0.010	-0.46	
September	-0.011	-0.49	
October	0.022	1.01	
November	0.022	0.99	
December	-0.010	-0.48	

Note: * denotes test statistic significance at the 10% level.