

## SEASONED EQUITY ISSUES IN THE GREEK STOCK MARKET. STOCK PRICE REACTION ON THE EX-RIGHTS DAY: A TEST OF SEMI-STRONG FORM MARKET EFFICIENCY

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### Abstract

This paper is an empirical study of the common stock price reaction on the ex-rights day of seasoned equity issues. Using an event study methodology we investigate 34 seasoned equity offerings by listed firms in the Athens Stock Exchange (Greece) during the period 1981-1990 and observe that on the ex-rights day there are no abnormal returns concluding that the Greek Stock Market is efficient in the semi-strong form. (JEL G3, G30)

### 1. Introduction

In Greece, when listed firms issue seasoned equity they are required by law to use the rights issue method<sup>1</sup>. In a rights offering each shareholder receives one right for each share owned. The rights permit shareholders to purchase a specific number of new shares in proportion to the number of shares already owned. The subscription price for the new shares, since it is irrelevant, is set below the current stock price<sup>2</sup>. A lower subscription price ensures the success of the offering, raises the market value of the right and reduces the probability that at the expiration date of the rights offering the stock price will be below the subscription price. On the ex-rights day there is a corresponding fall in the market price of the stock, but this fall is like a stock split effect which does not affect the wealth of the owners of the firm (as long as they participate in the new issue or sell their rights)<sup>3</sup>. Thus, the information that a share begins to trade ex-rights should carry no information about future prospects of the firm and should not have any effect on the stock's price. Whether such a theoretical prediction holds in emerging capital markets such as the Athens Stock Exchange (ASE) is an interesting empirical issue.

\* I would like to thank Nickolaos G. Travlos for his helpful comments as well as the anonymous referees.

This paper investigates the above proposition by analyzing stock returns on the ex-rights day. The testable hypothesis is that the average abnormal return on the ex-right day is zero. This test is also a test of the semi-strong form market efficiency hypothesis of the ASE.

The semi-strong form efficient market hypothesis implies that current security prices reflect all publicly available information<sup>4</sup>. If this is true, no abnormal returns can be gained by acting on this information<sup>5</sup>. Thus, if semi-strong form efficiency holds, market prices would have adjusted to any good or bad news contained in announcements as soon as they became public. When listed firms decide to issue new shares, all the information should be incorporated in the security's price on the announcement day. The day on which the stock begins to trade ex-rights (that is, without the right to subscribe to the new issue) is associated with no new information. Thus, under the semi-strong form efficiency hypothesis abnormal returns shouldn't be observed on the ex-rights day.

This study is important because it enhances our understanding of the link between major corporate financing decisions and capital markets. In addition this is the first test of the semi-strong form market efficiency hypothesis, in the Athens Stock Exchange and therefore, it provides further evidence on the efficiency of the Greek capital market.

The remainder of this paper is organized as follows. Section 2 provides related empirical evidence. Section 3 describes the data. Section 4 presents the methodology and the hypothesis that will be tested. Section 5 discusses the results. Finally section 6 contains the conclusions.

## 2. Related Studies

Smith (1977) argues that "arbitrage profits must not be available. When a stock trades ex-rights, a right is issued for each share outstanding. At the ex-rights date, the expected change in the stock price must equal the expected value of the right, or profit opportunities would exist. If the sum of the ex-rights value of the stock plus the value of the right at the ex-rights date were systematically different from the value of the stock immediately before the ex-rights date, then profits could be made by taking an appropriate position in the stock upon the announcement of the rights issue"<sup>6</sup>. Consistent with this argument Kothare (1991) finds no evidence of abnormal returns on the ex-rights day of rights offers. In contrast to this, however, Marsh (1979) finds that "there did appear to be a small setback of 0.5% to 1% when shares went ex-rights".

Regarding the empirical evidence on market efficiency in the Athens Stock Exchange the evidence covers only the weak form efficiency. Niarhos (1972) using monthly data investigates a sample of 17 listed firms to test if the market conditions under which stocks are sold guarantee that they are traded at fair prices (objective prices) and concludes that the market is weak form-efficient. Papaioannou (1982) on the other hand, using a larger sample (25 firms) and daily data, for the period 1970-1975, reports a statistically significant serial dependence of stock prices that may be viewed as evidence of weak-form inefficiencies. No formal tests of semi-strong form market efficiency have been conducted and this study bridges this gap.

### 3. Sample and Data Description

The initial data analyzed in this study consists of all the ex-rights dates of the common seasoned equity issues made by firms listed on the ASE via the rights issue method during the period 1981-1990. The sample was identified through a search of the ASE publications and the Database of Athens Stock Exchange Security Returns<sup>7</sup>. Here the announcement day is the date common shares begin trading without their rights (ex-rights date).

To avoid the problem of infrequent trading the final data sample consists of all the ex-rights dates of successful rights issues of common shares which comply to the following criteria: *Only issues by firms with at least 30 trading days during the respective estimation period ( $t = -200, t = -51$ ) were included in the analysis*. Thus, the final sample contains 34 ex-rights dates of rights offerings of common stock. For each ex-rights date, the daily stock returns for 211 days surrounding the date were calculated. These 211 days are divided into two groups from  $t = -200$  to  $t = -51$ , the estimation period and  $t = -50$  to  $t = +10$ , the prediction period (ex-rights date  $t = 0$ ).

Table 1 lists summary statistics (means, standard deviations and medians) of the firms in the final sample of ex-rights dates. The values for the total assets (row one) and total liabilities (row two) are taken from each firm's financial statement at the year-end prior to the ex-rights date. The mean values (in thousands of Dr.) for these items are 110,646,995 and 104,972,271 respectively, while the standard deviations are (in thousands of Dr.) 236,708,309 and 227,379,546, respectively, and the medians are (in thousands of Dr.) 5,816,151 and 4,201,887, respectively.

Row three (3) reports the market value of the common stock that the firm has outstanding before the ex-rights date, that is, this number of common shares out-

standing times the closing price year-end prior to the ex-rights date. The mean, standard deviation and median are (in thousands of Dr.) 6,696,770, 8,242,216 and 4,485,069, respectively.

Row four (4) contains the current value of common shares issued, that is, the number of common shares outstanding times the issue price. The mean, standard deviation and median are (in thousands of Dr.) 3,503,809, 5,831,376 and 1,256,300 respectively.

Row five (5) and six (6) report statistics on the number of common stock outstanding and number of common stock issued taken from the ASE publications years 1985-1990 respectively. The mean number of common shares outstanding and common shares issued is 2,916,153 and 856,366 respectively while the corresponding standard deviations are 2,920,730 and 617,903 and the median values are 2,256,350 and 768,125.

Row seven (7) contains the percentage change of debt from the equity issues. The mean, standard deviation and median of the percentage of change are -13%, 8% and -15% respectively.

The percentage change is based on book value and is computed:

$$\left( \frac{D}{A_{+1}} \div \frac{D}{A_{-1}} \right) - 1$$

where:

D = Total debt (liabilities) year-end prior to the ex-rights date

A<sub>-1</sub> = Assets year-end prior to the ex-rights date

A<sub>+1</sub> = A<sub>-1</sub> + new capital from equity issues

#### 4. Methodology (Estimation of Abnormal Stock Returns)

Using an event study methodology as described by Brown and Warner (1980, 1985) we test whether the stock returns are effected by the event that the stock begins to trade ex-rights.

For each security *i* the market adjusted model is used to calculate a abnormal return (prediction error)  $e_{it}$  for the event day *t* as follows<sup>9</sup>:

$$\hat{e}_{it} = R_{it} - R_{mt}^{10} \quad (1)$$

where  $R_{it}$  is the rate of return on security  $i$  for event day  $t$  and  $R_{mt}$  is the market rate of return on the event day  $t$ <sup>11</sup>.

The estimation period is from  $t = -200$  to  $t = -51$  relative to the announcement date  $t = 0$  (ex-rights date). Abnormal returns are calculated over the interval  $t = -10$  to  $t = +10$ . For a sample of  $N$  securities an Average Abnormal Return (AR) for each day  $t$  is defined as:

$$\overline{AR}_t = \overline{e}_t = \frac{\sum_{i=1}^N \hat{e}_{it}}{N} \quad (2)$$

where:

$t = -50, -49, -48, \dots, 0, +1, +2, \dots, +10$  and

$N =$  number of stock in our sample each day.

The Cumulative Abnormal Returns (CAR) for  $N$  shares from the sample and for the period from event day  $t_1$  to event day  $t_2$  is also defined as:

$$CAR(t_1, t_2) = \sum_{t=t_1}^{t_2} \overline{AR}_t \quad (3)$$

As mentioned at the beginning the hypothesis we are testing is:

$$\overline{AR}_t = 0$$

where  $t = 0$  is the day the stock begins to trade ex-rights.

The expected values of  $\overline{AR}_t$  and  $[CAR(t_1, t_2)]$  are zero in the absence of abnormal returns. The statistical significance of  $\overline{AR}_t$  and  $[CAR(t_1, t_2)]$  is tested by the following t-statistics respectively:

$$t(AR) = \frac{\overline{AR}_t}{S(AR_t)} \quad (4)$$

$$t = \frac{CAR_t}{\sqrt{T} * S(AR_t)} \quad (5)$$

where:

$S(\overline{AR}_i)$  : is the sample standard deviation of the abnormal returns during the estimation period. The estimation period includes 150 days from period  $t = -200$  to  $t = -51$ <sup>12</sup> ( $t = 0$  is the announcement date) and

$T = t_2 - t_1 + 1$  : where  $t_1$  is the first day of the period for which the CAR is calculated and  $t_2$  is the last.

Finally a binomial-sign test examines whether the proportion of positive event-day returns is greater than expected under the null hypothesis. This test is a test of location, thus it is not affected by outlier returns in either a positive or negative direction<sup>13</sup>.

## 5. Results

Table 2 presents the results for the behavior of the daily average abnormal returns and cumulative average abnormal returns for the sample of 34 firms ex-rights dates, for the period of -10 to +10 days relative to the announcement day ( $t = 0$ ). Column 1 lists the event time relative to the announcement day, in terms of trading days. Column 2 presents the number (N) of firms with valid returns on each event day. Column 3 has the number of positive/negative abnormal returns. Column 4 presents the daily average abnormal returns (AR) for each event day. Column 5 contains the cumulative daily average abnormal returns (CAR). Column 6 contains the t-statistics for the average abnormal returns ( $t[AR]$ ). These statistics indicate whether the null hypothesis of zero abnormal return on a given day can be rejected or not. We also present cumulative daily average abnormal returns (CAR) for two, six and eleven days and the corresponding t-statistics and the z-values for the proportion of positive abnormal returns on the event days -1 and 0.

As shown in Table 2, the average abnormal return on the ex-rights day ( $t = 0$ ) is statistically insignificant ( $t = 0.6433$ ) at any conventional level of significance. Also, there are statistically insignificant abnormal returns observed on day  $t = -1$  ( $t = -1.1578$ ). Finally, the z-values for the proportion of positive abnormal returns on the ex-rights day  $t = 0$  ( $z = 0.2085$ ) and on the day  $t = -1$  ( $z = -0.3651$ ) are statistically insignificant.

## 6. Conclusions

This study documents the stock price reaction on the ex-rights dates of 34 common stock issues during the period 1981-1990. Using an event study methodology we test the hypothesis that "the average abnormal return on the ex-rights day is zero" and find that on average there were no statistically significant abnormal stock returns when stock began to trade ex-rights. Because of this, we cannot reject the hypothesis that the Greek market is efficient in the semi-strong form with respect to ex-rights dates. Thus, it is expected that all the information is incorporated in the stock's price on the day of the first announcement (the day the rights offerings are publicly announced) and the event that the stock begins to trade ex-rights has no effect on the stock prices (it carries no information about the firm's future prospects) as expected in a efficient market. Our conclusions agree with the argument set by Smith (1977) and the findings of Kothare (1991), that in a efficient market there should be no abnormal returns expected, but not with the results of the research conducted by Marsh (1979) who observed a temporary decline in the stock prices when shares went ex-rights.

## Appendix

**TABLE 1**

**Summary Statistics of 34 Rights Issues of Common Stock During the Period 1981-1990**

	Mean	Standard Deviation	Median
(1) Total Assets (in Thousands of Dr.) <sup>a</sup>	110,646,995	236,708,309.	5,816,151
(2) Total debt (liabilities) (in Thousands of Dr.) <sup>a</sup>	104,972,271	227,379,546	4,201,887
(3) Market Value of Common Stock Outstanding (in Thousands of Dr.) <sup>b</sup>	6,696,770	8,242,216	4,485,069
(4) Market Value of Shares Issued in Thousands of Dr.) <sup>c</sup>	3,503,809	5,831,848	1,256,300
(5) Number of Common Stock Outstanding	2,916,153	2,920,730	2,256,350
(6) Number of Stock Issued	856,366	617,903	768,125
(7) Debt Change (%) From Equity Issues <sup>d</sup>	-13	8	-15

Note: Source of data the Athens Stock Exchange

a Book value at year-end prior to ex-rights date.

b Common stock outstanding times the closing price year-end prior to ex-rights date.

c Common shares issued times the issue price.

d Based on book value.

TABLE 2

Number of Positive and Negative Observations, Daily Average Abnormal Returns (AR), Cumulative Average Abnormal Returns (CAR) and t-Statistics of AR (t[AR]) for a Sample of 34 Ex-rights Dates of Common Stock Right Issues by Listed Firms for the Period of 10 Days Before Through 10 Days After the Ex-rights Date (day zero) Years 1981-1990

EVENT DAY	N	POSITIVE/ NEGATIVE	AR	CAR	t [AR]
-10	29	17/12	0.00293	0.00293	0.40784
-9	28	17/11	-0.00321	-0.00028	-0.44651
-8	29	7/22	0.01771	0.01743	2.46346**
-7	29	12/17	0.00248	0.01991	0.34538
-6	26	10/16	0.00659	0.02650	0.91697
-5	27	16/11	-0.01131	0.01520	-1.57299
-4	30	19/11	-0.00962	0.00558	-1.33801
-3	30	14/16	0.00779	0.01337	1.08373
-2	30	13/17	0.01611	0.02947	2.24082**
-1	30	16/14	-0.00832	0.02115	-1.15784
0	23	11/12	0.00462	0.02578	0.64332
1	22	15/7	-0.00822	0.01756	-1.14308
2	25	15/10	-0.00356	0.01400	-0.49575
3	29	16/13	-0.00281	0.01118	-0.39153
4	27	10/17	-0.00662	0.00456	-0.92083
5	27	18/9	-0.00967	-0.00511	-1.34528
6	27	16/11	0.00028	-0.00482	0.03901
7	26	15/11	-0.00122	-0.00605	-0.17033
8	27	13/14	-0.00336	-0.00941	-0.46717
9	24	12/12	0.01077	0.00136	1.49773
10	25	14/11	-0.00107	0.00029	-0.14848



**Table 2 (continued)**

	t-statistic
<b>Cumulative Average Abnormal Returns:</b>	
- Two day CAR (-1, 0) = -0.00370	-0.25726
- Six day CAR (-5, 0) = -0.00073	-0.01683
- Eleven day CAR (-10, 0) = 0.02578	0.32602
	z-value
Proportion of positive AR on event day -1:	-0,36515
Proportion of positive AR on event day -0:	0,20851

\* Significant at the 0.10 level

\*\* Significant at the 0.05 level

\*\*\* Significant at the 0.01 level

### Footnotes

1. Another type of seasoned equity issues is the rights offering issued for free. This method is similar to stock dividends in the respect that it only increases the number of stock with no actual changes in the amount of equity capital. Although this kind of equity issues are quite common in Greece, here we will focus only on cash rights issues.

2. See Brealey and Myers (1991).

3. For a detailed description of the mathematics for calculating the new adjusted stock prices see Smith (1977) and Brealey and Myers (1991).

4. See Fama (1965), Fama (1970), Fama (1976) and Brigham (1985).

5. Abnormal returns are calculated after the market adjustments on the ex-rights day.

6. See Smith (1977) footnote 18.

7. See Travlos (1992), a comprehensive source of daily stock returns for the Athens Stock Exchange. In this data bank the stock prices have been adjusted so that they reflect the technical correction of stock prices on the ex-right days.

8. The returns following the missing values are excluded in order to avoid mixing one-day and two-day returns (Brown and Warner (1985)).

9. This choice is justified by:

- Brown and Warner's (1980) conclusion that a simple methodology is not less powerful.
- Problems in calculating the  $\beta$  (See Glezakos (1987), Glezakos (1987b), Glezakos (1992) and Karathanassis and Philippas (forthcoming)).

Marsh's (1979) observation that: "The market model tends to perform relatively poorly in terms of statistical efficiency, since the alpha estimate impounds any unusual behavior during the estimation period, giving rise to noisy stage two estimates of abnormal returns. In Addition, the alphas can very easily become systematically biased by an inappropriate choice of estimation period".

10. It can be regarded as the limiting model of the market model  $R_{it} = \alpha_i + \beta_i R_{mt} + \epsilon_{it}$  when  $\alpha = 0$  and  $\beta = 1$ .

11. The market rate of return  $R_{mt}$  contains all the shares proportionate to their value. We could use the ASE index which however does not contain the paid dividends, thus it can't be considered an objective measure of portfolio return since it undervalues the return. Also thin trading and non synchronous trading create problems when calculating  $\beta$ . If the investor needs a measure of total return the ASE index should not be used. Instead an equally weighted index which contains dividends should be used (see Travlos (1992), Papaioannou (1982), Papaioannou (1984), Karathanassis and Philippas (1990) and Karathanassis and Philippas (Forthcoming)).

12.  $S(\overline{AR}_t)$  is not calculated in the prediction period since the stock returns for this period may be affected (positively or negatively) by the announcements of equity issues and so  $S(\overline{AR}_t)$  may be greater or smaller than if calculated in the estimation period where there are no announcements.

13. The z-value for the proportion of positive abnormal returns is given by (see Doukas and Travlos (1988)):

$$z = \frac{(m - pn)}{\sqrt{p(1-p)n}}$$

where:

$p$  = the probability under the null hypothesis of observing a positive (or negative) abnormal return (0.50)

$n$  = the number of abnormal returns

$m$  = the number of positive (or negative) abnormal returns observed.

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