ABNORMAL RETURNS: ECONOMETRIC PROBLEMS OR PSYCHOLOGICAL BIAS?

Nizar Hachicha*, Abdelfettah Bouri**, Foued Khlifi***

Abstract

To validate the existence of abnormal returns, the most of empirical studies use the event study methodology which examines the behavior of firms' stock prices around corporate event. However, this methodology was been the source of several limits. Some defenders of efficiency theory assert that the abnormal returns are due to the event study methodology failures and econometric problems. However, partisans of behavioral finance demonstrate that the abnormal returns are due to psychological bias. The main purpose of this paper is to verify if the abnormal returns resulting from the event study methodology are due to econometric problems or to psychological bias generated by irrational investors' reactions. For the econometric bias, five problems are studied: the choice of market index; the missing observations; the abnormal returns normality, joined hypothesis; and the variance volatility in the event window. Results show that abnormal returns are far from being due to the event study methodology failures and econometric bias. For the psychological problems, based on trading volumes, the results show negative and significant abnormal returns (investors' under-reaction); a strong positive correlation between abnormal returns and abnormal trading volumes and a significant causal sense between them. So, abnormal returns are due to psychological bias.

Key words: abnormal returns, emergent market, econometric problems, psychological bias

**Ph.D, Faculty of Economics Sciences and Management, University of Sfax-Tunisia,*
E-mail: hachicha_nizar@yahoo.fr
***Professor of finance, Faculty of Economics Sciences and Management, University of Sfax-Tunisia,*
E-mail: abdelfettah.bouri.@fsegs.rnu.tn
****Ph.D, Faculty of Economics Sciences and Management, University of Sfax-Tunisia,*
E-mail: khlifi.foued@laposte.net (Corresponding author)

1. Introduction

Efficiency theory constitutes a dominate approach used to explain financial market's dynamic. This makes it possible to provide stable and significant results in the explanation of firms' stock returns. However, it is submit to several criticisms. Behavioral finance researches criticized the basic hypothesis of this theory: the investors' rationality. Other researches criticized the existence of abnormal returns on several financial markets that the efficiency theory is unable to explain their persistence.

To validate the existence of abnormal returns, the most of empirical studies use the event study methodology which examines the behavior of firms' stock prices around corporate event. However, this methodology was been the source of several limits.

Some defenders of efficiency theory affirmed that the abnormal returns are due to the event study methodology failures and econometric problems. Nevertheless, partisans of behavioral finance demonstrate that the abnormal returns are due to psychological bias.

In this paper, our interest is to study the source of abnormal returns: are they due to econometric problems or to psychological bias? To achieve this goal, we proceed as follows. In section 2, we present specific and general econometric failures of abnormal return. In section 3, we demonstrate that abnormal returns are due to psychological problems. And section 4 summarizes the results.

2. Abnormal returns and econometric problems

2.1. Methodology of detection abnormal return

In this section, we describe the sample and the methodology for detection of abnormal return. Our sample is composed by 119 dividends distribution announcement events of firms quoted on the Tunisian Stocks Exchange (TSE) for the period January 1999-December 2005. We divide the sample into two groups. The first is composed by the securities of the firms which form the TSE index and the second by the securities of the firms which form the TUNINDEX index. Our basic event is the dividends distribution. The event window is composed by 11 months: 5 months before the date of event and 5 months afterwards. The estimate window is composed by 30 months. Event studies examine the behavior of

firms' stock prices around corporate events. Abnormal return is the difference between the observed return and the predicted return:

$$AR_{i,t} = R_{i,t} - E\left(R_{i,t} / X_t\right) \quad (1)$$

Where $AR_{i,t}$: Abnormal return on the security i for time period t relative to the event, Observed return on the security i for time period t relative to the event, Normal return on the security i for time period t relative to the event, is given by estimating the Security Market Line ($R_{it} = \alpha_i + \beta_i R_{mt} + \varepsilon_{it}$). The abnormal return becomes equal to:

$$AR_{i\tau} = R_{i\tau} - \hat{\alpha}_i - \hat{\beta}_i R_{M\tau} \quad (2)$$

The Mean Cumulative Abnormal Returns (MCAR) calculated on the event window for the firms which form the TSE index (Panel A) and the firms which form the TUNINDEX index (Panel B) are presented in the table below:

Table 1. Mean Cumulative Abnormal Returns (MCAR)

	Panel A		Panel B	
	MCAR	t-stat	MCAR	t-stat
-5	- 0.0133	1.7941	-0.0021	0.3574
-4	- 0.0149	0.1647	0.0068	1.0916
-3	- 0.0112	0.6579	0.0095	0.4663
-2	-0.0077	0.5475	0.0034	0.9305
-1	0.0013	1.5670	0.0146	1.7362
0	-0.0350	5.7639	-0.0181	4.5048
1	-0.0622	3.7144	-0.0339	2.1528
2	-0.0663	2.6003	-0.0299	1.6468
3	-0.0670	1.9109	-0.0246	0.7997
4	-0.0594	1.2299	-0.0264	0.2620
5	-0.0589	0.0961	-0.0409	2.5574

From the table 1, we can conclude:

- The investor reaction starts at the date 0 for the two panels. It is proportionately intense for the panel B; however, it is smaller than the panel A.
- The Mean Cumulative Abnormal Returns are significant for the event window [0, 2] for the panel B against event window [0, 3] for the panel A.
- The TSE inefficiency for the semi-strong form efficiency (panel A and panel B).
- The sensibility of the event study methodology to the choice of market index (we use the same methodology for the same market, the same period and almost the same data base (the difference between components of the TSE and TUNINDEX index is almost small in our data base).
- The sign of the Mean Cumulative Abnormal Returns for the two panels is negative; this means that the observed return is lower than the normal (predicted) return. Investors under estimate securities prices. This under-estimation is the cause of the MCAR negative sign and the under-reaction approved in our event study. We remind that this under-reaction was identified after the dividends level announcement event.

2.2. Abnormal returns and econometric problems

Several studies have documented that the event study methodology exhibits an econometric bias. In this section, we present the most important problems illustrated in the financial literature and solutions that we took to remedy to some of them.

2.2.1. Specific failures

The choice of market index

Brown and Warner (1980) show that use of the Equally Weighted Index is more likely to pick up abnormal performance than use of the Value-Weighted Index. Such a finding is consistent with the argument that the returns on randomly selected securities are on average more highly correlated with the Equally Weighted Index than the Value-Weighted Index. If for a majority of sample securities the precision with which β and hence residuals are measured is higher with the Equally Weighted Index, abnormal performance would be easier to detect using that benchmark.

To examine the sensitivity of our results to the choice of market index, we use two indexes: one is Equally Weighted Index (TSE index) and another is no (TUNINDEX) index).Results show that the use of Equally Weighted Index reduces the level of abnormal returns but not eliminate them. We can so conclude that the abnormal returns found in our study are not due to the problem of the choice of market index.

The missing observations

To solve this problem, we have use the Brown and Warner (1985) methodology which consists in using only the available data, by taking away the missing periods and the periods which succeed them, in order to preserve the sample size and not to affect the periodic returns real values.

2.2.2. General failures

Econometric problems presented as general failures are the MCAR normality, the jointed hypothesis and the method of composed abnormal returns (BHAR) and the MCAR autocorrelation and heteroscedasticity.

Problem of MCAR normality

To test the hypothesis of existence abnormal return, the empiric studies use the statistical tests that suppose the normality of return. Brown and Warner (1985) affirm that the abnormal returns are not normally distributed. To check this hypothesis, we use the Skewness and kurtosis coefficients:

Table 2. Distribution of abnormal return

	Skewness	kurtosis	Jarque Bera
PANEL A	0.39870	5.248806	16.408475
PANEL B	0.63263	6.457315	18.098114

1. Skewness:

$$v_{1,A} = \left| \frac{S-0}{\sqrt{6/N}} \right| = 3.24 > 1.96$$

$$v_{1,B} = \left| \frac{S-0}{\sqrt{6/N}} \right| = 4.11 > 1.96$$ ith: N represent the number of observations

2. Kurtosis:

$$v_{2,A} = \left| \frac{K-3}{\sqrt{24/N}} \right| = 6,103 > 1.96$$

$$v_{2,B} = \left| \frac{K-3}{\sqrt{24/N}} \right| = 6,42 > 1.96$$

3. Jarque Bera > 5.99 for two panels

The following table shows that the MCAR are not normally distributed. The value of Student test are generally erroneous to solve this problem, we based on nonparametric tests. The methods most often employed are the sign test and the rank test.

The sign test compare proportion of positive and negative abnormal returns during event period. The Z statistic is given as follow:

$$z = \frac{w - N\hat{\rho}}{[N\hat{\rho}(1-\hat{\rho})]^{1/2}} \quad (6)$$

Where,

w is the number of securities which have a positive MCAR during event period.

N is the securities number.

P is the proportion of positive abnormal returns observed during the estimate period. It is defined as:

$$\hat{\rho} = \frac{\sum_{i=1}^{N} \frac{\sum_{i=1}^{T1} S_{i,t}}{L}}{N} \quad (7)$$

Where $S_{i,t}$ is the sign of abnormal returns on the security i for time period t relative to the event.

$$S_{i,t} = \begin{cases} 1 \text{ si AR}>0 \\ 0 \text{ si AR}<0 \end{cases} \quad (8)$$

For the application of rank test, it is necessary to transform the abnormal return by their ranks (Ki) on the period combines the estimation window and event window (Ti):

$$K_{i,t} = rang(RA_{i,t}) \quad (9)$$

Under the null hypothesis of the abnormal return:

$$\overline{K_t} = 0.5 + T_i/2 \quad (10)$$

The statistic of null hypothesis is defined as:

$$R = \frac{\sum_{i=1}^{L} \frac{1}{N} \sum_{i=1}^{N} (K_{i,t} - \overline{K_t})}{\sqrt{\sum_{i=1}^{L} S^2(\overline{K_t})}} \quad (11)$$ With:

$$S(\overline{K_t}) = \sqrt{\frac{1}{T} \sum_{t=1}^{T} \frac{1}{N^2} \sum_{i=1}^{N} (K_{i,t} - \overline{K_t})^2} \quad (12)$$

Table 3. Mean Cumulative Abnormal Returns and non parametric test

	Panel A			Panel B		
	MCAR	t-sign	t-rang	MCAR	t-sign	t-rang
-5	- 0.0133	10.2974	1.5903	-0.0021	0.0000	0.3929
-4	- 0.0149	-5.7208	0.1634	0.0068	-9.7980	1.0759
-3	- 0.0112	-5.7208	0.6922	0.0095	-9.7980	0.4865
-2	-0.0077	-3.2418	0.5416	0.0034	5.3072	0.9075
-1	0.0013	-8.3905	1.6412	0.0146	-8.3691	1.8051
0	-0.0350	10.4881	5.7864	-0.0181	9.7980	4.3652
1	-0.0622	10.2974	3.3993	-0.0339	6.1237	2.3132
2	-0.0663	5.9115	2.1929	-0.0299	-6.7361	1.6740
3	-0.0670	2.6697	1.8067	-0.0246	-9.7980	0.7955
4	-0.0594	10.4881	1.2757	-0.0264	-5.9196	0.2800
5	-0.0589	-4.3102	0.0789	-0.0409	1.1286	2.2423

The sign test used in our study shows that the abnormal returns remain significant. So, we can conclude that the significant abnormal returns are not due to an econometric problem related to the statistic tests used which supposes the abnormal returns normality.

Joined hypothesis and BHAR method

In section 2.1 we presented the general method for detection of abnormal return (used by most empiric studies). This method based on the Security Market Line to calculate the normal return. The model market is only verified when the market is efficient. This problem is called "*Joined hypothesis problem"* to remedy this problem, we use the BHAR methodology

In recent years, following the works of Ikenberry, Lakonishok, and Vermaelen (1995), Barber and Lyon (1997), Lyon et al. (1999), the buy-and-hold abnormal returns approach, BHAR, has been widely used. Mitchell and Stafford (2000) describe BHAR returns as "the average multiyear return from a strategy of investing in all firms that

complete an event and selling at the end of a prespecified holding period versus a comparable strategy using otherwise similar non-event firms. An appealing feature of using BHAR is that buy-and-hold returns better resemble investors' actual investment experience than periodic rebalancing entailed in other approaches to measuring risk-adjusted performance. The joint-test problem remains in that any inference on the basis of BHAR hinges on the validity of the assumption that event firms differ from the "otherwise similar non-event firms" only in that they experience the event.

The researcher implicitly assumes an expected return model in which the matched characteristics perfectly proxy for the expected return on a security. Since corporate events themselves are unlikely to be random occurrences, there is a danger that the event and nonevent samples differ systematically in their expected returns notwithstanding the matching on certain firm characteristics. This makes matching on expected returns more difficult, especially in the case of event firms experiencing extreme prior performance.

The buy-and-hold abnormal returns (BHAR) are defined as:

$$BHAR_{i,t} = \prod 1+R_{i,t} - \prod 1+R_{m,t} \quad (13)$$

The BHAR method is used to check if the MCAR are null. Barber and Lyon (1997) and Lyon, Barber and Tsai (1999) recommend the use of this method even if it is submitted to several bias (the survivor bias, the asymmetry bias).

We suppose that BHAR is normally distributed. Student's test is presents as follows:

$$test - statistique = BHAR_{i,t} \Big/ \sigma(BHAR_{i,t}) * \sqrt{N} \quad (14)$$

Where, N is the number of observation used for calculate BHAR

$$\sigma^2(BHAR_{i,t}) = \sum_{t=1}^{30} (BHAR_{i,t} - \overline{BHAR}_{i,t})^2 \quad (15)$$

The results of our study are represented in the following table:

Table 4. The abnormal return and BHAR methodology

	Panel A		Panel B	
	BHAR	t-test	BHAR	t-test
-5	0.0448	1.1677	0.0524	0.3357
-4	0.0456	0.4512	0.0135	1.1291
-3	0.0432	1.6459	0.0029	0.4564
-2	0.0422	**-2.3459**	0.0023	1.0930
-1	0.0906	**4.1254**	0.0433	**2.6233**
0	0.1011	**4.8342**	0.0128	1.5048
1	0.1455	**4.0221**	0.0507	**2.1418**
2	0.1481	**3.3329**	0.0096	1.6468
3	0.1434	**3.4587**	-0.0039	0.6799
4	0.1618	1.8563	0.0174	0.2453
5	0.1912	-0.7456	0.0281	2.6675

We can conclude that the MCAR are statistically significant during the period [-1, 1] for the two panels A and B. This result shows the TSE inefficiency and the abnormal returns generated by the MCAR methodology are far from being due to econometric problems.

MCAR and the variance volatility in the event window

Much of the event study literature is based on a Security Market Line relating the return on an individual asset to the return on a market index and an asset-specific constant. The parameters in this model are assumed to be stationary, i.e. constant over time. Several studies (e.g., Hsu (1977; 1982)), however, have found this to be an unreasonable assumption. Further, Chen and Keown (1981) have demonstrated that non-stationarity in a stock beta coefficient can lead directly to an overestimate of the unsystematic risk parameter. Although most traditional event study methods assumed a constant variance through both the pre- and post-event periods, some, like Brown and Warner (1985), have noted that if the variance is underestimated, the test statistic will lead to rejection of the null hypothesis more frequently than it should. Recently, a number of papers, including those by Connolly (1989) and Schwert and Seguin (1990), have analyzed the importance of adjusting for autoregressive conditionally heterskedastic (*ARCH*) effects in the residuals obtained from the conventional Security Market Lines. It is argued that the ability to reliably form statistical inferences can be seriously compromised by failing to consider the *ARCH* error structure. Since the *ARCH* effect has been shown to be significant in many financial series, we take this into consideration in our model by applying the generalized autoregressive conditionally heterskedastic *GARCH* (1, 1) model to the error or residual term.

The GARCH (1, 1) model is made up of two equations: The first is the mean equation which is based on the Security Market Line, and the second is the conditional variance equation:

$$R_{it} = \alpha_i + \beta_i Rm_t + \varepsilon_t \quad (16)$$

$$\delta_t^2 = \alpha_0 + \alpha_1 \varepsilon_{t-1}^2 + \beta_{t-1}^2 \quad (17)$$

Normal return is given by the equation:

$$NR=\hat{\alpha}_i+\hat{\beta}_i Rm_t \quad (18)$$

The parameters α_i and β_i are estimated, for each security and each event, by the maximum likelihood estimator on the window out event.

The model GARCH (1, 1) supposes that the variance is not constant during the period of time and consequently the security risk changes with a new event. The Student statistic takes in consideration the evolution of the volatility. We note T as the statistic of abnormal returns test which is given by the relation below:

$$T_{it}=\frac{AR_{it}}{\delta_{it}} \quad (19)$$

The variance δ_{it} is calculated on the event window by the equation:

$$\delta_{it}^2=\hat{\alpha}_0+\hat{\alpha}_1 AR_{i,t-1}^2+\hat{\beta}_{t-1}\delta_{t-1}^2 \quad (20)$$

The parameters are estimated by the model GARCH (1, 1) on the window out event. Under the null hypothesis, the T statistic follows a normal law centered reduced.

If abnormal returns will be reduced, compared to the first study, we can affirm that a part of the TSE inefficiency can be explained by the existence of a no linearity which we must take on account during our research and in the construction of the TSE environment.

Table 5. MCAR and the Security Market Line with volatility GARCH (1, 1)

	Panel A		Panel B	
	MCAR	T-stat	MCAR	T-stat
-5	0.1912	-0.7456	0.0281	2.6675
-4	-0.0133	0.6452	-0.0021	0.3574
-3	-0.0149	0.7698	0.0068	1.0916
-2	-0.0112	0.6579	0.0095	0.4663
-1	-0.0077	0.5475	0.0034	0.9305
0	0.0013	1.5670	0.0146	1.7362
1	**-0.0350**	**3.7639**	**-0.0181**	**4.5048**
2	**-0.0622**	**2.7144**	**-0.0339**	**2.1528**
3	**-0.0663**	**2.0003**	**-0.0299**	**1.6468**
4	**-0.0670**	1.2109	-0.0246	0.7997
5	-0.0594	1.2299	-0.0264	0.2620

The table 4 shows that:

- The level of MCAR has reduced compared to the event study based on the security Market Line. This reduction allows us to confirm the variation of volatility on the event study. This result assumes that the MCAR level, resulting from the event study based on the Security Market Line, is due to the econometric problems related to the no stability of the securities systematic risk on the event window.
- In spite of the amelioration of the event study methodology, by introducing the systematic risk variation on the event window, the MCAR exist usually and there are significant for the two panels A and B.

3. Abnormal returns and psychological bias

In this section we will try to see if the abnormal returns are due to psychological bias. we verify if the abnormal return are descended to abnormal movements of investors. through trading volumes. Specifically we test if the movements of abnormal return are accompanied by abnormal movements trading volume (Ping. McInish and Wongchoti, 2007). The validation of existence a relation between abnormal return and abnormal trading volume permits to conclude that abnormal returns are due to psychological bias

Behavioral finance considers that the trading volumes have an important informational content on the investor's psychological studies. They are used as a proxy for some measures like overconfidence. This theory shows a strong relationship between abnormal returns and trading volumes which validate psychological bias. [Statman and Thorley, 1999; Odean, 1998…].

The importance of trading volumes led numerous studies interested of the relation between the volume and event; these studies find in a big majority. a variation of trading volume to information announcement. Among these studies one can mention: Copeland (1979) Mai and Tchemeni (1994) Harris and Gurel (1986).

3.1. Methodology

In the literature of financial market microstructure an elevated trading volume is generally associated to the receipt of information (Bolster. J. and M. (1992) Kyle (1985) and Darrat. Zhong and Cheng (2007)).

Lately, Hauser, Kedar-Levy, Pilo and Shurki (2006) studied the effect of public information on trading volumes and the impact of these last on the

speed of price adjustment. Smith Shepherd and Douglas (2004) validated the existence of the abnormal volumes on the Chinese market. following the announcement of a public event.

Our methodology consists to adapt the event study based on the prices to an event study based on the trading volume .The interest of this study is to verify if abnormal returns are synchronized with abnormal trading volumes.

Several volume definitions were used in the event studies. We use in our study the number of securities exchanged noted "V".

Mai and Tchemeni (1995) argue that variables logarithmic transformation is most adapted to identify abnormal trading volumes because it improves observations normality. The variable becomes LOGV: log (1+V).

Let V_{it} : volume of security i for time period t. V_{mt} : number of market mean volume. t_0 : event date. $t \in [-L-c,-c-1]$: estimate period for time period . $t \in [-c,+c]$: event window. In our study L= 60 and c= 15.

Abnormal trading volume is calculated by the difference between observed trading volumes toward a norm:

$$AV_{it} = V_{it} - \varphi_{i,t} \quad (21)$$

$\varphi_{i,t}$ can be defined as security volume during estimate period out of event. This norm is so a constant and the abnormal trading volume is given by:

$$AV_{it} = V_{it} - \frac{1}{L}\sum_{\tau=-c-1}^{-c-L} V_{i\tau} \quad (22)$$

In our study we choice the model that adjusts the norm $\varphi_{i,t}$ to security Market Line:

$$\varphi_{i,t} = \alpha + \beta V_{mt} + \varepsilon_t \quad (23)$$

Abnormal volume is so defined as:

$$AV_{it} = V_{it} - (\hat{\alpha} + \hat{\beta} V_{m,t}) \quad (24)$$

The Mean cumulative Abnormal Trading Volume of all securities at the period t ($MCATV_t$) is given by:

$$MCATV_t = \frac{1}{N}\sum_{i=1}^{N} AV_{it} \quad (25)$$

We also calculate the volume dispersion for estimate period:

$$MAVS = \sqrt{\frac{1}{L-1}\sum_{t=-c-1}^{-c-L}(MAV_\tau - \frac{1}{L}\sum_{\tau=-c-1}^{-c-L} MAV_\tau)^2} \quad (26)$$

To measure the event impact on trading volumes the ratio of mean volumes to standard deviation form a Student statistic:

$$MAVS = \sqrt{\frac{1}{L-1}\sum_{t=-c-1}^{-c-L}(MAV_\tau - \frac{1}{L}\sum_{\tau=-c-1}^{-c-L} MAV_\tau)^2} \quad (27)$$

$$\frac{MAV_t}{MAVS} \rightarrow T(N-1)$$

This statistic shows volumes normality securities independence and constant dispersion. To give more robustness for tests we propose another measure of standard deviation.

$$MAVS_t = \sqrt{\frac{1}{N-1}\sum_{i=1}^{N}(AV_{it} - MAV_\tau)^2} \quad (28)$$

3.2. Results

In the literature of the financial markets microstructure a high trading volume is generally associated with the information reception (Ding. McInish and Wongchoti, 2007). Several empirical researches studied the impact of public event announcement on trading volumes (Bolster, et al.1992 and Kyle, 1985).

Recently, Hauser Kedar-Levy, Pilo and Shurki (2006) examine the effect of public information on trading volumes and their impact on the prices adjustment speed. Smith, Berger and Douglas (2004) validate the existence of abnormal trading volumes on the Chinese market after the announcement of public event.

To study the effect of our dividends distribution announcement on trading volumes we use the same method of event study methodology based on the MCAR.

Table 6. MCATV

	Panel A			Panel B		
	MCATV	T-stat	T-sign	MCATV	T-stat	T-sign
-5	0.0316	0.2037	0.0000	0.0040	0.0525	1.2339
-4	-0.0652	0.4830	0.8165	0.0131	0.0989	-0.2847
-3	0.1112	1.0734	-2.4495	-0.0488	0.6137	9.9662
-2	0.3340	1.2345	-2.4495	-0.1627	1.3715	10.5357
-1	**0.5774**	**1.9075**	**2.4495**	-0.0786	1.8904	3.7017
0	**0.5319**	**2.2143**	**2.6330**	**-0.1144**	**1.9938**	**8.2577**
1	-0.0489	0.8529	-1.6330	**-0.3331**	**2.5161**	**10.3458**
2	-0.0077	0.0962	-2.4495	**-0.4836**	**2.5117**	**9.7763**
3	0.0854	0.4760	0.0000	**-0.6239**	**1.9307**	**9.9662**
4	-0.1373	1.2476	2.4495	-0.7020	0.6070	9.9662
5	-0.1650	0.1047	-0.8165	-0.7514	0.3910	9.7253

From the table 6 we can conclude a difference in the results given by panel A and panel B:

- For the panel A, the investor reaction stars at the date -1 and finishes at the event date and the trading volume are significant only for the event date (difference with results found on abnormal returns). So, the abnormal returns are due to the econometric problems.
- For the panel B, the investor reaction stars at the event date, the negative sign of Mean Cumulative Abnormal Trading Volume (under-reaction) justify the negative sign found on abnormal returns (under estimation) and the trading volume are significant for the event window [0.3] (similar results found on abnormal returns). So, the abnormal returns are due to psychological problems materialized by trading volume.

To validate our results, we have study the correlation and the causality test between the MCAR and the MCATV.

For the correlation between MCAR and MCATV we have found the results below:

Table 7. Correlation between MCAR and MCATV

	MCAR Panel A	MCAR Panel B
MCATV	0.765097692	0.831512

We can conclude that the MCAR and MCATV are strongly correlated except the panel B MCAR and the MCATV in TND.

For the causality test between the MCAR and the MCATV, our aim is not to verify a specific sense (which causes the other). but only to verify the existence of such sense to validate the idea that the MCAR are due to psychological problems.

The causality test is formulated as follows:

$$\begin{bmatrix} MCAR_t \\ MCATV_t \end{bmatrix} = \begin{bmatrix} \alpha_{MCAR,t} \\ \alpha_{MCATV,t} \end{bmatrix} + \sum_{i=1}^{r} \begin{bmatrix} \beta_{MCAR,t} \\ \beta_{MCATV,t} \end{bmatrix} \begin{bmatrix} MCAR_{t-i} \\ MCATV_{t-i} \end{bmatrix} + \varepsilon_t \quad (29)$$

The results are presented in the following table:

Table 7. Causality test between the MCAR and the MCATV

	Lag 1	
	Test 1	Test 2
Panel A: TSE index		
MCATV	0.08186	0.02839
Panel B: TUNINDEX index		
MCATV	0.07006	0.00104
Test 1:MCAR causes MCATV		
Test 2: MCATV causes MCAR		
A test is validate if p-value is less than 0.05		

This table shows that there is a significant sense of causality between the MCAR and MCATV so we can affirm that the MCAR are due to psychological problems.

We remind that under reaction suggests that the market prices under react to information on short-term horizon. Consequently, information is integrated slowly into the prices.

Cutler, Poterba and Summers (1991) demonstrate that, for a number of returns index. there is a positive returns auto-correlation on short-term horizon. The positive returns correlation is interpreted as the under-reaction influence on the market prices which must be neutralized slowly afterwards.

Barberis. Shleifer and Vishny (1998) declare that the market prices under-reaction for a bad or good signal means that the expected security return after the first reaction is higher if the signal announces good news:

$$E\left[\tilde{R}_{t+1} / \tilde{s}_t = G\right] > E\left[\tilde{R}_{t+1} / \tilde{s}_t = B\right] \quad (30)$$

For our study the results of MCAR auto-correlation are presented as follow:

Table 8. MCAR auto-correlation

Panel A	Panel B
0.778	0.649
0.451	0.362
0.116	0.157
-0.165	-0.056
-0.412	-0.326
-0.475	-0.466
-0.347	-0.302
-0.238	-0.262
-0.137	-0.179

The results show that the MCAR are positively correlated before the event date. and they are negatively correlated after this date. This result confirms the investors' under-reactions.

4. Conclusion

In this paper we have try to check if the abnormal returns resulting from the event study methodology are due to the econometric problems or to the psychological bias generated by irrational investors reactions.

To achieve this goal, we presented in a first section an event study. Based on the Mean Cumulative Abnormal Returns as measure of abnormal returns, we have found significant abnormal returns.

In the next section we have exanimate if the significant abnormal returns have due to econometric bias. For that, we studied the specific and general failures of the methodology. We have conclude that the MCAR of our study are not due to the problem of index choice and also not due to the statistic tests which suppose their normality, their correlation and the variance volatility in the event window. As a result, we have concluded that the abnormal returns are not due to econometric problems.

In the end section, we have exanimate if the significant abnormal returns have due to psychological bias. Based on trading volumes as

measure of psychological bias, we have found negative significant abnormal returns (the investors' under-reaction) a strong positive correlation between MCAR and MCATV and a significant causal sense between them. So, we have concluded that the abnormal returns result from event study methodology is so far being due to econometric problems but to the psychological bias.

References

1. Keown, J. Pinkerton, and P. Bolster, (1992) "Merger Announcements, Asymmetrical Information, and Trading Volume: An Empirical Investigation." *Journal of Business Finance and Accounting*, 19, 901–910.
2. Barber, B. and Lyon, J. (1997) "Detecting long-run abnormal stock returns: The empirical power and specification of test statistics", *Journal of Financial Economics*, 43, 341- 372.
3. Barberisn, N. Shleifer, A. and Vishny, R. (1998) "A model of investor sentiment" *Journal of Financial Economics*, 49, 307-343.
4. Brown, S. and Warner, J. (1980) "Measuring security price performance" *Journal of Financial Economics*, 8, 205-258.
5. Brown, S. and Warner, J. (1985) "Using daily stock returns: The case of event studies" *Journal of Financial Economics*, 14, 3-31.
6. Cutler, Poterba and Summers (1991) "Speculative Dynamics" *The Review of Economic Studies*, 58, 529-546.
7. Darrat, Zhong and Cheng (2007) "Intraday volume and volatility relations with and without public news", *Journal of Banking & Finance*, 31, 9, 2711-2729
8. Ding. McInish and Wongchoti (2007) "Behavioral explanations of trading volume and short-horizon price patterns: An investigation of seven Asia-Pacific markets". *Pacific-Basin Finance Journal*. In Press.
9. Hauser, Haim Kedar-Levy, Batia Pilo and Itzhak Shurki (2006) "The Effect of Trading Halts on the Speed of Price Discovery", *Journal of Financial Services Research*, 83-99.
10. Kothari, S. and J. Warner (1997) "Measuring long-horizon security price performance. *Journal of Financial Economics*, 43, 301-339.
11. Kyle, Albert S. (1985) "Continuous actions and insider trading" *Econometrica*, 54, 1315-1336.
12. Lyon, J. B. Barber and C. Tsai (1999) "Improved methods of tests of long-horizon abnormal stock returns" *Journal of Finance*, 54, 165-201.
13. Mai et Tchemini (1996) "Etude d'évènement par les volumes : méthodologies et comparaison". *Cahier de recherche*. CEREG. Université de Paris-Dauphine.
14. Ng and Wu (2007) "The trading behavior of institutions and individuals in Chinese equity markets" *Journal of Banking & Finance*, 31, 9, 2695-2710
15. Odean, T. (1998) "Are investors reluctant to realize losses?" *Journal of Finance*, 53, 1775-1798.
16. Statman, Thorley and Vorkink (2004) "Investor Overconfidence and Trading Volume" Working paper, Santa Clara University.