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Can Extension of fundamental Models Cancel the Existence of Abnormal Returns in Emerging Market?

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In front of the existence of abnormal returns, defendants of the efficient market theory try to explain them by specific and microstructural factors like: size effect, book to market effect and liquidity effect. The validation of certain anomalous on financial markets initiate some researchers to adjust fundamental models to the detected anomalies, as the case of Fama and French (1993), for the size and book to market effects, and the case of Acharya and Pederson (2005) for the liquidity effect. The question which arises at this level is: Do these models cancel the existence of abnormal returns?

In this paper we try at first, to loosen the determiners of the inefficiency of the BVMT through a cross-sectional study. After, we check if extensions of fundamental models adjusted to microstructural factors can cancel the existence of abnormal returns. We conclude the incapacity of the theory of the efficiency to explain abnormal returns and the influence of the psychological bias on these last ones.

Field of Research: abnormal return, cross-sectional study, emergent market, risk liquidity, multi-criteria model

1. Introduction

The theory of efficiency dominates the explanation of the dynamics of financial markets. It supplied stable and significant results in the explanation of stock returns. However, it undertakes several critics at various levels. Certain works criticizes the basic hypotheses of this theory. We can cite as example the critics relating to the hypothesis of the rationality of the investors, advanced by behavioral researchers. Other criticisms concern the existence of abnormal returns on several financial markets, that the theory of the efficiency is incapable to explain their persistence.

According to Hansson (2001) the stock market is efficient in the sense that every single stocks' pricing is set in accordance to all information available, therefore it does not add any value in making your own analysis. If there would exist an easy way to obtain abnormal return on capital, other investors would soon have knowledge of this method and the possibility of abnormal returns would disappear. The efficient market is further distinguished of that all investors are maximizing profits meaning that no single investor can affect the price of a stock.

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For the validation of the existence of abnormal returns, most of the empirical studies use almost the same methodology, which consists in studying the behavior of the stock returns around a specific event. This methodology, called the event study, is the native of several analyses. In front of the existence of abnormal returns, defendants of the efficient market theory try to explain them by specific and microstructural factors like: size effect, book to market effect and liquidity effect. The validation of certain anomalous on financial markets initiate some researchers to adjust fundamental models to the detected anomalies, as the case of Fama and French (1993), for the size and book to market effects, and the case of Acharya and Pederson (2005) for the liquidity effect. The question which arises at this level is: Do these models cancel the existence of abnormal returns?

The paper is organized as follows. The second section develops the literature review and describes the data. In the third we try, through a cross-sectional study, to loosen the determiners of the inefficiency of the BVMT. In the forth, we check if extensions of fundamental models adjusted to microstructural factors can cancel the existence of abnormal returns. The conclusion will be in the last section.

2. Literature Review and data base

2.1. Literature Review

For the validation of the existence of the abnormal returns, most of the empirical studies used almost the same methodology, which consists in studying the behavior of the stock returns around a specific event. Brown and Warner (1985) test whether the event-day abnormal return is significantly different from portfolio returns over the estimation period. This test is commonly called the traditional test. Brown and Warner also suggest using a cross-sectional test using the standard deviation of the portfolio's event-day abnormal returns, which tests whether the abnormal return on the event day equals zero.

Schwert and Seguin (1990) propose and estimate a single factor market model of portfolio returns, which incorporates the estimation of the time-varying component of beta. As market volatility increases, the systematic risk of small firms increases at a faster rate than those of large firms, given that small firms are less diversified and more vulnerable to shocks. Therefore, the spread between the systematic risk of small and large firms is larger during periods of high aggregate market volatility. The Schwert and Seguin results show that the small firm portfolio variances are four times more sensitive to market volatility changes than the large firm portfolio variances.

The Fama and French (1993) three factor asset pricing model was developed as a result of increasing empirical evidence that the Capital Asset Pricing Model performed poorly in explaining abnormal returns. In fact, Fama and French [hereafter FF] (1992a) studied the joint roles of market beta, size, Earnings/Price (E/P) ratio, leverage and book-to-market equity ratio in the cross-section of average stock returns for NYSE, Amex and NASDAQ stocks over the period 1963-1990. In that study, the authors find that beta has almost no explanatory power. On the other hand, when used alone, size, E/P, leverage and book-to-market equity have significant explanatory power in explaining the cross-section of average returns. When used jointly however, size and book-to-market equity are significant and they

seem to absorb the effects of leverage and E/P in explaining the cross-section average stock returns. FF (1992a) therefore argued that if stocks are priced rationally, risks must be multidimensional.

Fama and French (1993) extend the FF (1992a) study by using a time-series regression approach. The analysis was extended to both stocks and bonds. Monthly returns on stocks and bonds were regressed on five factors: returns on a market portfolio, a portfolio for size and a portfolio for the book-to-market equity effect, a term premium and a default premium. For stocks, the first three factors were found to be significant and for bonds, the last two factors. As a result, Fama and French (1993) construct a three-factor asset pricing model for stocks that includes the conventional market (beta) factor and two additional risk factors related to size and book to market equity. They find that this expanded model captures much of the cross section of average returns amongst US stocks.

Similarly, Chan and Chen (1991) posit that small and large firms have different risk and return characteristics. Small firms on the New York Stock Exchange are firms that have not been doing well, are less efficiently managed and are highly levered. As a result small firms tend to be riskier than large firms and that risk is not captured by the market index. For instance, Lakonishok et al. (1994) find a strong positive relation between averages return and BE/ME for the largest 20 per cent of NYSE-Amex stocks, where survivor bias is not an issue. Similarly, FF (1993) find that the relation between BE/ME and average return is strong for value-weight portfolios. As value-weight portfolios give most weight to larger stocks, any survivor bias in these portfolios is trivial. There are also are many studies using different sample periods on US data and samples in different countries confirming the existence of the size and book-to-market equity effects. Faff (2001) use Australian data over the period 1991 to 1999 to examine the power of the Fama French three-factor model. He finds strong support for the Fama and French three factor model, but find a significant negative rather than the expected positive, premium, to small size stocks. Faff (2001) concludes that his results appear to be consistent with other recent evidence of a reversal of the size effect.

Maroney and Protopapadakis (2002) tested the FF three-factor model on stock markets of Australia, Canada, Germany, France, Japan, the UK and the US. The size effect and the value premium survive for all the countries examined. They conclude that the size and BE/ME effects are international in character. Using a Stochastic Discount Factor (SDF) model, and a variety of macroeconomic and financial variables, do not diminish the explanatory power of BE/ME and MVE. Their evidence suggests that the BE/ME and MVE effects are not artefacts of the inadequacies of the augmented CAPM as an asset-pricing model or of omitting macroeconomic and financial variables. The positive relation of returns with BE/ME and their negative relation with MVE remain strong under a general SDF model.

Drew and Veeraraghavan (2003) compare the explanatory power of the single index model with the multifactor asset pricing model of Fama and French (1993) for Hong Kong, Korea, Malaysia and the Philippines. They find that the size effect and book to equity effect are present in these markets and that the FF three-factor model explains the variation in returns better than the single index model. They suggest that the premium is a compensation for risk that is not captured by the CAPM.

Gaunt (2004) studies the Fama French three-factor model in the Australian setting and provides further out of sample (non US) tests of the model. The study covers the period 1991 to 2000 of firms listed on the Australian Stock Exchange. He finds that beta risk tends to be greater for smaller companies and those with lower BM ratios. There is a lack of empirical evidence of whether the size and value premium are present in emerging equity markets generally, and particularly in the emerging African stock markets. This study provides some empirical evidence in Tunisia stock exchange as an emerging market

2.2. Database

The analysis includes monthly data for two indexes of the Tunisian stock exchange: BVMT and TUNINDEX, as well as for theirs constituent stocks. The sample covers 20 firms, where 10 are belonging to the banking sector. The data is obtained from the www.bvmt.com.tn Website of the Tunisian stock market from 2/01/1999 to 31/12/2005. So we have 1680 observations for each stock. For some firms, there is loss of significance of the relationship between investor sentiment and return at the individual level. So, we separate individual stocks into four groups according to activity sector, size, book to market and liquidity criteria. We also aim to see if there are different relation between investor sentiment and returns on these classes.

According to these criteria, we subdivide our sample into two sub samples. Hence, we obtain sub samples of small and big size companies, great and small value book to market companies or liquid and illiquid companies. The size effect is calculated from the stock exchange capitalization. A company which has a lower capitalisation than the average capitalisation of the total sample is considered as a small size company and vice versa. For the book to market effect, we use a ratio that compares the book value of a firm to its market value. Book value is calculated from the firm's historical costs, or an accounting value. Market value is determined in the stock market through its market capitalization.

For liquidity we apply a measure of Amihud (2002). According to this author, the illiquidity of an action I for one month T is measured by the following formula:

$$ILLIQ_t^i = \frac{1}{N_t^i} \sum_{d=1}^{N_t^i} \frac{\left|R_{d,t}^i\right|}{V_{d,t}^i} \qquad (1)$$

Where: $R_{d,t}^i$: return on stock i in the day d of the month t, $V_{d,t}^i$: Trading volume of stock i in the day d of the month t, N_t^i : A number of days of transaction of stock i in the month t

The subdivisions of our total samples to sub samples according to these criterions can be presented by the following table:

Table 1: Data statistics

	Name in English	Sector		size		Book to market		Liquidity	
		banking	Non banking	big	little	big	little	Liquid	illiquid
AB	Amen Ban	X		X		X			X
ATB	Arabic Tunisian Bank	X		X		X		X	
BH	habitat Banks	X		X		X		X	
BIAT	international Arabic Tunisian Bank	X		X			X	X	
BNA	agricultural national Bank	X		X		X		X	
BS	south Bank	X		X			X	X	
BT	Tunisian Bank	X		X			X	X	
UBCI	Union trade industrial banks	X		X			X		X
UIB	International union banks	X		X			X	X	
STB	Tunisian company banks	X		X			X	X	
AMS	Metal workshop Sahel		X		X		X		X
ASTR	Reinsurance and insurance company		X		X	X			X
ICF	Chemical Industries of Florine		X		X	X			X
ATL	Arab Tunisian Lease		X		X	X			X
CIL	International Company of Leasing		X		X	X			X
MONOPRIX	Company New House of the Town Tunis		X		X		X	X	
SFBT	Refrigerating company and Brewery Tunis		X		X		X	X	
SOTETEL	Tunisian company of telecommunication		X		X	X			X
TAIR	Tunis airlines		X	X		X		X	
SOTUVER	Tunisian company of glass makings		X		X	X			X
Total		10	10	11	9	11	9	11	9

This table summarizes constituent firms of our sample and its divisions according to activity sector, size, book to market and liquidity criteria.

3. Methodology and results

3.1. Determinants of abnormal returns in the emergent markets: cross-sectional study

Fama (1998) declares that the ACAR (Average Cumulated Abnormal Returns) is sensitive to several criteria. In this respect, we use various criteria, to give more homogeneity to the sample. Barber and Lyon (1997) assert that the study of the existence of abnormal returns is more influenced by activity sector of firms. They demonstrate that, when we subdivide the sample by sector, the empirical validation to detect abnormal returns is more difficult. On the other hand, when we use simply four groups, the general results remain unchanged. Within the framework of our study, we employ risk effect, size effect, book to market effect and liquidity effect.

3.1.1. Abnormal return and size effect:

The size effect stipulates that there is a difference between reaction of investors for companies of big sizes and to those of small sizes. This discrepancy, which has no explanation for fundamentalists, presents an abnormality for financial markets. The finding of this abnormality goes back up to decades (Fama and Macbeth (1973)). Banz (1981) reveals the size effect on the New York Stock Exchange during period from 1926 to 1975. His results show that adjusted returns for risk of small sizes firms are significantly superior to those of big sizes firms.

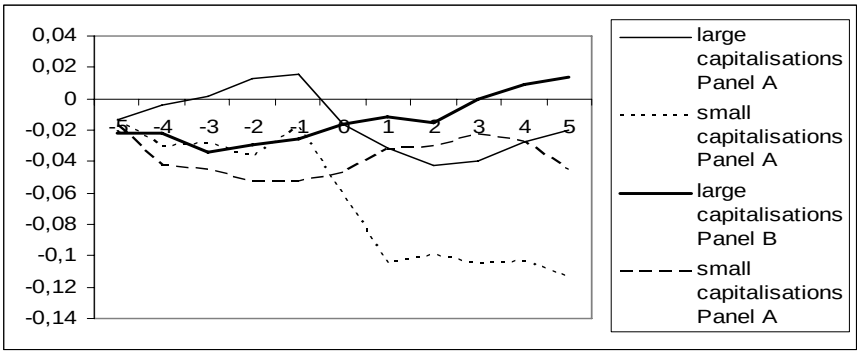
There are several measures to calculate the size. For example, Heaney and al. (2007) calculated the size of companies from the logarithmic of book value, adjusted by the market average. In our study, we select the market capitalization. To classify companies according to the size criterion, we supposed two classes of sizes (large and small capitalization). For each society of the global sample, we calculate its market capitalization during the event month. Then, we calculate the average of the whole sample for every event. Companies, which have a market capitalization lower than the average of the sample, are considered as companies of weak capitalizations. Also, companies capitalisation which exceed the average of the sample, indicate that companies are of large capitalizations.

For every class of size, we proceed to the event study based on the methodology of average cumulated abnormal returns, in order to compare the abnormal returns generated by all groups. Results of this methodology are presented in the table 2.

Table 2: Abnormal returns and size effect

	Panel A							
	large capitalisations				small capitalisations			
	ACAR	T-stat	T-sign	T-rang	ACAR	T-stat	T-sign	T-rang
-5	-0,0133	1,9064	7,7500	1,6503	-0,0134	0,8938	5,3079	0,8144
-4	-0,0040	0,7870	-8,0000	0,8878	-0,0300	1,0957	3,8335	0,9352
-3	0,0015	0,7842	-1,7500	0,8231	-0,0288	0,1240	-3,2437	0,1395
-2	0,0129	1,6849	-7,7500	1,7848	-0,0365	0,6663	4,7181	0,6538
-1	0,0155	0,4515	-5,2500	0,4693	**-0,0183**	**2,6005**	**-6,7823**	**1,6582**
0	**-0,0161**	**4,1968**	**8,0000**	**4,0320**	**-0,0614**	**3,9523**	**5,6028**	**4,1794**
1	**-0,0317**	**2,8419**	**7,7500**	**1,8108**	**-0,1046**	**3,4188**	**5,3079**	**2,9429**
2	-0,0422	1,4547	2,0000	1,3329	-0,0999	0,3635	-6,1926	0,3651
3	-0,0395	0,4184	-7,7500	0,4091	-0,1053	0,4525	4,7181	0,4132
4	-0,0279	1,4858	-8,0000	1,5978	-0,1031	0,2187	-3,8335	0,2231
5	-0,0196	1,3047	-4,7500	1,3078	-0,1137	1,3052	5,5156	1,2100
	Panel B							
	large capitalisations				**Small capitalisations**			
	ACAR	T-stat	T-sign	T-sk-aj	ACAR	T-stat	T-sign	T-sk-aj
-5	-0,0216	2,8624	7,2801	2,9196	-0,0176	1,5379	5,3374	1,6343
-4	-0,0223	0,1099	-2,3351	0,1180	-0,0425	1,7373	6,2524	1,8681
-3	-0,0345	1,2536	1,7857	0,9236	-0,0456	0,2367	4,1175	0,2392
-2	-0,0296	0,6998	-3,1593	0,7950	-0,0529	0,6530	2,2875	0,6399
-1	-0,0260	0,6167	-7,2801	0,6011	-0,0529	0,0016	-3,5075	0,0104
0	**-0,0160**	**2,3663**	**-7,0054**	**1,3890**	-0,0470	0,5122	-6,1721	0,5334
1	-0,0118	0,6065	0,4121	0,6735	**-0,0321**	**2,3908**	**-6,1721**	**1,3660**
2	-0,0157	0,6397	-4,2582	0,6406	**-0,0306**	**2,1333**	**4,0119**	**0,1560**
3	-0,0007	2,4074	-7,2801	2,6702	-0,0228	0,4649	-3,0861	0,5160
4	0,0090	1,4084	-7,2801	1,5971	-0,0274	0,4428	-2,1602	0,4456
5	0,0142	0,9337	-0,9615	0,9779	-0,0455	1,5662	4,8414	1,5169

Graphic 1: Abnormal returns and size effect



The table 2 presents different results for both panel A and B and for the companies of small and large.

For the group of companies of small capitalizations in panel A, we notice that the reaction of the investors begins from the event date. This reaction is reflected by a strong variation of abnormal returns, with regard to date -1, which reaches the 235.52 % value. It stills for date 1 with a 70.36 % variation. From date 2, we observe stability in the variation of abnormal returns. The average cumulated abnormal returns of small companies are statistically significant for date -1, 0 and 1. This confirms the obstinacy of abnormal returns, and as a consequence the inefficiency of the BVMT.

For the large companies of in panel A, we notice that the reaction of investors begins from the event date but it continues for date 2. After this date, we notice an upheaval of this reaction and the abnormal returns get back to 0. The average cumulated abnormal returns of these companies are statistically significant for dates 0 and 1. This allows us to conclude that, even for the large companies panel A, this confirms the inefficiency of the BVMT.

In spite of the existence of the average cumulated abnormal returns in both groups of the panel, we notice that there is a strong difference in the level of abnormal returns generated by these two groups. The companies of small capitalizations generate higher abnormal returns, especially from the date of the event. The percentage of the overtaking of the abnormal returns on the companies of small capitalizations with regard to the companies of large capitalizations exceeds the 200 % rate for date 1 and 150 % for dates 2 and 3.

Contrary to the panel A, both groups of the panel B mark a difference even at the level of the reaction of the investors. For the companies of weak capitalizations, we notice two phases of reaction. The first phase covers the period which precedes the event date. This reaction increases the abnormal returns in negative sense. From the event, the reaction overturns towards the decreases of abnormal returns and the link towards 0. Statistically, abnormal returns are significant for dates 0 and 1.

For large companies, we observe the absence of a significant investor reaction. Even from statistical view, abnormal returns are significant only for the event date. However, we find that the level of the average cumulated abnormal returns, generated by small companies of, is higher than that of large companies. The size effect is more potential for the panel B. Indeed, we find that the percentage of variation of abnormal returns, for both type of companies, reaches the 193,75 %, 172,03 % and 94,90 % value, respectively for dates 0, 1 and 2; and this value increases enormously in the date 3 and reaches the 3157,14 % value.

In spite of the differences of reaction between both type of firms in both panel A and B, small size companies always generate higher abnormal returns. This confirms that the size effect can be a determinant of inefficiency of the BVMT.

3.1.2. *Book to market effect*:

It is well confirmed, in the literature review, that shares returns are influenced by the values of their book to market. Most of the empirical studies show that shares, which have a high book to market value, present higher returns. These results are interpreted by the behavioural polarizations effect. Kothari, Shanken and Sloan (1995), Vassalou and Xing (2004), Griffin and Lemmon (2002), Roychowdhury and Watts (2007) confirm that the book to market effect is stronger for companies with high risk.

In this sub section, we try to verify if the book to market effect can be a determinant of abnormal returns. In that case, we must have a significant change in the level of abnormal returns generated by the companies of small book to market values compared to those of high values. Accepting this hypothesis allows us to consider that the book to market effect presents a determinant of abnormal returns. To do it, we subdivide our sample into two groups. The first group represents the firms with small book to market values and the second group gathers the others. The results of this study are represented in the following table:

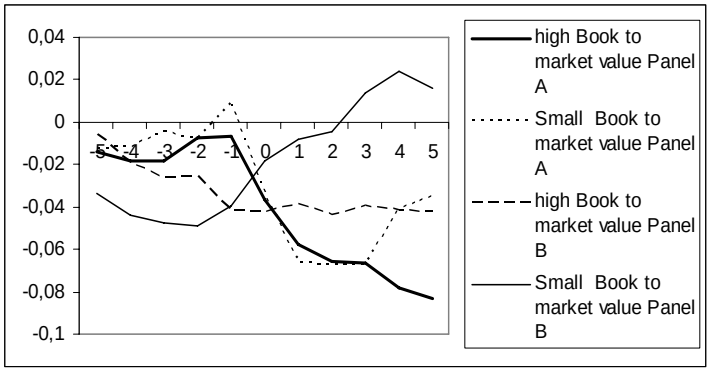
Table 3: abnormal returns and *Book to market effect*

Panel A								
	high *Book to market value*				**Small *Book to market value***			
	ACAR	**T-stat**	**T-sign**	**T-rang**	**ACAR**	**T-stat**	**T-sign**	**T-rang**
-5	-0,0138	1,4440	-0,2722	1,2962	-0,0128	1,1283	7,2161	1,0000
-4	-0,0183	0,2976	-0,8165	0,2707	-0,0116	0,1123	-6,6815	0,1627
-3	-0,0180	0,0288	-6,8041	0,0493	-0,0045	1,1468	-0,8018	1,1862
-2	-0,0071	1,1520	-2,7217	1,1915	-0,0083	0,4669	-4,0089	0,4264
-1	-0,0065	0,0694	-0,2722	0,0799	**0,0090**	**2,1682**	**-4,5434**	**2,3928**
0	**-0,0367**	**3,3257**	**5,4433**	**3,3554**	**-0,0334**	**4,8190**	**7,4833**	**4,7962**
1	**-0,0575**	**1,9940**	**2,7217**	**1,9099**	**-0,0667**	**3,4226**	**7,2161**	**2,4996**
2	-0,0656	0,8214	5,9876	0,8335	-0,0671	0,0386	0,0000	0,0249
3	-0,0666	0,1241	4,8990	0,1329	-0,0674	0,0363	-5,3452	-0,0170
4	-0,0782	1,1773	5,7155	1,2596	-0,0412	3,7749	-7,4833	4,2056
5	-0,0834	0,6571	0,2722	0,6231	-0,0350	0,9865	-4,0089	1,0097
Panel B								
	high *Book to market value*				**small *Book to market value***			
	ACAR	**T-stat**	**T-sign**	**T-rang**	**ACAR**	**T-stat**	**T-sign**	**T-rang**
-5	-0,0061	0,5705	2,8868	0,5884	-0,0339	4,6719	6,9282	4,6338
-4	-0,0189	0,9803	5,4848	1,0218	-0,0441	1,4807	-0,5774	1,4266
-3	-0,0267	0,5775	2,5981	0,5198	-0,0474	0,4938	1,1547	0,5205
-2	-0,0257	0,0924	-1,7321	0,1001	-0,0493	0,3094	0,5774	0,3139
-1	-0,0415	1,4601	5,4848	1,4471	**-0,0393**	**2,3319**	**-6,9282**	**2,5923**
0	**-0,0423**	**2,0775**	**-1,4434**	**2,0953**	**-0,0183**	**3,0431**	**-6,6395**	**3,3059**
1	-0,0385	0,3773	0,0000	0,3863	**-0,0082**	**2,4956**	**-1,1547**	**2,6385**
2	-0,0435	0,6145	5,4848	0,6029	**-0,0042**	**2,4542**	**-6,9282**	**2,5127**
3	-0,0392	0,2981	-2,8868	0,3545	**0,0135**	**2,3232**	**-6,9282**	**2,3583**
4	-0,0418	0,2547	-6,3509	0,2740	0,0243	1,7670	-6,9282	1,8548
5	-0,0422	0,0396	5,1962	0,0436	0,0160	1,1579	0,8660	0,9714

The table 3 represents different results for both panel A and B and for the companies of high and small book to market.

For the panel A, we notice that there is no difference in reactions for the two types of companies. For both groups, the reaction of the investors begins in the event date. It is proportionally strong and reaches, in term of percentages, 464,62 % for companies of high book to market values, and 471,11 % for companies with weak book to market values, compared to date -1. For the companies of high values book to market, this reaction continues until dates 1 and 2, with a respective variation of 56,68 % and 14,09 % with regard to the previous date.

Graphic 2: abnormal returns and Book to market effect



On the other hand, for the companies of weak book to market values, the reaction persists only for date 1 with a variation of 99,70 compared to date 0. From this date, the reaction is almost null (0,60 % and 0,45 % respectively for dates 2 and 3). Statistically, abnormal returns are significant for companies of high s book to market value, for dates 0 and 1, and dates -1, 0 and 1 for the other companies. This result confirms the inefficiency of the BVMT for both groups. Concerning our main objective, the panel A presents no difference in reactions according to the book to market criterion. The variation of the average cumulated abnormal returns between both types of firms is small. We find that for companies of high book to market values, the returns exceed those of other companies for dates -5, -4, -3, 0 with the respective percentages 7,25 %, 36,61 %, 75,00 %, 8,99 %; and vice versa for dates -2, 1, 2 with respective percentages 16,90 %, 16 % and 2,29 %.

For panel B, the results are contradictory between the two groups. For the group of high book to market values, the effective reaction begins from date -1 with a negative variation of the average cumulated abnormal returns by 61,48 % compared to date -2. This variation continues until the event date with a small variation of 1,93 %. After this date, we notice stability in abnormal returns. Whereas the average cumulated abnormal returns are significant only for the event date.

This result contradicts the previous ones concerning the inefficiency of the BVMT. Contrary to companies of high book to market values, other companies record a positive variation of average cumulated abnormal returns. This reaction begins at the date -1 and still until the date 3 with respective percentages: 20,28%, 53,44%, 55,19%, 48,78% et 421,43%. So, the average cumulated abnormal returns are

significant for the interval [-1, 3]. Companies of small book to market values confirm the inefficiency of the BVMT.

For the level of abnormal returns generated by both groups, it is clear that companies of high book to market values generate greater abnormal returns. This level is superior from date -1 and still a long the event window. The percentage of overtaking the level of abnormal returns for companies with high book to market values compared to other companies reaches the values: 5,30 %, 56,74 %, 78,70 %, 90,34 %, 134,44 %, 158,13 % and 137,91 % respectively for dates -1, 0, 1, 2, 3, 4 and 5.
This study confirms that companies with high book to market values generate abnormal returns superior to those generated by companies of small book to market value. However, this confirmation is stronger for panel B than panel A. This allows us to conclude that the book to market effect can be a determinant of inefficiency of the BVMT.

3.1.3. Liquidity effect:

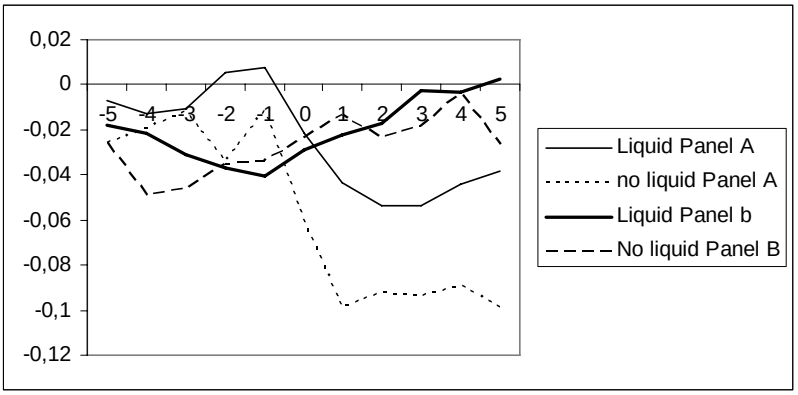
In this sub section, we try to verify if the liquidity effect can be a determinant of the inefficiency of the BVMT (Lesmond (2005)). In this case, we must find a significant change in abnormal returns generated by liquid companies compared to illiquid ones. To classify companies according to liquidity criteria, we use the classification given by the authorities of the Tunisian financial market. We consider the liquid companies those belonging to the group 11 and the illiquid companies those belonging to the group 12. This classification is based on the number of quotation days in such way that group 11 gathers assets of which the days of quotation vary between 75% et 100% and group 12 includes the others.
The results of this study are represented in the following table 4:

Table 4: abnormal returns and liquidity effect

Panel A								
	Group 11				Group 12			
	ACAR	T-stat	T-sign	T-rang	ACAR	T-stat	T-sign	T-rang
-5	-0,0068	0,8783	0,2357	0,8366	-0,0259	1,6482	5,8400	1,3839
-4	-0,0127	0,5467	4,9497	0,4618	-0,0192	0,3769	-6,1644	0,4427
-3	-0,0108	0,2863	-4,7140	0,3104	-0,0124	0,6872	-3,2444	0,7138
-2	0,0057	2,4834	-8,4853	2,8123	-0,0340	1,8024	0,9733	1,6393
-1	0,0075	0,2662	-5,6569	0,2697	**-0,0111**	**2,0400**	**-2,5955**	**2,2600**
0	**-0,0218**	**3,4489**	**8,4853**	**3,4233**	**-0,0611**	**6,0067**	**6,1644**	**5,2960**
1	**-0,0436**	**2,8418**	**8,4853**	**3,0089**	**-0,0986**	**2,4323**	**2,9200**	**2,0473**
2	-0,0535	1,2311	5,6569	1,1980	-0,0920	0,5074	-2,9200	0,5083
3	-0,0537	0,0234	-4,7140	0,0224	-0,0939	0,1313	-0,9733	0,1016
4	-0,0444	1,6437	-8,2496	1,6493	-0,0893	0,3079	-6,1644	0,3264
5	-0,0386	0,8950	-7,4767	0,8597	-0,0990	1,2253	3,8933	1,2016
Panel B								
	Group 11				**Group 12**			
	ACAR	**T-stat**	**T-sign**	**T-rang**	**ACAR**	**T-stat**	**T-sign**	**T-rang**
-5	-0,0176	2,0267	7,6200	2,1754	-0,0258	2,8366	5,8310	2,5835
-4	-0,0214	0,3721	-2,7940	0,3898	-0,0495	2,5728	3,0870	2,3117
-3	-0,0312	0,9439	4,3180	0,8392	-0,0464	0,3122	0,3430	0,3199
-2	-0,0367	0,8258	0,2540	0,7556	-0,0353	0,8724	-3,4300	0,9377

-1	-0,0408	0,6566	-2,2860	0,5752	-0,0339	0,1126	-5,1450	0,1156
0	**-0,0291**	**2,5241**	**-7,8740**	**2,5071**	**-0,0240**	**2,8865**	**3,4300**	**2,9751**
1	**-0,0225**	**1,9619**	**2,0320**	**2,0262**	**-0,0133**	**2,8950**	**4,4590**	**2,8861**
2	-0,0175	0,6992	-7,8740	0,7564	-0,0241	1,0646	3,7730	1,0858
3	-0,0028	1,2854	-7,8740	1,4484	-0,0183	0,6101	-5,8310	0,6074
4	-0,0034	0,0741	-4,5720	0,0939	-0,0042	1,5569	-5,8310	1,5875
5	0,0026	0,8895	-4,3180	0,8880	-0,0264	2,0091	2,7440	1,8409

Graphic 3: abnormal returns and liquidity effect



For liquid companies in panel A, the investors' reaction begins from date 0 and continues until dates 1 and 2. In term of variation in abnormal returns, the date 0 records the highest level of variation which reaches a 390,67% value with regard to date -1. This variation of the average cumulated abnormal returns continues for dates 1 and 2 with a respective variation of 100 % compared to date 0 and 22,71% with regard to date 1. From date 3, we notice the stability in the returns' reaction. For dates 0 and 1, they are statistically significant. We conclude that liquid companies of panel A confirm the inefficiency of the BVMT.

For illiquid companies in panel A, the reaction of average cumulated abnormal returns begins from date 0 and continues only for date 1. The variation in reaction reaches its maximal value in the date 0 with a percentage value equal to 450,45% compared to date -1. This variation remains proportionally strong in the date 1 and takes a 61,37% value with regard to date 0. From date 2, we observe stability in the average cumulated abnormal returns. They are statistically significant for dates 0 and 1. This result confirms that for illiquid companies in group A, the BVMT is inefficient.

Concerning the variation average cumulated abnormal returns recorded by the liquid companies, with regard to illiquid ones, we notice that illiquid companies register higher abnormal returns than the others. This superiority reaches 696,49% for date -2, continues during the event window and sets respectively for dates -1, 0, 1, 2, 3, 4, 5 the values: 248,00%, 180,28%, 126,15%, 71,96%, 74,86%, 101,13%, 156,48%. These high percentages assert that the lack of liquidity of some stocks can be at the origin of the high level of abnormal returns and as a result of the inefficiency of the BVMT.

For panel B, the average cumulated abnormal returns by liquid companies pass by two phases:

- The first phase begins from date -4 and continues until date -1. This phase is characterized by the increase of the average cumulated abnormal returns in the negative sense. The returns variation is 21,59%, 45,79%, 17,63% and 11,17%, in the negative sense, respectively for dates -4, -3, -2, and -1, with regard to the previous date.
- The second phase begins from date -1 and continues until date 3. During this phase, we notice the weakening of the curve of average cumulated abnormal returns towards the X-axis (i.e. towards the cancellation of the existence returns). This reversal records a constant rhythm for dates 0, 1 and 2, that is a variation of the abnormal returns of 20%.

However, during these periods, abnormal returns remain existing. The great variation during the second phase is registered during the date 3. It reaches 84,00% with regard to date 2. This variation allows the cancellation of the existing abnormal returns. These last ones remain almost nulls for the remainder event window.

From statistical view, the average cumulated abnormal returns are significant for dates 0 and 1. This confirms the inefficiency of the BVMT for liquid firms in group B.

For illiquid companies, the curve of average cumulated abnormal returns registers almost a same variation sense. The date 4 records the highest level of abnormal returns in negative sense. Then, the curve of the abnormal returns turns toward the X axis and it links to 0 in date 4. The average cumulated abnormal returns are statistically significant for dates -1, 0 and 1. This result confirms the inefficiency of the BVMT for illiquid companies in panel B.

For the variation of average cumulated abnormal returns registered by the liquid companies with regard to illiquid firms, we notice that these last ones register abnormal returns proportionally higher than the others. This superiority reaches 553,57% in date 3. These high percentages prove that the lack of liquidity of certain stocks can be at the origin of the high level of abnormal returns, and as a result of the inefficiency of the BVMT.

3.2. Abnormal return and extension fundamentals models in emergent market

In previous section, we validate three determinants of the inefficiency of the BVMT, namely: size effect, book to market effect and liquidity effect. In this stage, we try to verify if the fundamental models adjusted for these factors of the inefficiency can remedy to the existence of abnormal returns, and as a consequence to explain the dynamics of the shares' prices on the BVMT.

So, we use the same methodology of the event study as presented in the first section. Except that we employ the fundamental models adjusted for the determinants of inefficiency of the BVMT to calculate the normal return.

We study, in what follows, three models. The first is the model of Fama and French (1993) of three factors, which represents a fundamental model adjusted for the size and book to market effects. The second is the model of Acharya and Pederson

(2005) which represents a fundamental model adjusted for risk of liquidity. Finally, we use a multi-criteria model which merges both models cited before.

3.2.1. Abnormal return and market line with GARCH (1,1) risk

The abnormal return is defined as the difference between the observed and the theoretical returns. This last one represents the return in the absence of any event. In the first stage, we used the model of market initiated by Fama, Fischer, Jensen and Roll (1969). The main limit of this model is that it considers variance as constant in time. In other words, the arrival of new information does not modify the risk of the concerned stock. Ohlson and Penman (1985) and David (1987) put in evidence the modification of returns' variance the distributions of shares.

Consequently, we reject in this section, the hypothesis of independence of variance towards time, by introducing a GARCH modelling. This latter allows as calculating, for every date t of the event window, a variance which will take into account the impact of the information.

In order to take into account the evolution of the volatility in time, we use a modelling GARCH (1,1). The choice of the model GARCH (1,1) as determinant of historic return does not imply that we specify the non linearity on the BVMT, but rather to bring to light the impact of the non linearity as the determinant of the risk. However, the specification of the non linearity of the quote on the BVMT will be determined with more details in the sixth chapter.

The model GARCH (1,1) consists of two equations: the first one is the equation of the average, based on the market model. And the second one is the equation of conditional variance.

$$R_{it} = \alpha_i + \beta_i Rm_t + \varepsilon_t \quad (2)$$

The variance is dependent in time; its equation is:

$$\delta_t^2 = \alpha 0 + \alpha 1 \varepsilon_{t-1}^2 + \beta_{t-1}^2 \quad (3)$$

The normal or theoretical return is given by the following equation:

$$Normal\ returns = \hat{\alpha}_i + \hat{\beta}_i Rm_t \quad (4)$$

The parameters α_i and β_i are estimated, for each stock and each event, by the method of the maximum likelihood outward the event window. The use of the GARCH (1,1) allows as supposing that the variance is not constant in time, and consequently the risk of the stock modifies with the arrival of the new event. The calculation of the statistics of Student takes into account the evolution of volatility. Let us note T the statistics of the test of the abnormal returns, the calculation is established by the follow relation:

$$T_{it} = \frac{RA_{it}}{\delta_{it}} \quad (5)$$

The variance is measured for the entire event window by this equation:

$$\delta_{it}^2 = \hat{\alpha}_0 + \hat{\alpha}_1 RA_{i,t-1}^2 + \hat{\beta}_{t-1} \delta_{t-1}^2 \quad (6)$$

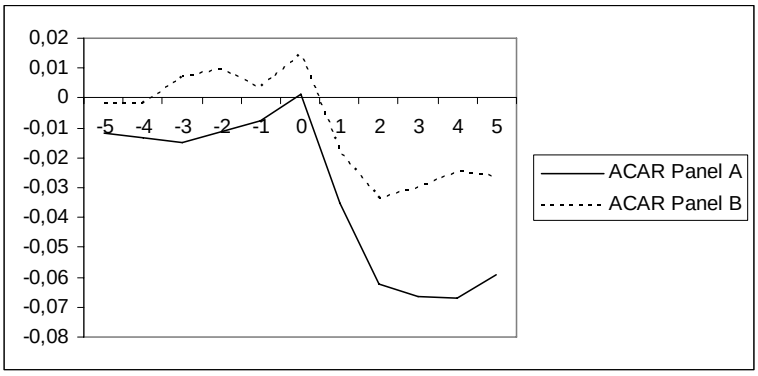
The parameters result from the estimation of the model GARCH (1,1) outward the event window. Under the null hypothesis, the statistics T follows a reduced centred normal distribution.

In this stage, the reduction of the abnormal returns with regard to the first study shows that a part of the inefficiency of the BVMT, according to the fundamental principles, is explained by the existence of a non linearity. This will be taken into account during the remainder of our search and especially in construction of the environment of the BVMT.

Table 5: ACAR and security market line with GARCH (1, 1) volatility

	Panel A		Panel B	
	ACAR	**T-stat**	**ACAR**	**T-stat**
-5	-0.012	0.528	-0.0018	0.215
-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

Graphic 4: ACAR and security market line with GARCH (1, 1) volatility



The results of the event study, based on security market line with GARCH (1, 1) volatility, bring us to two remarks:
1- The level of average cumulated abnormal returns decreases with regard to the study of event based on security line of the standard market. This decrease allows us to confirm the variation of the volatility on the event window. This result supposes that average cumulated abnormal level of returns, issued from the even study based on security market line, is due to econometric problems concerning the non stability of the systematic risk on the event window. However, this weakness does not imply the non-existence of abnormal returns.

2- In spite of the improvement of event study methodology, by taking into consideration the variation of the systematic risk within the event window, average

cumulated abnormal returns remain existing and significant for both panels. This allows us to conclude that ACAR are far from being owed to problems of linearity of abnormal returns and to problems of stability of the systematic risk within the window of the study of event.

3.2.2. Abnormal return and Fama-French three factors model

To take into account the size and book to market effect as determinant of the inefficiency of the BVMT, we proceed in this sub section to the model of Fama and French (1993) which appears as follows:

$$r_{it} - r_{ft} = \alpha_i + \beta_{1i}\left(r_{It} - r_{ft}\right) + \beta_{2i}SMB_t + \beta_{3i}HML_t + \varepsilon_{it} \quad (7)$$

In this model, the average excessive returns of stock are explained by the risk prim of the market. To which are added two factors called SMB (Small capes Minus Big capes) and HML (High B/M Minus Low B/M). These two risk factors are considered as abnormalities on financial markets.

Before going to verify if this model allows us to cancel the existence of abnormal returns, we check the significance of size and book to market effects in the Tunisian context. To do it, we build two portfolios (P1 and P2). The first portfolio represents companies belonging to the banking sector, and the P2 represents the other companies. The results of this estimation are represented in the following table:

Table 6: Model of Fama and French with three factors

Bêta i	coefficient	Panel A: BVMT index		Panel B: Tunindex	
		P 1	P2	P1	P2
Bêta 1	value	0.452992	0.736239	0.739715	1.064788
	t*	7.150794*	10.19035*	13.09162*	16.62109*
Bêta 2	value	0.351075	-2.61E-01	1.46E-01	-5.56E-01
	t*	4.104521*	-2.678327*	2.287479*	-7.669195*
Bêta 3	value	-0.037758	-0.028983	-0.118822	-0.13422
	t*	-0.522521	-0.351675	-2.240071*	-2.231764*

* design significance at 5% level

The reading of results in table 6 shows that:

1- The systematic risk is statistically significant for both panels (A and B) and for both portfolios (P1 and P2). However, we notice that the coefficient of the systematic risk of non banking companies is higher than other. This allows us to conclude that non banking companies are more sensitive to the systematic risk.

2- The coefficients of size effect are statistically significant for both panels and both portfolios. However, we notice that, for both panels, the coefficient of size effect of banking companies is positive. On the other hand, it is negative for the non banking ones. This result confirms our finding in cross sectional study of this effect. In this stage, we validate that the small companies generate abnormal returns higher than those of the large sizes. Knowing that, on the BVMT, the sample of big sizes firms consists generally of banking companies, we can interpret the phenomenon according to which the size effect represent a positive effect for the banking companies, on the other hand it is negative for the other ones.

3- The third effect in the model of Fama and French (1993) is the book to market effect. We notice that, for this effect, there are two contradictory results between groups A and B. For the panel B, this coefficient is significant; but it is not for group A. For both groups, book to market effect presents a negative coefficient, which implies that this effect influences negatively the returns. This result also confirms our finding in the cross sectional study in two criteria. In this latter, we validate that the size effect is more potential than the book to market effect. This confirmation is due to the stability of the significance of size effect coefficients both groups and for both portfolios, and in the instability of the significance of the book to market effect.

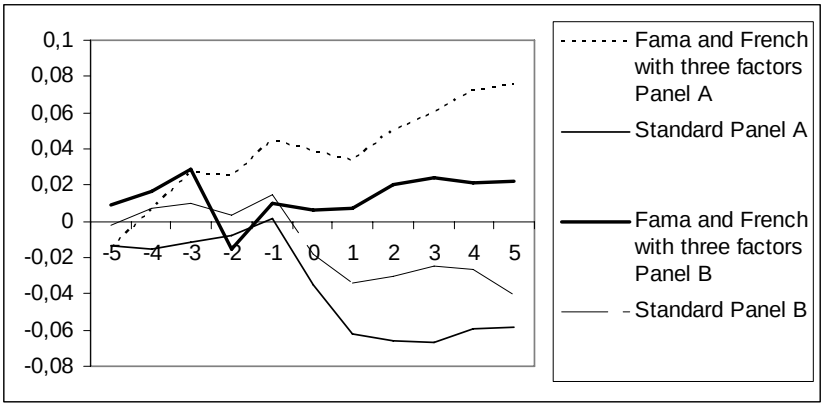
These results allow us to pass to the following stage: ‘‘to verify if integrating the two effects in the explanation of the dynamics of stock prices, permit to explicate and cancel the existence of abnormal returns generated by standard fundamental models’’. To do that, we adopt the same methodology of event study, used in first section. Except, we suppose that the normal return is calculated with of Fama and French with three factors model. The results of this study are presented in the following table:

Table 7: Abnormal returns and the model of Fama and French with three factors

	Panel A			Panel B		
	Fama and French with three factors	t-statistic	Standard	Fama and French with three factors	t-statistic	Standard
-5	-0,01476	0.2246	-0,01332	0,00941	0.2453	-0,00210
-4	0,00665	1.5471	-0,01486	0,01690	1.2929	0,00676
-3	0,02652	1.3765	-0,01115	0,02903	1.0884	0,00954
-2	0,02501	1.2345	-0,00774	-0,01502	1.7654	0,00342
-1	0,04484	1.9891*	0,00134	0,01016	2.4438*	0,01457
0	0,03873	2.3421*	-0,03504	0,00648	2.6547*	-0,01811
1	0,03372	1.0745	-0,06218	0,00731	1.9691*	-0,03386
2	0,04988	0.9546	-0,06633	0,02077	1.6697	-0,02989
3	0,05944	0.7876	-0,06702	0,02389	1.3543	-0,02457
4	0,07181	1.6456	-0,05936	0,02108	0.3276	-0,02637
5	0,07532	0.2203	-0,05887	0,02205	0.2314	-0,04091

* design significance at 5% level

Graphic 6: Abnormal returns and the model of Fama and French with three factors



The results of the event study based on the model of Fama and French with three factors, show that there is an upheaval in sign of abnormal returns. Indeed, it is negative, and then it becomes positive, according to the model of Fama and French.

This means that, considering existing abnormalities in the market as those of size and the book to market effects (within the framework of our model), investors' expected returns will be much less with regard to those in case of efficient market. This decrease provokes the positive sign of abnormal returns.

In term of absolute values, we notice that the abnormal returns issues from the security market line and those stemming from the model of Fama and French with three factors are competing. It implies that investors' reaction and abnormal returns remain existing. Thus, even when we consider both determinant of inefficiency of the BVMT (size and effect book to market effects), abnormal returns remain existing and significant. So, the model of Fama and French with three factors is inept to remedy the existence of the abnormal returns.

3.2.3. Abnormal return and CAPM-Adjusted for liquidity risk:

The empirical studies on the microstructure of financial markets generally demonstrate that the liquidity is risked on these markets. It changes in time, either for individual stocks, or for the whole market. This report urges certain authors to assert that challenge on financial markets does not result from the problem liquidity level, but from the variation of this level in the time. This makes investors in uncertainty, i.e. in a risky situation.

To validate the effect of risk liquidity on the degree of market efficiency, we use the adjusted CAPM for risk liquidity proposed by V. L.H Acharya and. Pedersen (2005). The authors suppose that the expected stock return, within the framework of the standard CAPM, must be increased by a prim illiquidity risk. Their model stipulates three types of liquidity risks:

1- The risk of stock liquidity with regard to market;
2- The sensibility of sock return with regard to market liquidity;
3- The sensibility of stock liquidity with regard to market return.

To measure the illiquidity, they use the measure of Amihud (2002). The model is formulated as follow:

$$E_t\left(r_{t+1}^i - c_{t+1}^i\right) = r^f + \lambda_t \frac{\mathrm{cov}_t\left(r_{t+1}^i - c_{t+1}^i, r_{t+1}^M - c_{t+1}^M\right)}{\mathrm{var}_t\left(r_{t+1}^M - c_{t+1}^M\right)} \quad (8)$$

Where:

$\lambda_t = E_t\left(r_{t+1}^M - c_{t+1}^M - r^f\right)$ is the prim risk.

The development of the first equation gives:

$$E_t\left(r_{t+1}^i\right)=r^f+E_t\left(c_{t+1}^i\right)+\lambda_t\frac{\mathrm{cov}_t\left(r_{t+1}^i,r_{t+1}^M\right)}{\mathrm{var}_t\left(r_{t+1}^M-c_{t+1}^M\right)}+\lambda_t\frac{\mathrm{cov}_t\left(c_{t+1}^i,c_{t+1}^M\right)}{\mathrm{var}_t\left(r_{t+1}^M-c_{t+1}^M\right)}$$
$$-\lambda_t\frac{\mathrm{cov}_t\left(r_{t+1}^i,c_{t+1}^M\right)}{\mathrm{var}_t\left(r_{t+1}^M-c_{t+1}^M\right)}-\lambda_t\frac{\mathrm{cov}_t\left(c_{t+1}^i,r_{t+1}^M\right)}{\mathrm{var}_t\left(r_{t+1}^M-c_{t+1}^M\right)} \quad (9)$$

This model asserts the first advanced opinion, because the expected stock return must be increased by a prim risk of illiquidity. Moreover, this model forecasts four risks supported by the expected stock return. In addition to the standard CAPM risk, that represents the covariance between stock return and market return, the adjusted CAPM to liquidity stipulate three other forms of risk caused by liquidity.

$$E\left(r_t^i-r_t^f\right)=E\left(c_t^i\right)+\lambda_t\beta^{1i}+\lambda_t\beta^{2i}-\lambda_t\beta^{3i}-\lambda_t\beta^{4i} \quad (10)$$

Where:

$$\lambda_t=E_t\left(r_{t+1}^M-c_{t+1}^M-r^f\right)$$

$$\beta^{1i}=\frac{\mathrm{cov}\left(r_t^i,r_t^M-E_{t-1}\left(r_t^M\right)\right)}{\mathrm{var}\left(r_t^M-E_{t-1}\left(r_t^M\right)-\left[c_t^M-E_{t-1}\left(c_t^M\right)\right]\right)},$$

$$\beta^{2i}=\frac{\mathrm{cov}\left(c_t^i-E_{t-1}\left(c_t^i\right),c_t^M-E_{t-1}\left(c_t^M\right)\right)}{\mathrm{var}\left(r_t^M-E_{t-1}\left(r_t^M\right)-\left[c_t^M-E_{t-1}\left(c_t^M\right)\right]\right)},$$

$$\beta^{3i}=\frac{\mathrm{cov}\left(r_t^i,c_t^M-E_{t-1}\left(c_t^M\right)\right)}{\mathrm{var}\left(r_t^M-E_{t-1}\left(r_t^M\right)-\left[c_t^M-E_{t-1}\left(c_t^M\right)\right]\right)},$$

$$\beta^{4i}=\frac{\mathrm{cov}\left(c_t^i-E_{t-1}\left(c_t^i\right),r_t^M-E_{t-1}\left(r_t^M\right)\right)}{\mathrm{var}\left(r_t^M-E_{t-1}\left(r_t^M\right)-\left[c_t^M-E_{t-1}\left(c_t^M\right)\right]\right)}$$

1- The first risk is similar to that of the systematic risk of the standard CAPM.

2- The second risk stipulates that the expected return increases with the covariance between the lack of stock liquidity and lack of market liquidity. This effect is explained by the fact that the investor wants to reward the lack of stock liquidity when the market is illiquid. Thus, the second beta represents the prim risk for which the investor agrees to hold or to buy an illiquid stock in an illiquid market. This phenomenon is empirically demonstrated by Chordia and al. (2000), Hasbrouck and Seppi (2001).

3- The third effect on the return is represented by the covariance between the stock return the market illiquidity. This covariance affects negatively the expected return. This is due to the fact that investors must accept an inferior expected stock in a market which misses liquidity. This phenomenon is empirically demonstrated by Pastor and Stambaugh (2003), Sadka (2002) and Wang (2002).

4- The fourth and last risk is represented by the covariance between the lacks of stock liquidity with regard to market return. This covariance influences negatively the expected return by the fact that the investors accept a lower expected return, although for a liquid stock in a generally overdrawn market. This risk shows that stock liquidity, in an overdrawn market, becomes a cost of illiquidity. This phenomenon was put in evidence by Lynch and Bronzing (2003).

Within the framework of our study, we are interested in the restricted version of this model proposed by Acharya and L.H. Pedersen (2005). This model spells under the following shape:

$$r_t^i = r_t^f + c_t^i + \beta_{1i}\left(r_t^m - r_t^f - c_t^m\right) \quad (11)$$

With:

r_t^i : Return of stock i in month t

r_t^f : Return of risk-free asset in month t

r_t^m : Market return in month t

c_t^i : Innovation of illiquidity of stock i in the month t. This measure is equal to the difference between the measure of illiquidity of stock i in the month t and the expected illiquidity.

c_t^m : Innovation of illiquidity of the market in the month t. This measure is equal to the difference between the measure of market illiquidity in the month t and the expected illiquidity.

For the measure of the illiquidity, they use the measure of Amihud (2002). According to this author, the illiquidity of stock i during a month t is measured by the following formula:

$$ILLIQ_t^i = \frac{1}{N_t^i}\sum_{d=1}^{N_t^i}\frac{\left|R_{d,t}^i\right|}{V_{d,t}^i} \quad (12)$$

Where:

$R_{d,t}^i$: Return of stock i in day d of month t

$V_{d,t}^i$: Trading volume on dinars of stock i in day d of month t

N_t^i : Number of trading days of stock i in month t

The market illiquidity in the month t is measured by the following formula:

$$ILLIQ_t^M = \frac{1}{N}\sum_{i=1}^{N} ILLIQ_t^i \quad (13)$$

N represents the number of the stocks which compose the index of reference that represent the market.

For the measure of expected illiquidity, authors use an auto-regressive modelling of the illiquidity. In our work, we employ a modelling of type AR (2) according to the specification of our data series. Therefore, the expected illiquidity of stock i in the month t is:

$$E(ILLIQ_t^i) = \alpha + \beta_1 ILLIQ_{t-1}^i + \beta_2 ILLIQ_{t-2}^i \quad (14)$$

The market expected illiquidity for month t is:

$$E(ILLIQ_t^M) = \alpha + \beta_1 ILLIQ_{t-1}^M + \beta_2 ILLIQ_{t-2}^M \quad (15)$$

Before checking the capacity of the model in cancelling the existence of abnormal returns, we are going to verify the significance of the systematic risk adjusted to the risk liquidity in the Tunisian context. The results of this estimation are represented in the table:

Table 8: CAPM adjusted to liquidity risk

	coefficient	**Panel A: BVMT index**		**Panel B: Tunindex**	
		P 1	P2	P1	P2
Adjusted bêta	Value	0.432456	0.744376	0.953232	0.751017
	T*	6.125703*	10.03256*	11.78273*	12.52123*

* design significance at 5% level

The reading of estimation results concerning the coefficient of systematic risk adjusted for the liquidity risk, shows that this risk is widely significant for both panels A and B and for both portfolios (the portfolio P1 represents banks P2 gathers non banking companies).

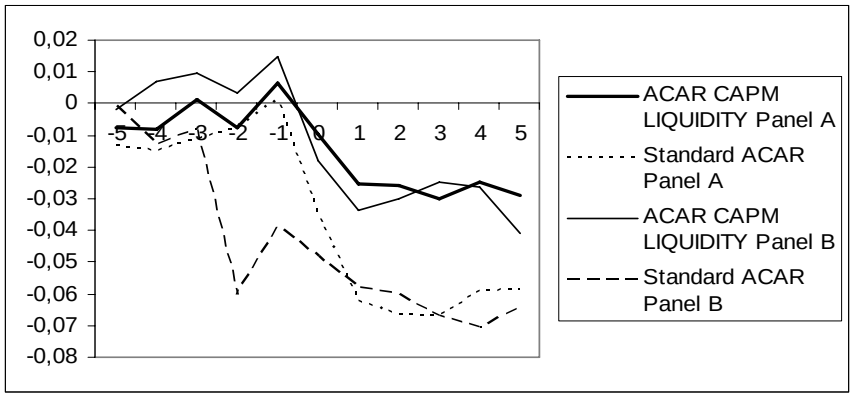
The following step consists in verifying if considering the liquidity risk in explaining prices dynamics can describe and cancel the existence of abnormal returns generated by the standard fundamental models. So, we adopt the same methodology of event study used on the first section. Except, we suppose that the normal return is calculated by the reduced version of the CAPM adjusted to liquidity risk. The results of this study are presented in the following table 9:

Table 9: Abnormal returns and adjusted CAPM to liquidity risk

	Panel A			**Panel B**		
	Standard ACAR	ACAR CAPM LIQUIDITY	t- statistic	Standard ACAR	ACAR CAPM LIQUIDITY	t-statistic
-5	-0,01332	-0,00769	0.6012	-0,00070	-0,00210	1.0254
-4	-0,01486	-0,00830	0.7342	-0,01262	0,00676	1.0768
-3	-0,01115	0,00126	1.9887*	-0,00806	0,00954	0.6875
-2	-0,00774	-0,00738	2.0987*	-0,06016	0,00342	1.3093
-1	0,00134	0,00632	2.6754*	-0,03889	0,01457	1.6548
0	-0,03504	-0,00972	2.0342*	-0,04808	-0,01811	1.9938*
1	-0,06218	-0,02537	1.6754	-0,05805	-0,03386	2.2387*
2	-0,06633	-0,02582	0.6718	-0,06018	-0,02989	2.5867*
3	-0,06702	-0,02980	0.5430	-0,06676	-0,02457	1.9783*
4	-0,05936	-0,02454	1.0123	-0,07049	-0,02637	1.6504
5	-0,05887	-0,02905	1.7366	-0,06461	-0,04091	0.4067

* design significance at 5% level

Graphic 8: Abnormal returns and adjusted CAPM to liquidity risk



The results of the event study based on the model of CAPM adjusted to liquidity risk; show that there is a decrease of abnormal returns with regard to the study based on market model. For panel A, the level of abnormal returns decreased in 50 %, almost over the entire event window. For panel B, we register a strong decrease of this level before the date of event. This decrease, in term of percentage, reaches the 153,57 %, 218,36 %, 105,68 % and 137,46 % respectively for dates -4, -3, - and -1.

From the date of event, abnormal returns decrease just little compared to the event study with market model, and is about 50 %. However, abnormal returns remain existing; and investors' reaction continues even after the event date.

Thus, even with the CAPM adjusted for liquidity risk, the BVMT remains inefficient. So we conclude that considering the liquidity effect decrease abnormal returns but can't cancel them. From where, the incapacity of the CAPM adjusted for liquidity risk to remedy the existence of abnormal returns and afterward to explain prices dynamics on the BVMT.

3.2.4. Abnormal return and multi-criteria model

In order to take into account three determinants of inefficiency of the BVMT, we suppose a multi-criteria model which merges the model of Fama and French (1993) and the model of Acharya and Pederson (2005). The foundation that we use for the development of our multi-criteria model is the same employed by Acharaya and Pederson (2005) during the passage from standard CAPM to CAPM adjusted for illiquidity risk. In our case, instead of basing on the standard CAPM as point of departure, we go from the model of Fama and French to three factors. The result is from the development and the formulation of a new relative model, appearing as follows:

$$r_t^i = r_t^f + c_t^i + \beta_{1i} \left(r_t^m - r_t^f - c_t^m \right) + \beta_{2i} SMB_t + \beta_{3i} HML_t \quad (16)$$

Before verifying if this model cancels the existence of abnormal returns, we are going to check the significance of the systematic risk adjusted at liquidity risk in the Tunisian context. The results of this estimation are represented in the following table 9.

Table 10: multi-criteria Modèle

bêta i	Coefficient	Panel A : BVMT index		Panel B: Tunindex	
		P 1	P2	P1	P2
Bêta 1	Value	0.453142	0.736275	0.739887	1.064839
	T*	7.153714*	10.19395*	13.09621*	16.62959*
Bêta 2	Value	0.350768	-0.261389	0.146006	-0.555522
	T*	4.100702*	-2.679968*	2.285366*	-7.67191*
Bêta 3	Value	-0.037868	-2.89E-02	-1.19E-01	-1.34E-01
	T*	-5.24E-01	-3.51E-01	-2.24E-01	-2.22752*

* design significance at 5% level

The results of this table show that:

1- The coefficient of the systematic risk adjusted for liquidity risk is positive and significant for both panels and portfolios

2- The coefficient of size effect is significant for both panels. However, this coefficient is positive for banks and negative for the other sector

3- For the coefficient of book to market effect, we notice that it is negative for both panels and portfolios. This coefficient is significant for the group B but not for group A.

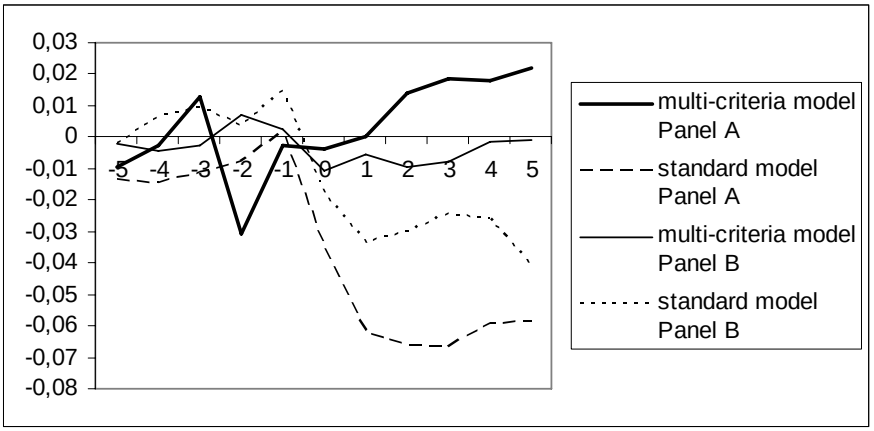
The use of this model in the event study gives us the results presented in the following table 10:

Table 11: Abnormal returns and multi-criteria model

	Panel A			Panel B		
	multi-criteria model	t-statistic	standard model	multi-criteria model	t-statistic	standard model
-5	-0,00973	1,054	-0,01332	-0,00209	2,654	-0,00210
-4	-0,00251	0,6840	-0,01486	-0,00466	1,7645	0,00676
-3	0,01270	1,0547	-0,01115	-0,00291	1,0186	0,00954
-2	-0,03077	0,7236	-0,00774	0,00706	2,1764*	0,00342
-1	-0,00265	1,3846	0,00134	0,00252	2,4583*	0,01457
0	-0,00384	3,4343*	-0,03504	-0,01085	2,0580*	-0,01811
1	0,00046	2,3548*	-0,06218	-0,00579	2,0792*	-0,03386
2	0,01371	2,2964*	-0,06633	-0,00956	1,0504	-0,02989
3	0,01879	2,1746*	-0,06702	-0,00755	1,2489	-0,02457
4	0,01771	0,3160	-0,05936	-0,00129	1,2935	-0,02637
5	0,02172	0,5735	-0,05887	-0,00077	1,0186	-0,04091

* design significance at 5% level

Graphic 10: Abnormal returns and multi-criteria model



The multi-criteria model shows similar results with regard to those of the model of Fama and French (1993). We notice an upheaval in sign of abnormal returns, as explained by the model of Fama and French (1993). In term of absolute values, the level of abnormal returns decreases compared to the standard model. However, investors' reaction remains existing and abnormal returns persist for several months after the event date. This confirms the inefficiency of the BVMT and the incapacity of the fundamental models, adjusted for microstructural determinants in explaining the prices dynamics.

4. Conclusion:

We study if extensions of fundamental models adjusted to microstructural determinants, can remedy the existence of abnormal returns. First, we study the microstructural determiners of the inefficiency of the BVMT, by using a cross sectional studies with one and two criteria. The studied criteria are: size effect, book to market effect and liquidity effect. The results of this study with a single criterion show that:

1- There is a significant change in the level of abnormal returns generated by the firms of small capitalizations with regard to those of large capitalizations. Indeed, the firsts generate a higher abnormal returns compared to the seconds. It means that the size effect present a determinant of the inefficiency of the BVMT.

2- There is a significant change in the level of the abnormal returns generated by the companies of big book to market with regard to those of small book to market. We find that firsts generate abnormal returns higher than other ones. It means that the book to market effect presents a determinant of the inefficiency of the BVMT.

3- There is a significant change in the level of the abnormal returns generated by the liquid companies with regard to those less liquid. It means that the liquidity effect presents a determinant of the inefficiency of the BVMT.

In second, we verify if the fundamental models adjusted for these determinants of the inefficiency can remedy the existence of abnormal returns and afterward, explain the dynamics of the stock prices on the BVMT. To do that, we use the same methodology of the event study presented in the first section. Except, we employ the

fundamental models adjusted for the determinant of inefficiency of the BVMT to calculate the normal return.

Finally, we study three models. The first one is the model of Fama and French in three factors which represents a fundamental model adjusted for the size book to market effects. The second is the model of Acharya and Pederson (2005) which represents a fundamental model adjusted for the liquidity risk. And for the third, we use a multi-criteria model which merges both models. The results show the incapacity of the fundamental models to cancel the existence of abnormal returns.

This first part confirms two important points: the incapacity of the theory of the efficiency to explain abnormal returns and the influence of the psychological bias on these last ones.

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