



The Impact of Investor Sentiment on the Tunisian Stock Market

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Abstract

The investor sentiment is a concept key in behavioral finance, it has attracted the interest of many researchers during the last decade. The presents study develops a new measure of the investor sentiment which includes indirect indicators. Our main objective is to test the impact of investor sentiment on returns. Using a VAR model, we record strong negative relationship between investor sentiment and future returns. In addition, we find that past returns for tangible stocks, young, mature, not very and highly profitable, and with policy of distribution of dividend are not factors that explain the sentiment indicator.

Keywords: investor sentiment, stock return, Market Timing, VAR Model

Introduction

Hirshleifer (2001), The central task of the active financial is to determine how the expected returns are associated with both the risk and m s valuation investors. The last decade has witnessed a lively debate around the issue of the link between behavioral aspects of investors and financial markets. The investor sentiment is a key concept in behavioral finance, many studies have tried to model the role of investor sentiment in the financial markets (Black (1986), De Long, Shleifer, Summers etWaldman (1990), Daniel, Hirshleifer and Brennan, M., T. Chordia, and A. Subrahmanyam and Barberis(1998), Shleifer and Vishny (1998)), Kaplanski and Levy (2009), Baker, Wergler and Yuan (2011), Dergiades (2012). Overall, the models assume the existence of two types of investors and arbitrageurs noise makers introduce an additional risk on the assets they trade.

Literature of behavioral finance suggests that sentiment affects business decisions. The influence of future expectations of investors can cause over-or under-valuation of stocks, and thus affect the valuation models. Empirical studies testing how the sentiment predicted future returns in the stock of the United States (Kothari and Shanken (1997), Shiller (1981, 2000); Baker and Wurgler, (2000), and Brown and Cliff (2005) and estimate the effect of sentiment on small stock premium (Lee and others, (1991), Swaminathan (1996), Brown and Cliff (2004) and Lemmon and Portniaguina (2006). Another series of studies examining the possibility of a causal relationship between returns and investor sentiment, finding no effect on the feeling returns in the short term, Otoo (1999), Jansen and Nahuis (2003) Brown and Cliff (2004) and Wang and al (2007). Wang (2001) analyze the effect of sentiment in the futures market, Han (2008), and Lemmon and Ni (2008) in the options market, Ahn, and al. (2002) in the currency market and Burghardt, and al. (2008) and Schmitz and al. (2009) in the market guarantees. Chui, and al. (2008) shows that the cultural differences between countries can be an element of bias behavior. Pursue this problem, a number of studies which analyzed a range of international markets has reported findings that indicate to analyze differences between countries. Schmeling (2009) found that the feeling has an effect on performance in 9 of the 18 countries analyzed. His results suggest a stronger effect in the countries affected by the behavior of the herd, investor overreaction and lowers market integrity (the quality of information and institutional development). Chang, and al. (2009a and b) in both paper emphasizes the greater intensity of the effect in countries with a higher level of collectivism and greater access to news media, in partial contradiction Schmeling (2009). It offers more than high quality legal environments and corporate governance intensify the effect of feeling. Baker and al. (2009) analyzes several aspects of sense (global and local), observing their impact on financial market returns. They also explore the effects on other exchanges countries, given that the effect of investor sentiment in the United States is contagious across markets. A main problem is the true measure of the variable of feeling. This varies from one study to another, with researchers who draw on many indicators including surveys of investor Otoo (1999), Jansen and Nahuis (2003), Brown and Cliff (2005), Lemmon and Portniaguina (2006) and Schmeling (2009), the mood of investors, Kamstra, and al (2003), retail shops investor, Barber and al (2006), Greenwood and Nagel (2006) and Kumar and Lee (2006), the flow of mutual fund, Brown and al (2003) Frazzini and Lamont (2008), dividend premium, Baker and Wurgler (2004a and b), the discount of closed bottom expect, Zweig (1973); Lee et al (1991), Swaminathan (1996) and Neal and Wheatley (1998), option volatility, Whaley (2000), the number of IPOs and the means yields first day of introduction scholarship Ritter (2003) and Ljungqvist and al

(2006), the volume of transaction rotation or Sheinkman and Xiong (2003) and Baker and Stein (2004). The theory does not seem to have developed clear criteria for assessing the validity of a variable with respect to others or even to the distribution of a variable into its constituent parts, Chang and al. (2009a and b) and Baker and al (2009). Most work has focused on the performance of small cap stocks, because they are held primarily by individuals. (Lee, Shleifer and Thaler (1991), Neal and Wheatley (1998)). Other studies showing that investor sentiment affects both small cap stocks that the market as a whole (Lee Jang and Indro (2002), Brown and Cliff (2004)). Before going into more detail in the subject, it is necessary to define the notion of investor sentiment, investor sentiment may be defined as investor influenced by emotions, future returns and investment risks, Chang et al (2009), and posed the following questions:

- Is the investor sentiment affects only the small caps?
- Is there more stock fragile investor sentiment than others?
- Affects Does the stock prices of companies regardless of their characteristics?

Baker and Wurgler (2006) showed that investor sentiment affects the cross sectional stock. They conclude that some firms are more sensitive to investor sentiment than others. According to them, the sense-profitability relationship is a function of the costs of arbitration and the nature of business valuation. Our study is in the same line of work that Baker and Wurgler (2006), but is distinguished by three key points.

1 - We use sentiment indicators monthly instead of annual data, which refines our results.

2 - Unlike Baker and Wurgler (2006), investor sentiment is not considered a conditional variable, but rather as an explanatory variable for returns. This approach allows us to study the dynamic relationship between sentiment and returns.

3 - The list of characteristics of firms vulnerable to investor sentiment different from Baker and Wurgler(2006).

Our paper is organized as follows. In the next section, we present a brief summary of the previous literature. The second section is devoted to the presentation of data, variable construction and the methodology and analysis of results. Finally, we conclude with a summary of our main results.

Section 1: Literature Review

Chang and al. (2009a) investor sentiment can be defined as investor sentiment, often influenced by emotions, future returns and investment risk. Baker and Wurgler (2006) also explained the propensity to speculate or optimism or pessimism of a given asset. Define the feeling is to identify an investor who is optimistic (pessimistic) without good (bad) economic reasons to be. The

literature has used several different measures of investor sentiment, as described in the theoretical framework. Baker and Wurgler (2006) use the principal component analysis to construct an index that aggregates a collection of variables sentiment indicator: two major families of measures can be distinguished: direct measurements and indirect measurements.

1.1 **Direct measures:** are produced using surveys of investors and economic studies. Solt and Statman (1988) tested the influence of the sentiment index from the Investors Intelligence survey of the Dow Jones over the periods 1963-1985 and they find that the feeling is not a reliable signal to effect transactions in scholarship. Indeed, there is no significant relationship between investor sentiment and Clark and Statman (1998) did the same test on the S & P500 over the periods 1963-1995 and confirms the result found by Solt and Statman (1988). Shiller (2000) tested a weak relationship between confidence indices of Yale University and several other proxies of investor sentiment.

De Bondt (1993) shows a significant negative relationship between sentiment index published by the American Association of Individual Investors (AAII) and future returns, what contradicts the results of previous studies. Brown and Cliff (2005) confirms in his article that examined the long-term correlation between the index of Investors Intelligence sentiment and profitability, the importance of investor sentiment in the valuation of financial assets. Otoo (1999) figured their study on consumer confidence indices and their relationship with the investor sentiment, and it is a significant relationship between simultaneous changes in the consumer confidence index from the University of Michigan and returns to Wilshire 5000 index over the period 1980-1999, the causality tests indicate that market movements affect investor sentiment.

Fisher and Statman (2003) concluded in his study the possibility to credibly predict the returns the indices of consumer confidence. . Indeed, there is a strong negative relationship between confidence indicators and returns of small cap stocks in the short term. This result is inconsistent with Otoo (1999), but confirms the behavioral approach, which provides that the sentiment of the individual investor claims primarily securities held by individuals, in this case small caps. Qiu and Welch (2005), Lemmon and Portniaguina (2006) and Charoenrook (2006) confirmed the results found by Fisher and Statman (2003). it should be noted that in each study, the measurement technique, there are both advantages and disadvantages.

Indeed direct indicators are specific measures that do not require sense to use theories to justify. But it does not take account of the strength and performance of the market. For this we will

remake indirect indicators that provide a better reflection of the strength and performance of the market and relate to economic and financial variables.

1.2 The indirect indicators: The indirect method assumes that certain financial and economic variables contain expectations are not justified by the fundamental economic, such as the number of IPOs, the initial profitability of enterprises newly introduced, the discount on closed-end funds, the premium dividends, volatility premium, premium dividend

To measure investor sentiment, several empirical studies refer to indirect proxies.

□ The discount of closed-end funds by Shleifer and Thaler tested (1991), they show that the share of U.S. closed-end funds are traded at a discount relative to the value of their underlying portfolio and the discount affects the profitability of securities held primarily by individuals and they find that the discount decreases when the price of the securities of small caps and screws to increase it. By cons, Chen, Kan Miller (1993) and Elton, Gruber and Busse (1998) find that the discount on closed-end funds is not involved in the reproductive process of returns. The existence of the large premiums and discounts fluctuations over time find no justification in the traditional approach. Several previous studies have shown that the discount is negatively related to investor sentiment (Zweig (1973) and Lee, Shleifer and Thaler (1991).

□ volume of IPOs (NIPO) studied by Lee, Shleifer and Thaler (1991), Helwege and Liang (1996), Rajan and Servaes (1997) and Lowry (1999), Baker and Wurgler (2006), Cornelli, Goldreich and Ljungqvist (2006) showed that the volume of IPOs is positively associated with investor sentiment and IPOs are very sensitive to the mood of investors. Indeed, when investors are optimistic, they are more prepared to overpay titles newly introduced on the market and therefore, more companies will be encouraged to enter.

□ The volume of transactions can be considered as an indicator of investor sentiment. Baker and Stein (2004) notes that if the short sale is more expensive than opening and closing long positions (as in practice), the irrational investors are more inclined to negotiate, thus increasing liquidity when they are optimistic and invest in rising stocks rather than when they are pessimistic and threats declines in stocks.

□ The volatility premium used by Baker and others (2009) to replace the dividend premium which is inappropriate in countries where dividends are rare, which is an indicator of investor demand compared between periods of high and low volatility.

□ The rate of rotation, another category of indicators is linked to certain types of business activities. The turnover (TURN) was calculated as the ratio of the volume of transactions on the

number of shares outstanding, it measures market liquidity and may serve as a measure of sentiment (Baker and Stein, 2004). In a market of short sales, the irrational investors participate and increase liquidity in a market where investor sentiment is positive (Bris, Goetzmann, and Zhu (2007)).

□ Cash flow net is proposed as a sentiment indicator in Frazzini and Lamont (2008) and Indro (2004). In times of high investor confidence, individual investors bought mutual funds (see, eg, Brown and Cli (2004)

□ firm's debt equity ratio, proposed by Baker and Wurgler (2000) to measure investor sentiment showed that managers try to time the market prefer to issue equity rather than debt when the sentiment is high, and vice versa

Although several studies based on surveys to measure investor sentiment, Brown and Cliff (2004), Brown and Cliff (2005), the use of surveys can also be problematic because of inaccurate responses, misunderstood questions, Bertrand and Mullainathan (2001), and non-response bias, Groves (2006). Therefore, documents such as Lee, Thaler and Shleifer (1991) and Dorn (2009) suggest using indirect indicators. Baker and Wurgler (2006) form a sentiment index based on the first principal component of a number of indirect proxies: ADV / DEC, ARMS, HILO, TURN, EQU, NIPO, RIPO P and D-ND

Section 2: Results and interpretation

The data were collected from the Tunis Stock Exchange BVMT. Orders are: accounting and finance.

2.1. The crude indicators of sentiment

We construct a composite index of sentiment which includes indirect indicators. Three sentiment indicators involved in the construction of the composite index:

The premium volatility (PVOL), the premium of dividend (PDIV), and the index performance (ARMS). All data are monthly frequencies and cover the period from January, 2008 till December, 2012. The indicators of feeling are calculated as follows :

The first proxy (PVOL) is the log ratio of the equal-weighted average market-to-book ratios of stocks with high idiosyncratic volatility (top three deciles) and with low idiosyncratic volatility (bottom three deciles).

The second proxy PDIV (the premium of dividend) : it is the difference between dividends received and the paid dividends

The third proxy ARMS (index performance) : the number of the titles which knew a progression of outflows standardized by their volumes exchanges divided by the number of the titles which knew a decrease of the outflows standardized by the volumes of exchange of these titles.

2.2. Construction of the composite index of sentiment

Investor sentiment is not easy to measure, but there is no fundamental reason why we can not find that imperfect indicators remain useful over time.

We apply a principal component analysis (PCA) on the three sentiment indicators in order to isolate the common component.

□ The Principal Component Analysis: A set of methods to perform linear transformations of a large number of intercorrelated variables to obtain a relatively small number of uncorrelated components. This approach facilitates analysis by grouping the data into smaller sets and to eliminate the problems of multi-collinearity between variables. The principal component analysis is similar to factor analysis, but it is an independent technique that is often used as a first step in a factor analysis (Vogt, 1993, page 177). « Dictionary of statistics and methodology. » Stevens (1992) also puts into relief the interest offered by the principal component analysis as a technique for data reduction. The main objective of PCA is to summarize effectively as possible in a single indicator information retained in the common set of indicators. The advantage of the composite index is that it reflects the moral of a very large sample of investors, both those PVOL, PDIV, and ARMS. As a result, the relation « lead lag » is taken into account in the construction of the composite index. We follow the same approach as Baker and Wurgler (2006) to avoid the problem of timing, because the indicators may reflect the same sentiment factor at different times.

Then we take the three variables (current or offset each proxy) with the highest loadings with the first clue. Finally, we define our measure of sentiment as the first principal component based on the correlation matrix of selected variables. We obtain the following composite index:

$$\text{ICS= Sentiment} = 0.753\text{PVOL}+0.312\text{PDIV}+0.785\text{ARMS} \quad (1)$$

PCA revealed two dimensions that explain round 44% of the total variance of the common factor. The first part summarizes the most significant change, she says her only round 42% of the variance. We record the coefficients of sentiment indicators have the expected signs.

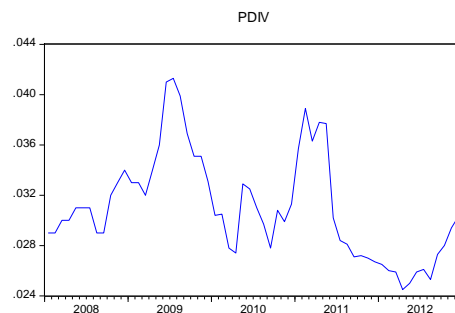
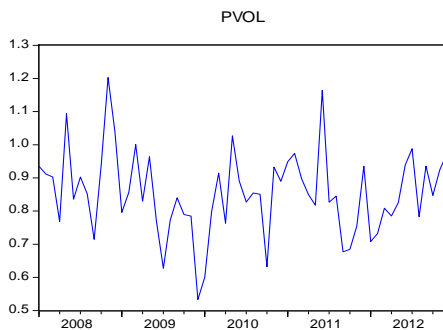
Table (1) summarizes the descriptive statistics and correlation matrix of indicators of feelings and sentiment index component.

	PVOL	PDIV	ARMS	ICS
Mean	0.854424	0.031028	0.827828	1.302907
Median	0.848296	0.030350	0.501940	1.049391
Maximum	1.202734	0.041300	7.709144	6.844939
Minimum	0.533172	0.024500	0.000000	0.649858
Std. Dev.	0.126543	0.004153	1.151464	0.933142
Skewness	0.140313	0.676071	4.175209	4.099269
Kurtosis	3.645328	2.791228	23.40621	22.85009
Jarque-Bera	1.237998	4.679689	1215.357	1153.105
Probability	0.538483	0.096343	0.000000	0.000000

Table (1) : The descriptive statistics of the indicators which forms the composite index of feeling and their correlations

	PVOL	PDIV	ARMS	ICS
PVOL	1	0.02839470728399941	0.2579556767083948	0.35202481185386
PDIV	0.02839470728399941	1	0.08433359906726379	0.08597868878426917
ARMS	0.2579556767083948	0.08433359906726379	1	0.9951195147406547
ICS	0.35202481185386	0.08597868878426917	0.9951195147406547	1

We note that the maximum index component feeling is 6.844939 and the minimum is 0.649858, this indicates an index of sentiment extreme asymmetric during the study period. Moreover, ARMS had the highest correlation with the sentiment index (09951195147406547) and the second is the PVOL (**0.35202481185386**). Subsequently we present the variation of the indicators used in this study feelings and sentiment index component



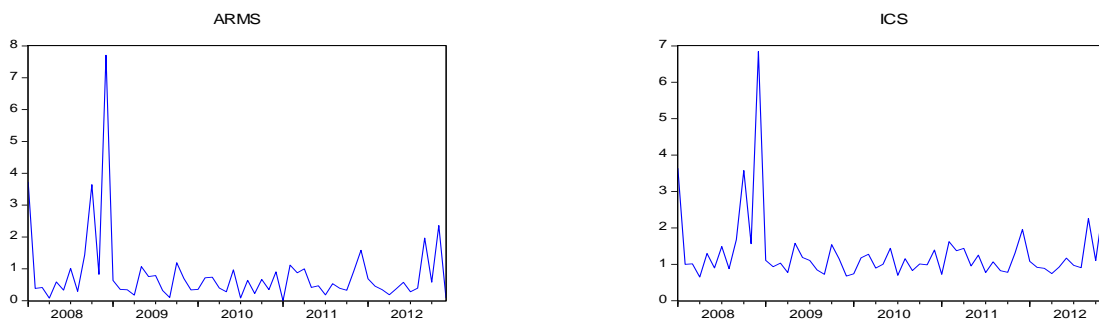


Figure (1) : the evolution of sentiment indicators

Overall, the evolution of the ICS aligns with the history of bubbles and crashes, in fact we see two spades in October 2008 and January 2011, respectively, which corresponds contagion international Subprime and revolution « Jasmine » Tunisia. This agreement suggests that the composite index captures changes appropriate sentiment factor. In the empirical work below, we use the composite index of equation (2.1) as a measure of investor sentiment.

2.3. Sample data used:

We can define the Tunisian financial market in terms of market capitalization as a narrow market given the limited number of companies that are listed, the market is dominated or composed by a very large number of companies in the financial sector. It uses a representative sample of the Tunisian market composed of 41 companies that are AIR LIQUIDE TUNISIE, AMEN BANK,ASTREE,ATB, ATL,ALKIMIA, ATTIJARI BANK, BH,BIAT, ADWYA, ASSAD, BNA,BT, BTE, CIL, EL WIFEK LEASING, ELECTROSTAR, ESSOKNA, GIF FILTER, ICF, MAGASIN GENERAL, MONOPRIX,PLACEMENT TUNISIE SICAF,SFBT, SIAME,SIMPAR,SIPHAT,SITS,SOMOCER,SOTETEL,SOTRAPIL,SOTUMAG,SOTUVER,SPD IT, STAR,STEQ,TPR,TUNINVEST SICAR, TSIE LEASING, UBCI, UIB,.. The choice of the number of companies (sample) is due to the availability and continuity of market data on current and securities exchanged. We selected as sample all companies listed on the Tunisian market between 2008 and December 2012. The accounting and financial data were collected respectively in the database « BVMT » and the sample includes all listed securities for which data are available.

□ For individual titles:

$$R_{it} = \left(\frac{P_{it} - P_{it-1}}{P_{it-1}} \right) + D_t \quad (2)$$

□ The profitability of portfolios is calculated by

$$R_{pt} = \sum_{i=1}^N w_i R_{it} \quad (3)$$

With

□ P_{it} the closing price of stock i at time t ,

□ N is the number of titles available at time t

□ And w_i the weight of each company measured by market capitalization ratio of the company / total market capitalization.

We build 10 portfolios based on business characteristics, for chatting portfolios profitability securities small / large caps, young / mature, low / very profitable, low / very tangible and low / high opportunity, and weak/strong dividends we adapt the median.

Table (2.2) presents the descriptive statistics on the characteristics of portfolios:

- Panel A regroup criteria associated with the size, represented by its market capitalization (CB).
- Panel B includes criteria associated with age, estimated by the number of least since the introduction of the title in the database
- Panel C include criteria related to profitability, profitability is determined by the profitability of the company (ROA) is the ratio of income before taxes and interest / total assets.
- The panel D presents the criteria for tangibility. We retain the ratio Tangible / total active (IC / AT) to represent the degree of tangibility firms
- The panel E regroups the criteria for the policy of dividend, such as the ratio of dividend is defined by the report of ratio of dividends distributed on equity capital.

Before presenting the methodology, results and interpretations, it should be noted that the TSE is a public institution with a commercial legal personality and financial autonomy, it is reacted with the provisions of the Commercial Code and member international organization of securities commissions, its mission is divided into three roles: BVMT responsible for managing market STICODEVAM responsible for compensation, deposits and securities settlement: both organizations take the form of private inter constituted by brokers. The third part of the trilogy of the structure is represented by an entity coating the public nature of market surveillance and enforcement of regulatory offenses.

In addition to the theoretical framework, the anecdotal evidence of the Internet bubble in the late 90s suggests that the returns and sentiment indicators can form a system. When the

market peaked, sentiment indicators often show a record level. So you could have a feedback effect between the feeling and the financial market. For this reason, we use the VAR model (Sims (1980)) and the study of causality between returns and sentiment. The advantage of using a VAR model is that it allows one hand to analyze the effects of one variable on another through simulations of random shocks via impulse response functions, and secondly to conduct an analysis in terms of causality via Granger tests. Before embarking in the presentation of results of the parameter estimation is proposed to take a glance on some elements descriptive statistics and then move to testing stationarity of the series.

Table (2): Descriptive statistics of the variables used

Variable of classification	portefolio	mean	median	maximum	minimum	skewness	Kurtosis	Jarque-Bera	probability	Std.dev
Size	small	0.001793	0.001061	0.021889	-0.012933	0.686294	5.844250	24.93438	0.000004	0.005924
	big	0.007190	0.003879	0.073085	-0.078070	-0.257437	3.888924	2.638199	0.267376	0.028755
Age	young	0.000839	0.000196	0.012276	-0.008483	0.651588	5.098724	15.25727	0.000486	0.003482
	matures	0.008143	0.005686	0.072824	-0.084770	-0.343294	3.972211	3.541494	0.170206	0.030600
profitability	weak	0.006089	0.001717	0.067734	-0.068993	-0.046827	3.960069	2.326258	0.312507	0.026122
	strong	0.002893	0.002891	0.023683	-0.024698	-0.484096	4.542188	8.289347	0.015849	0.008904
tangibilit	weak	0.005740	0.001643	0.068883	-0.069627	-0.147880	3.878472	2.147966	0.341645	0.026105

y	strong	0.003243	0.004159	0.028543	-0.021080	-0.006884	3.876124	1.919459	0.382997	0.009318
The policy of dividend	weak	0.005719	0.000991	0.066283	-0.062751	0.015122	4.031575	2.662652	0.264127	0.024501
	strong	0.003263	0.002342	0.029416	-0.027956	-0.555595	4.275301	7.152843	0.027976	0.010458
ICS		1.302907	1.049391	6.844939	0.649858	4.099269	22.85009	1153.105	0.000000	0.933142

We note that for the main series returns for all portfolios and characteristic variables, the null hypothesis of normality is rejected. We note first that the kurtosis coefficient is very high, that is to say, much higher than 3 (theoretical value of the coefficient of kurtosis for a normal distribution). This phenomenon of excess kurtosis confirms by the highly leptokurtic series stock returns. In the second place, the coefficient is different from 0 Skweness (theoretical value of the coefficient of Skweness for normal distribution), we note that the coefficient of Skweness in some cases is positive for the series of returns of portfolios (ranked by size and characteristic variables (CB, age and policy of dividend)this indicates that the serial distribution skewed and negative sets and profitability portfolios remaining variables characteristic(profitability and tangibility) that indicates that the serial distribution negatively skewed. This illustrates the presence of asymmetry, which can be an indicator of non-linearity. We find that the null hypothesis of normality is rejected for the series studied. As a result, stock returns do not follow a normal distribution, which is a general characteristic of financial series.

In summary, this preliminary study statistical properties highlights the following features:

(I) The series of stock returns of all portfolios and characteristic variables did not follow a normal distribution and characterized by:

(li) Excess Kurtosis.

(lii) An asymmetric distribution indicative of non-linearity.

The result show the evolution of the series of two variables gives us a first intuition about the stationarity of these variables, they trace their evolution over time. It appears that all the series

are stationary because they show no trend and converge to their long-term averages and are characterized by an instability that varies over time with the less volatile periods. At this level of advancement of our study, it is important to analyze the stationarity of all portfolios and ICS. Indeed, it is necessary to test the null hypothesis of no unit root. We then test the presence of a unit root in the process by testing the nullity of the parameter ϕ using Statistical weld, and the results of ADF and PP are presented in the table below:

Table (3) : stationarity tests

Variable of classement	portfolio	ADF		pp		Critical value		Stat						
		With constant	With constant and trend	With constant	With constant and trend	With constant	With constant and trend							
Size	Small	-6.124967	-6.086039	-6.082544	-6.040608	1% :3.546099 5% :2.911730 10% :2.593551	1% :4.121303 5% :3.487845 10% :3.172314	yes						
	big	-6.756040	-6.796131	-6.717773	-6.757553									
Age	young	-5.890155	-5.833719	-5.890155	-5.833719			1% :3.546099 5% :2.911730 10% :2.593551	1% :4.121303 5% :3.487845 10% :3.172314	yes				
	matures	-6.638380	-6.679886	-6.595314	-6.635816									
profitability	Weak	-6.753654	-6.878936	-6.717761	-6.883008					1% :3.546099 5% :2.911730 10% :2.593551	1% :4.121303 5% :3.487845 10% :3.172314	yes		
	Strong	-5.931877	-5.875110	-5.960497	-5.905587									
Tangibility	Weak	-6.845904	-6.960006	-6.852038	-6.960006							1% :3.546099 5% :2.911730 10% :2.593551	1% :4.121303 5% :3.487845 10% :3.172314	yes
	Strong	-5.805009	-5.744624	-5.830765	-5.772129									
Distribution of dividend	Weak	-	-7.054618	-	-	1% :3.546099 5% :2.911730 10% :2.593551	1% :4.121303 5% :3.487845 10% :3.172314							

		6.957237		6.931457	7.056399			yes
	Strong	-5.814587	-5.755178	-5.820351	-5.760301			
ICS		-4.018079	-6.473229(second difference)	-7.690222	-7.724742			yes

From Table stationarity tests ADF, PP performed on the series of portfolio returns and ICS, we note that all the series used are stationary. Start with the ADF test (with constant), the (Rpt) (ICS) have values that are less ADF critical values not displayed directly EViews, according ADF test (with constant and trend), the above variables have values are also below the critical values for the three levels 1%, 5% and 10% (see annexes). The same holds for the PP test, as can be noticed that the return series of all portfolios and ICS have a t-test of PP at different lower critical values recorded by Eviews. For the model (with constant).

According to PP (with constant and trend), the series have already mentioned PP values which are below the critical values for the three seuils 1%, 5% and 10%, hence the rejection of the null hypothesis H_0 « there is a unit root process is therefore not stationary » test PP. It can be noted as well as the probability of accepting H_0 for all series in both stationarity tests: ADF and PP is zero, we can conclude that all series stationary in its level.

b) Estimation of the VAR model:

The VAR model is an econometric model used to capture the interdependencies between multiple time series and trends, all the variables in the VAR are treated symmetrically by including for each variable an equation explaining its evolution based on these specific delays and offsets of all other variables in the model, based on this feature.

Determination of the number of delay:

The determination of the lag order is an essential step for the estimation of our VAR model to do this it was based on two criteria namely the information criteria SCHWARTZ amended (SC) and the criterion Akaike that are considered effective in determining the lag order of vector autoregressive models (VAR), these criteria showed us an order optimal delay equal to 1 for all portfolios.

Table (4): the criteria for choosing the optimal lag order of the VAR model

Retards	1	2	3	4	5	LM
AIC (weaklyCB)	-4.699766*	-4.654667	-4.630335	-4.504338	-4.676227	146.9642
SC (weaklyCB)	-4.626773*	-4.435686	-4.265365	-3.993381	-4.019282	
HQ (weaklyCB)	-4.671539*	-4.569985	-4.489198	-4.306747	-4.422181	
AIC (Strong CB)	-1.643381*	-1.592205	-1.462332	-1.469282	-1.442877	64.32989
SC (Strong CB)	-1.519211*	-1.243351	-1.104313	-0.931920	-0.986435	
HQ (Strong CB)	-1.563977*	-1.377650	-1.328146	-1.245286	-1.389334	
AIC (young companies)	-5.886323*	-5.826589	-5.792084	-5.766049	-5.664848	182.2382
SC (young companies)	-5.753595*	-5.573102	-5.401080	-5.153890	-5.229378	
HQ (young companies)	-5.798362*	-5.707402	-5.624913	-5.467256	-5.632277	
AIC (matures companies)	-1.493479*	-1.459544	-1.335104	-1.337328	-1.317097	60.03655
SC (matures companies)	-1.386550*	-1.116123	-0.972358	-0.806139	-0.836534	
HQ (matures companies)	-1.431316*	-1.250422	-1.196191	-1.119505	-1.239433	
AIC (weak profitability)	-1.770045*	-1.761242	-1.632765	-1.613810	-1.542074	67.75819
SC (weak profitability)	-1.688248*	-1.413783	-1.248841	-1.031117	-1.113099	
HQ (weak profitability)	-1.733015*	-1.548083	-1.472674	-1.344483	-1.515999	
AIC (strong profitability)	-3.958606*	-3.879697	-3.927442	-3.932702	-3.889688	125.3263
SC (strong profitability)	-3.885612*	-3.660715	-3.562472	-3.421745	-3.232743	
HQ (strong profitability)	-3.930379*	-3.795015	-3.786305	-3.735111	-3.635642	
AIC (weak tangibility)	-1.789359*	-1.761006	-1.629370	-1.624137	-1.558898	68.67533
SC (weak tangibility)	-1.688012*	-1.410388	-1.259167	-1.047941	-1.132414	
HQ (weak tangibility)	-1.732778*	-1.544688	-1.483000	-1.361307	-1.535313	
AIC (strong tangibility)	-3.860816*	-3.795349	-3.768821	-3.751541	-3.859452	124.5206
SC (strong tangibility)	-3.787822*	-3.576368	-3.403851	-3.240584	-3.202507	
HQ (strong tangibility)	-3.832588*	-3.710667	-3.627684	-3.553950	-3.605406	
AIC (weak dividend)	-1.892788*	-1.758759	-1.739052	-1.654241	-1.887210	71.12599
SC (weak dividend)	-1.819794*	-1.539778	-1.374083	-1.143283	-1.230264	
HQ (weak dividend)	-1.864561*	-1.674077	-1.597916	-1.456649	-1.633163	
AIC (strong dividend)	-3.621571*	-3.553411	-3.572785	-3.601423	-3.561191	116.2373
AIC (strong dividend)	-3.548577*	-3.334429	-3.207816	-3.090466	-2.904246	
AIC (strong dividend)	-3.593343*					

		-3.468729	-3.431649	-3.403832	-3.307145	
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The following table shows the estimated parameters of the VAR model and shows the relationship between the different variables of the model, it presents the results of the full sample VAR model of bi diverse portfolio performance (R_{pt}) and ICS. For each coefficient, the value was estimated standard error and t value statistics.

□ The estimation results of the VAR model

Table (5): Results of estimation of the VAR model (1)

	$R_{pt} (-1)$	$R_{pt} (-2)$	$ICS (-1)$	$ICS (-2)$	c
Small firme (weak CB)	0.205285 (0.13941) [1.47253]	-0.164904 (0.14433) [-1.14257]	-0.000470 (0.00095) [-0.49558]	-0.000539 (0.00088) [-0.61095]	0.003070 (0.00200) [1.53527]
ICS	-37.86781 (19.9451) [-1.89860]	-7.021747 (20.6486) [-0.34006]	-0.029751 (0.13563) [-0.21935]	0.228682 (0.12634) [1.81011]	1.097339 (0.28612) [3.83523]
Big firme (strong CB)	0.126365 (0.14308) [0.88321]	-0.180136 (0.14312) [-1.25863]	0.000165 (0.00466) [0.03549]	-0.001954 (0.00444) [-0.44008]	0.010183 (0.00957) [1.06418]
ICS	-2.178454 (4.28590) [-0.50828]	-2.676349 (4.28724) [-0.62426]	0.012728 (0.13961) [0.09117]	0.225659 (0.13301) [1.69658]	0.997845 (0.28663) [3.48128]
Young firms	0.229254 (0.14278) [1.60561]	-0.185625 (0.14725) [-1.26065]	-0.000345 (0.00057) [-0.60763]	-0.000553 (0.00053) [-1.04418]	0.001980 (0.00121) [1.64223]
ICS	-66.48210 (35.2838) [-1.88421]	-8.414441 (36.3864) [-0.23125]	-0.055689 (0.14014) [-0.39739]	0.219462 (0.13083) [1.67753]	1.124299 (0.29798) [3.77313]
Matures firms	0.145895 (0.14259) [1.02318]	-0.170643 (0.14293) [-1.19393]	0.000264 (0.00494) [0.05342]	-0.001868 (0.00470) [-0.39706]	0.010736 (0.01019) [1.05374]
ICS	-2.520934 (4.01063) [-0.62856]	-2.506696 (4.02005) [-0.62355]	0.007114 (0.13888) [0.05122]	0.226712 (0.13231) [1.71354]	1.009995 (0.28656) [3.52455]
(weak profitability)	0.127278 (0.14132) [0.90062]	-0.172104 (0.14179) [-1.21380]	0.000138 (0.00419) [0.03299]	-0.002003 (0.00399) [-0.50249]	0.009037 (0.00854) [1.05788]
ICS	-2.712466 (4.67179) [-0.58061]	-0.574605 (4.68725) [-0.12259]	0.017610 (0.13852) [0.12712]	0.246752 (0.13179) [1.87227]	0.948247 (0.28240) [3.35784]
(strong profitability)	0.225381 (0.14833) [1.51943]	-0.011971 (0.15141) [-0.07906]	7.35E-05 (0.00146) [0.05024]	0.000126 (0.00140) [0.09006]	0.002062 (0.00314) [0.65628]
ICS	-14.55543 (13.7421) [-1.05919]	-28.05145 (14.0267) [-1.99985]	-0.057294 (0.13551) [-0.42280]	0.151302 (0.12965) [1.16704]	1.276985 (0.29114) [4.38620]

(weak tangibility)	0.110831 (0.14132) [0.78428]	-0.178126 (0.14165) [-1.25747]	5.65E-06 (0.00419) [0.00135]	-0.001498 (0.00399) [-0.37580]	0.008314 (0.00851) [0.97694]
ICS	-2.380655 (4.66599) [-0.51021]	-1.971641 (4.67718) [-0.42155]	0.017465 (0.13834) [0.12625]	0.236379 (0.13164) [1.79561]	0.967482 (0.28098) [3.44325]
(strong tangibility)	0.259893 (0.14623) [1.77724]	-0.060829 (0.14945) [-0.40701]	0.000117 (0.00151) [0.07748]	-0.000573 (0.00144) [-0.39699]	0.003244 (0.00326) [0.99555]
ICS	-17.01881 (13.4061) [-1.26948]	-12.47331 (13.7012) [-0.91038]	-0.042468 (0.13847) [-0.30670]	0.202640 (0.13228) [1.53194]	1.162145 (0.29870) [3.89068]
Weak distribution of dividend	0.092966 (0.14190) [0.65516]	-0.161211 (0.14197) [-1.13555]	0.000104 (0.00395) [0.02636]	-0.001626 (0.00377) [-0.43139]	0.008307 (0.00806) [1.03101]
ICS	-2.553052 (4.98074) [-0.51258]	-0.844053 (4.98319) [-0.16938]	0.019757 (0.13877) [0.14237]	0.245201 (0.13228) [1.85366]	0.946775 (0.28282) [3.34768]
Strong distribution of dividend	0.250952 (0.14611) [1.71760]	-0.069907 (0.14866) [-0.47026]	-6.02E-05 (0.00170) [-0.03542]	-0.000328 (0.00161) [-0.20419]	0.003232 (0.00363) [0.89000]
ICS	-13.91504 (11.7355) [-1.18572]	-18.85668 (11.9403) [-1.57925]	-0.054478 (0.13653) [-0.39903]	0.178123 (0.12918) [1.37884]	1.224763 (0.29170) [4.19866]

We notice that the ICS depends negatively on one period the delayed value of return. Such as the values of T of student or T-statistics (calculated) are inferior than the critical value which is of the order 1.96 on a level of 5%, one can interpret this by the existence of the coefficients relatively near to zero and negative which explains the negative effect of other portfolios of return on the sentiment on a level of equal delay 1.

Same interpretation for the return of portfolio for unquestionable characteristics negatively depends on one period the delayed value of the ICS for example small companies (weak CB), their coefficients are respectively for the two orders of delay of the ICS of the order (- 0.000470, - 0.000539), the large companies (strong market capitalization) their coefficients are of the order (0.000165, -0.001954), for the young companies (- 0.000345, -0.000553) companies, for the mature companies (0.000264,-0.001868).

The cumulative effect of sentiment on the performance of other portfolios monthly negative and significantly different from zero, since the t-statistic of student feeling a level of delay (1 and 2) is not significant, these values are less than the critical value which is order 1.96 at a 5% level, this can be interpreted by the existence of a relatively coefficient near to zero and negative which explains

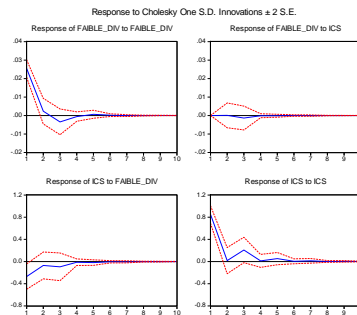
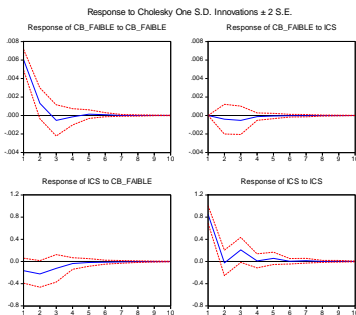
negative relationship between the stock return and the composite index of sentiment in both equal level of delays 1et 2.

This brings us back to say that there is not a relationship between (Rpt) and (ICS),Also notices it the observed positive effect of variable (at the level of delay (1) on itself at time t is introducing stocks of positivese t-statistics

It is therefore possible to conclude that the feeling for all levels of delay cannot influence positively influence the portfolio performance.

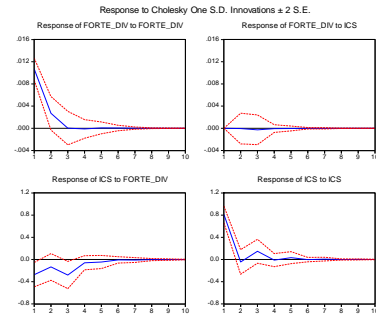
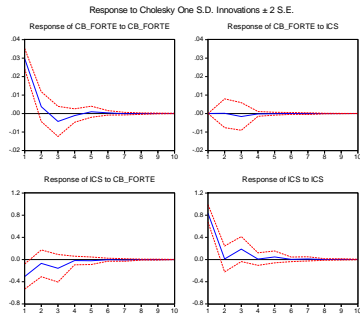
a) impulse response function

This function traces the effect of a shock of one standard deviation, innovation on current and future values of the endogenous variables. Our VAR model that describes a relationship between the portfolio yield () and sense (ICS) and represent two innovations. It seeks to identify the impact of a shock unit on () at time t, depending on the dynamic variable (S) to periods after t and vice versa, assuming the changes in these two variables t and T known data according to the charts of these coefficients and their associated values, we can see that we find the general shape of the response function to an innovation. VAR coefficient estimates can not capture the full impact of an observation of the endogenous variable. For this, the impulse response functions all use the coefficient estimates VAR to trace the full impact of residual shock. FIG contain possible graph of impulse response function using the estimate of VAR.



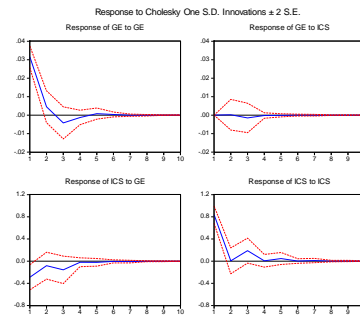
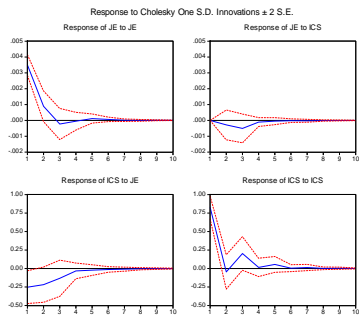
Weak market capitalization

Weak distribution of dividend



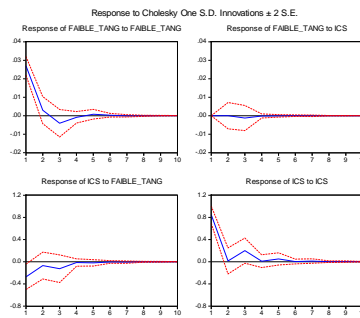
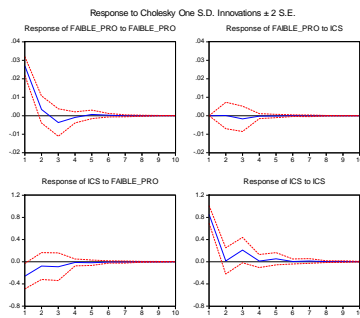
Strong market capitalization

Strong distribution of dividend



Young firms

Matures firms



Weak profitability

weak tangibility



Strong profitability

Strong tangibility

Fig (2) Function of response of impulse

For graphs (1) and (2) (R to R and R to S), they trace the response of portfolio performance to a standard deviation shock to each variable on themselves and feeling. The vertical axis in these graphs measure the percentage increase in R. For graphs (3) and (4) (S to R and S to S), they trace the response of feeling a shock standard deviation respectively of the portfolio return and the variable themselves. Table impulse responses of innovations (in the Appendix), we can learn about the purpose of our study, because the representation of responses to shocks \mathbb{R} and (S) for later periods.

On the one hand, the profitability monthly portfolio has zero response during the first period after following a shock of feeling, and the series of returns shows a decrease during the second and then the third period after an increase during the following periods and return it to the equilibrium point during the sixth period after a correction process, as the shows a positive response and the persistent feeling of shock \mathbb{R} and the realization of impulse response for relatively large after the first three periods, but this impulse response continues to decrease gradually return to equilibrium through a process of correction during the seventh period after this leads us to reveal our hypothesis node. This result is interpreted as evidence that portfolio returns have a negative impact on investor sentiment and conversely.

b) causality tests (Granger)

Causality tests of Granger (1969) were performed to check the direction of causality between the returns of different portfolios and investor sentiment (ICS). This test is used to examine whether there is a positive relationship between trading volume and market returns, you must use the Granger causality test (1969.1988) because it examines a double causality between two variables, a

set of processes $\{j = (1 \dots q)\}$, if there is a causal link between (and $\{j\}$), this means we can better predict (using past values).

In the Granger sense, a series of profitability « cause » of the series sense if knowledge of past profitability improves prediction of feeling and / or vice versa. Thus, the causality tests are used to highlight the direction of the causal relationship between the returns of each portfolio and ICS. Taking into account the ICS can - it improve the prediction of returns and / or vice versa?

Table (6): results of Granger causality tests between returns and investor sentiment

Test 1: H0: the feeling does not predict the direction of Granger returns

Test 2: H0: the returns do not predict the Granger sense

	Test 1		Test 2	
	F-Statistic	P-Values	F-Statistic	P-Values
Weak CB	0.30456	0.7387	1.97307	0.1491
Strong CB	0.09707	0.9077	0.35196	0.7049
Young firms	0.69647	0.5028	1.88373	0.1621
Matures firms	0.07971	0.9235	0.43286	0.6509
Weak profitability	0.12639	0.8815	0.18315	0.8332
Forte profitabilité	0.00529	0.9947	3.02796	0.0569
Weak tangibility	0.07067	0.9319	0.23510	0.7913
Strong tangibility	0.08206	0.9213	1.50646	0.2310
Weak distribution of dividend	0.09312	0.9112	0.15125	0.8600
Strong distribution of dividend	0.02140	0.9788	2.32992	0.1072

It can be seen that the performance of portfolio does not cause the direction of the Granger sense is accepted because the probability is relatively high (0.05) As well, we note that if the yield is used as the dependent variable and the explanatory variable is the feeling the probability is greater than (0.05), which says that the null hypothesis that the feeling does not cause any performance portfolio in the sense of Granger is accepted, it allows us to conclude that n is not a dual granger causality between performance and sentiment.de there, we can conclude that there is no relationship retroactive (feedback) between these two variables for all portfolios. Except for the companies which

have a strong profitability can predict the feeling seen that the probability is very close to 0.05 and which is worth (0.0569).

Conclusion

Although several studies based on surveys to measure investor sentiment, Brown and Cliff (2004), Brown and Cliff (2005), Otoo (2009), the use of surveys can also be problematic because of inaccurate responses, misunderstood questions, Bertrand and Mullainathan (2001), and non-response bias, Groves (2006). Therefore, documents such as Lee, Thaler and Shleifer (1991) and Dorn (2009) suggest using indirect indicators. Baker and Wurgler (2006) form a sentiment index based on the first principal component of a number of indirect proxies. In our study we construct a composite index of sentiment which includes three proxies.

The first proxy(PVOL) is the log ratio of the equal-weighted average market-to-book ratios of stocks with high idiosyncratic volatility (top three deciles) and with low idiosyncratic volatility (bottom three deciles).

The second proxy PDIV (the premium of dividend) : it is the difference between dividends received and the paid dividends

The third proxy ARMS (index performance) : the number of the titles which knew a progression of courtyards standardized by their volumes exchanges divided by the number of the titles which knew a decrease of the lectures standardized by the volumes of exchange of these titles. In a market of short sales, the irrational investors participate and increase liquidity in a market where investor sentiment is positive (Bris, Goetzmann, and Zhu (2007)). All data are monthly frequency and cover the period from January 2008 to December 2012. Our result confirms the results found by Solt and Statman (1988), testing the influence of sentiment index from Dow Jones over the periods 1963-1985 and they find that the feeling is not a reliable signal to transact exchange. Indeed, there is no significant relationship between investor sentiment and Clark and Statman (1998) did the same test on the S & P500 over the periods 1963-1995 and confirms the result found by Solt and Statman (1988). Shiller (2000) tested a weak relationship between confidence indices of Yale University and several other proxies of investor sentiment. De Bondt (1993) shows a significant negative relationship between sentiment index and future returns, what contradicts the results of previous studies. Brown and Cliff (2005) confirms in his article that examines the long-term correlation between the index and the feeling returns, the importance of investor sentiment in the valuation of financial assets

The use of VAR (1) on the Tunisian stock market over the period 2008 to 2012 leads us to conclude the absence of a significant relationship between investor sentiment and performance, and thus we see that the feeling is not a reliable signal to operate the Tunisian stock exchange transactions.

According to the Granger causality tests we can conclude that there is no relationship retroactive (feedback) between these two variables for all portfolios. This result is contradictory to Brown and Cliff (2004) who reject the conventional view that investor sentiment affects the small caps. In addition, we confirm that young and mature firms, with (low/high) profitability and tangibility, and the small and large titles, with (weak/strong) policy of distribution of dividend are weakly influenced by investor sentiment. On the other hand, as other researchers had already found, we find that investor sentiment is not affected by past returns. The question that may arise in this step is if the results will change and improve the application of nonlinear model or not?

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