Overconfidence and Trading Volume:
The Case of the Tunisian Stock Market

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This paper aims to present an attempt to explain exchange incentives on the Tunis Stock Market from a behavioural point of view. We think that the elucidation of these anomalies cannot be done without circumspect description of the psychological aspects of investors. The excessive confidence has been given the predominant explanation of these phenomena. Indeed, when investors store increments, they become more confident of the precision of their private information and their exchange activities become more aggressive on the subsequent periods. The objective of this work is to identify whether the trading volume observed on the Tunisian Stock Market from the excessive exchange of overconfident investors. Results obtained through a set of tests, over the period which extends from 04/01/1999 to 07/10/2016. Results reveal that the hypothesis of overconfidence is not check on the Tunisia Stock Market over the study period.

INTRODUCTION

Recently, several psychological and experimental studies have been conducted to explain the financial market participants "behavior and some financial market anomalies". A new field called behavioral finance has emerged, which is a mixture of psychology and finance to explain these anomalies. Thaler (2000), Greenfich (2000), and Titman (2003) show the investors' decisions are influenced by several psychological biases. This conclusion is the result of observing the behavior of traders on the stock markets. Several empirical studies have also shown that overconfidence can explain the excessive trading volume (Gervais & Odean, 2001; Chuang & Lee, 2006; Acker & Duck, 2008 and Gerlinde & Sebastian, 2014). Daniel et al. (1998) have modeled that investor overconfidence, overweight their own private information. However, investors overreact to private information and underreact to public information. Actually there are few studies exploring the investor behavior on many stocks market. The objective of this paper is to test the relation between stock returns and trading volume using Granger (1969, 1988) causality tests by examining whether investors overreact to their private signals under the overconfidence bias effect in the Tunisian Stock Market. The remainder of the paper is organized as follows: Section 2 introduces the methodology and the data. Section 3 presents the empirical results and analysis. Section 4 concludes the paper.

RESEARCH DESIGN AND DATA

The Overconfidence and Trading Volume

The overconfidence hypothesis of Gervais and Odean (2001) predicts that when investors store increments they become more confident of the precision of their private information. Hence, their exchange activities become more aggressive on the subsequent periods. Thus, the overconfidence hypothesis predicts a causality running from stock returns to trading volume. The hypothesis to test can be formally stated as follows: "Market gains (losses) make overconfident investors trade more (less) aggressively in subsequent periods". Kim and Nofsinger (2003) use Japanese market level data. They identify stocks with varying degree of individual ownership to test the hypothesis and discover higher monthly turnover in stocks held by individual investors during the bull market in Japan. Statman et al. (2006) use U.S market data to test the hypothesis that overconfidence leads to high trading volume. They argue that after high returns subsequent trading volume will be higher as investment success increase the degree of overconfidence. They find increases in trading activity after bull markets. Stock trading volume (turnover) is positively related to lagged stock returns.

Fayaz and Riaz (2012) test whether overconfident investors trade more aggressively, assuming that past returns lead investors to become overconfident therefore turnover is positively related to past returns. They test the implication of investor overconfidence related to trading volume within the framework of vector auto regression (VAR) in Karachi Stock Exchange, Pakistan using multivariate times series analysis, using market data from Karachi Stock exchange (KSE) for the period November 1999 to October 2010, the study reveals positive link of trading activity with past returns using unique data sets consist of individual investors accounts. Since data on individual investor accounts is not available in Pakistan we stick only to market level data to test the overconfidence predictions.

The study of Metwally and Darwish (2015) tests the overconfidence bias in the Egyptian Stock Market during the period from 2002 till 2012 on the aggregate market level though examining the relation between market returns and market turnover in different market states, seeking to document or deny whether overconfidence bias encourages investors to trade or not . The whole period is divided into four sub periods; two tranquil upward trending (2005-2005) and (2005-2008) and two volatile and down ward trending (financial crisis 2008-2010) and the (Egyptian Revolution Period 2010-2012). This research follows Statman et al. (2006) methodology. Time series analysis, which is based on four statistical techniques; mainly Vector Auto Regression, Optimal Lag Selection, Impulse Response Function and Granger Causality Tests is used. Market Turnover ratios are used as proxies for overconfidence. The research finds a significant impact of past market return on current turnover in lag1, then turns negative in lag 2, and returns back positive in lag3, then remains positive and significant until lag5. This is in line with the overconfidence and self-attribution theory of Denial et al. (1997). Market States are found to be strongly affecting the trading activity within the Egyptian Stock Market, especially in an upward trending market. Trading activity is triggered by investors' overconfidence when the Egyptian Stock Market is upward trending. There is also a positive significant impact of market gains on Market turnover in subsequent periods.

Causal Relation Between Trading Volume and Stock Returns

To test this hypothesis, we examine the causality between the trading volume and the stock returns based on Granger causality tests. Formally, if the prediction of the trading volume (V_t), using past values of stock returns (R_t) is more accurate than the prediction without using (R_t) in the mean square error sense ($\sigma^2 (V_t / \Omega_{t-1}) < \sigma^2 (V_t / \Omega_{t-1} - R_t)$, where Ωt is the information set at time t, then R_t Granger causes V_t.

Many studies have shown a synchronous positive relationship between trading volume and the volatility of returns of the securities. De long et al. (1990) proposed a positive feedback trading model, implying a positive bi-directional causal relation between trading volume and stock returns. Our empirical framework helps us distinguish between the overconfidence hypothesis and alternative hypotheses of trading volume.

We perform the following bivariate Granger causality tests.

$$V_{mt} = \alpha_{vm} + \beta_{vm} \left| R_{mt} \right| + \delta_{vm} MAD_t + \sum_{j=1}^{P} a_j V_{mt-j} + \sum_{j=1}^{p} b_j R_{mt-j} + e_{vmt} \tag{1}$$

$$R_{mt} = \alpha_{Rm} + \beta_{Rm} \left| R_{mt} \right| + \delta_{Rm} MAD_t + \sum_{j=1}^{P} c_j V_{mt-j} + \sum_{j=1}^{p} d_j R_{mt-j} + e_{Rmt} \tag{2}$$

where V_{mt} is the turnover on the stock market defined as the ratio of the number of shares traded to the number of shares outstanding, R_{mt} is the market wide return, $\left| R_{mt} \right|$ is the absolute value of R_{mt} and MAD_t denotes the mean absolute cross-sectional return deviation, and defined as follows:

$$MAD_t = \sum_{i=1}^{N} w_i \left| R_{it} - R_t \right| \tag{3}$$

where R_{it} is the return on stock i, R_t is the market-wide return, w_i is the (value-weighted) weight of stock i, and N is the total number of stocks in the sample. The number of lags p, is selected by considering both the Akaike information criterion (AIC) and Schwarz criterion (SC). $|R_{mt}|$ and MAD_t are used as control variables. Bessembinder et al. (1996) and Chuang and Lee (2006) use $|R_{mt}|$ to proxy for common information flow and MAD_t for firm-specific information flow in order to account for informational trades.

In the bivariate Granger causality tests, rejection of the null hypothesis that stock returns do not Granger-cause trading volume (H_0: $b_j = 0$, for all j) provides evidence in favor of our hypothesis, rejection of the null hypothesis that trading volume does not Granger-cause stock returns (H_0: $c_j = 0$, for all j) will be considered as an evidence of market inefficiency. If we find a feedback relation between stock returns and trading volume, it provides evidence in favor of positive-feedback trading hypotheses.

DATA

Our sample consists of all firms listed on the Tunisian Stock Market (BVMT). We use daily prices, daily number of shares traded, and number of shares outstanding at the end of the day and we use turnover defined as the ratio of the number of shares traded in a day to the number of shares outstanding at the end of the day, as a measure of trading volume. Our study period extends from January 4, 1999 to October 9, 2016 for 37 firms listed on the Tunis Stock Exchange.

The Turnover Series

The key element in the study of the psychology of investors in the stock market is the turnover. The rate of rotation is being a relative measure, and not absolute one of the exchange activity.

The turnover of action is calculated as follows:

$$T_i = \frac{The\ number\ of\ shares\ traded\ of\ action}{The\ number\ of\ shares\ outs\tan ding\ of\ action}$$

The turnover of stock market:

$$TMP_t = \frac{\sum The\ number\ of\ traded\ in\ rate \times shares\ prices}{Stock\ market\ capitalization}$$

This means: $\qquad TMP_t = \sum W_{it} T_{it}$

$$W_{it} = \text{(market capitalization of the shares i in t) / (stock market capitalization in t)}$$

The capitalization is defined by:
$$CB_{it} = \text{(the number of shares outstanding of action in t)} \times \text{(shares prices in t)}$$

EMPIRICAL RESULTS AND ANALYSIS

Modeling VAR

Before processing the time series, we need to study the stochastic characteristics. Because VAR models are estimated for stationary variables, we used an Augmented Dickey-Fuller test (Dickey and Fuller, 1981) for turnover and stock return series of each of the 37 stocks. Both series are stationary. Formal theories of overconfidence do not specify a time frame for the relationship between stock return and trading volume. In the case of the VAR representation the optimal number of delays to include will be determined using AIC and SC. The procedure of selecting the order of representation is to estimate all the VAR models for an order from 0 to h (h being the admissible maximum delay by economic theory or the available data).

TABLE 1
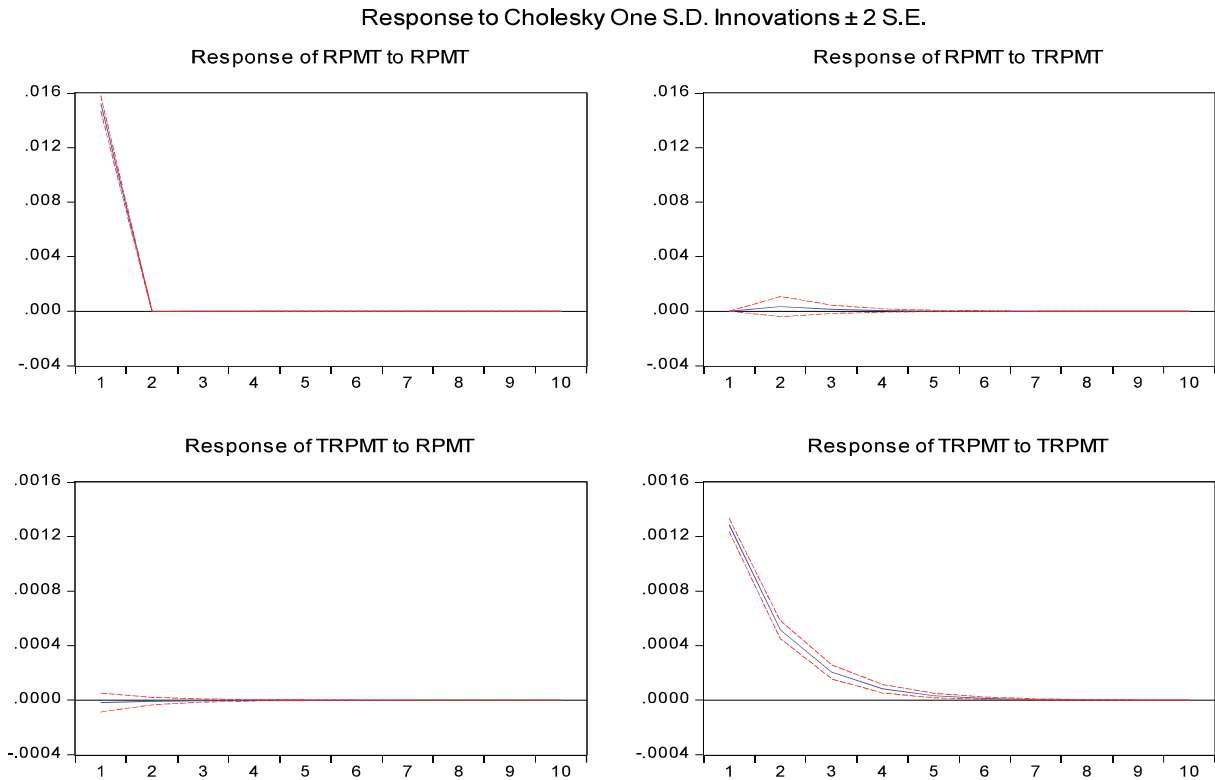### VAR ESTIMATION BETWEEN TRADING VOLUME AND STOCK RETURNS
PERIOD 1/4/1999 – 7/10/2016

		VM_{t-1}	$RDTM_{t-1}$	Cst	MADT	|RDTM|
VM_t	Coefficient	0.275611	-4.11E-07	0.000367	-6.76E-07	-1.45E-07
	(p-value)	(0.01456)	(1.0E-06)	(1.7E-05)	(2.7E-06)	(1.8E-06)
$RDTM_t$	Coefficient	0.226662	6.06E-06	-0.004554	1.33E-05	0.99999
	(p-value)	(0.17546)	(1.2E-05)	(0.00021)	(3.3E-05)	(2.1E-05)

The observed relationship between V_m and the stock returns of market delayed at level 1 shows that p-value (1.0E-06) is lower than the different P-values, so the performance of market delayed level 1 do not explain the current volume of transactions; there is no relationship between the current transaction volume and stock returns of market delayed level 1. This does not confirm the hypothesis of overconfidence and its impact on the volume of transactions. For the relationship between MAD and V_m, we noted that the p-value associated with the coefficient of the variable MAD (2.7E-06) is less than the different P-values, similarly to |RPMT| since p-value (1.8E-06). So there is no significant relationship between V_m and MAD and between V_m and |RPMT| (See Table 1).

Impulse Response Function

According to impulse response function, all variables in the VAR model converge to their equilibrium (towards0). It implies the stationary model. The response of trading volume to shock of stock returns does not exist for all periods. This result confirms what is found by the VAR model suggesting that there is no relationship between the stock returns and trading volume (See Figure 1).

FIGURE 1

Response to Cholesky One S.D. Innovations ± 2 S.E.

Response of RPMT to RPMT

Response of RPMT to TRPMT

Response of TRPMT to RPMT

Response of TRPMT to TRPMT

Causality Test

For this test, we consider whether a variation of the stock market returns is followed by a variation of the trading volume. It is the underlying idea of the test of causality in the sense of Granger (1969 and 1988). This test is based on the idea that the future may not cause the present or the past. Formally, if the prediction of the trading volume V_t, using returns past R_t, is more accurate than prediction without the use of these returns in terms of error variance ($\sigma^2 (V_t / \Omega_{t-1}) < \sigma^2 (V_t / \Omega_{t-1} - R_t)$, where Ω_t is the set of available information), then R_t cause V_t in the sense of Granger (See Table 2).

TABLE 2
CAUSALITY TESTES BETWEEN TRADING VOLUME AND STOCK RETURNS
PERIOD 1/4/1999- 7/10/016

	F-Statistic	P-value
RDTM does not Granger cause VM	0.38231	0.8260
VM does not Granger Cause RDTM	1.32305	0.5161

The p-value of the test that stock returns of market RDTM don't cause trading volume V_m is (p = 0.8260) more than the different p-values, so we reject the hypothesis that stock returns of market cause trading volume in the sense of Granger.

CONCLUSION

Overconfidence has been proposed as a viable explanation for several observed anomalies in securities markets. In this paper, we tested the hypothesis of Gervais and Odean (2001) that if investors are overconfident, they attribute market gains to their own ability to pick stocks, process the information

and trade more aggressively in subsequent periods. By performing Granger-causality tests of stock returns and trading volume of the Tunisian Stock Market, we find that high stock returns do not Granger-cause high trading volume. There is no relationship between the current transaction volume and delayed stock returns. The hypothesis of overconfidence is not empirically validated in Tunisian Stock Market.

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