Observation of the Disconnection between Real and Financial Spheres: The Case of the Tunisian Stock Market during the Period 1969-2008

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Abstract

The strong volatility that characterized financial markets all over the word, these last years, leaves to think the existence of a disparity between stock prices and their fundamental values, which gives us the presumption of a disconnection between the real sphere and the financial one (Binswanger (1999, 2000, 2004)). The purpose of this paper is to focus on this possible disconnection by using the cointegration tests, to detect a possible equilibrium relation between the stock exchange returns and the real economic activity growth (measured by the GDP). The period of study lies between 1969 and 2008, according to an annual frequency of two series: the **real yields** (Stock Market Index return) and of GDP growth rates (real economic sphere indicator). To settle on the dynamics of short and long term between the stock exchange returns and the GDP growth, we used the Vector Errors Correction Model (VECM). Our results corroborate the existence of the disconnection between the two financial and economic series.

Keywords: Stock market return, Financial bubbles, Real sphere

JEL classification: E30, E44, G10, G12

1. Introduction

Stock market prices fluctuations are certainly linked with economic ones, this fact was confirmed by the present financial and economic crisis of October 2008. Theoretically, stock price expectations are based on economic fundamentals. In a macroeconomic level, these anticipations depend largely on market expectation of future economic growth level. Indeed, financial market can be considered as a leading indicator of the economy. Consequently, stock price movement explanation must be held according to economic indicators' fluctuations.

The last few years have been characterized by several speculative accidents that have affected financial market all over the world. Many explanations based on fundamentals have been given essentially by Balke and Wohar (2001), Carlson and Sargent (1997), Heaton and Lucas (2000), Kopcke (1997), McGrattan and Prescott (2000). Contrarily, other authors like Binswanger (1999, 2000, 2004) and Shiller (2000), think that the stock price fluctuations can not be explained by fundamentals but they are the consequence of exogenous speculative bubbles or an irrational exuberance.

Binswanger (2000, 2004) studied the role of real activities in speculative accidents explanation in the case of American market. He found no evidence that real economy would explain these disorders. This finding - opposed to the classic learning of the actualized future cash flow approach considered by Fama (1990) as a reflection of the

real economy – lead Binswanger (2000, 2004) to explain this disconnection by the existence of speculative bubbles or fads.

Moreover, in order to determine if recent fluctuations exhibited by stock prices are governed by fundamentals, we must, according to Binswanger (2000, 2004) approach, analyze whether stock prices carry on significant information about real economy growth rate.

According to the future cash flow (dividend) actualization model, stock market prices must reflect investor's anticipations about future real economic activities. Consequently, fundamental value of a stock price will be equal to the actual value of future cash flows or dividends, witch are supposed to be generated by the firm's real economic activity. Therefore, future cash flows must reflect real economic activity apprehended according to Morck, Shleifer and Vishny (1990) and Shapiro (1988) by industrial production or GDP. These aggregates are considered by Choi, hauser and Kopecky (1999) as proxies of firm's earnings or profits.

However, we note that all over the world, major transactions are motivated by speculative intentions independently from fundamentals. This makes us think, *à priori*, that there is a disconnection between real and financial spheres.

The purpose of this paper is to give and explanation to this disconnection between economic and financial spheres and to detect a possible equilibrium relation between stock market returns and real economic activity growth apprehended by the GDP. In these conditions, this study will be organized as follows: second section explore the literature studying relationship between real and financial spheres. Section three presents our empirical methodology. Section four comments the results. Section five concludes.

2. Literature review

Several studies tried to find whether recent stock price fluctuation could be conducted by fundamentals. A first approach analyses the relationship between financial assets returns and economic growth level such as Binswanger's (2000).

By reference to the Discounted Cash Flow approach, stock prices must reflect investor's anticipations of the future economic growth level. Indeed, the fundamental value of a stock market must be equal to the future anticipated actualized dividends. These payments can so reflect the real growth level.

Morck, Shleifer, & Vishny (1990), Shapiro (1988) maintain that financial assets returns can be used as proxies for firm's earnings and so for economic growth. Binswanger's findings confirmed the strong classical relationship between financial assets returns and their consequences on the real economic growth level. Such relationship was often rejected in the eighties, where all estimations failed to find significant evidences.

This failure was concomitant to the submerging of speculative bubbles all over financial markets and stimulated the non fundamental approach.

Choi and al. (1999) have studied this relationship in the case of the G-7 countries during the period 1957-1996. They have found a significant relationship between financial assets returns and economic level growth for all countries except Italy.

However, this relationship was not the same in all the countries, especially in the case of the USA, where it was less significant compared to the rest of G-7 countries. This can be explained by the size of this economy significantly greater than the others. Then, because firms of those countries deal partially or totally abroad. Hence, investors do not include their national macroeconomic variables in their anticipations. For all these reasons, it seems that it is difficult to confirm this relationship in these countries. It would be more difficult to confirm it in the case of emerging economies.

After the Second World War, the United States has experienced two periods of strong growth in their stock market. The first period lasted from 1949 until the first half of the 60s, and coincided with a period of strong economic growth. At that time, economic research had no problem to demonstrate the relationship between economic and financial spheres, using asset pricing standard models, under which financial asset prices are determined through market fundamentals. However, the second growth period began in the 80s and demonstrated how it became difficult to verify that asset prices could still be determined by fundamentals.

If asset prices are determined by fundamentals, it will be possible to predict future economic activity. For example, Shapiro (1988) considers that the fundamental value of the in a company share will equal the present value of expected future dividends, which is simply a reflection of economic activity anticipated evolution, measured by GDP. Therefore, financial assets prices can be used to estimate the economic activity growth.

Since then, several studies have been engaged, to examine this relationship, such as Barro (1990), Chen (1991), Fama (1990), Lee (1992), Schwert (1990)…they have concluded that much annual and quarterly stock returns

fluctuations can be explained by the future estimations of real economic activity in the United States. Peiro (1996) confirmed these results in several industrialized economies, using changes in asset prices instead of yields. Furthermore, Domian and Louton (1997) have demonstrated the existence of an asymmetry in the predictability of economic growth through the stock returns. According to these authors, a negative stock return is followed by a decrease on a greater extent in the economic activity growth rate. In contrast, a low increase in the economic activity growth rate induces a positive change but in a greater extent of stock returns. These conclusions were also supported by Estrella and Mishkin (1996), who concluded that variations in stock returns are more effective in predicting recession economic cycles, including a horizon of three quarters of the year.

However, as Fama (1990) pointed, real activity change is not the only source of stock returns one. Indeed, there are three sources for this change: first, the market reaction to any anticipated cash flow based on GDP growth rate or industrial production (which is used as a proxy). Then, market reaction related to changes in the actualization rate, used to estimate the cah flow. Finally, the anticipated change in yields due to the change in time of the actualization rate. Indeed, Chen (1991), Fama (1990) consider that variations in expected returns are assumed to be estimated on the basis of variables such as dividend or interest rates spread.

Furthermore, Binswanger (2004) tested whether the classical relationship between the real and the financial sphere remains valid for a time horizon greater than the period of two years, which has been highlighted by previous research, especially during the period of recession that characterized the late 20th century. Indeed, all studies have focused on clearly distinct periods (1954-1986 Chen, Fama 1953-1987, 1947-1987 and Lee Schwert: 1889-1988). So, Binswanger (2004) chose a study period that ranges from 1953 to 1997. The author has confirmed the findings of Fama (1990) to the United States, noting that much of the variation in asset returns can be explained by the future value of anticipated or actual economic activity growth.

3. Methodology

With reference to Binswanger studies (2000, 2004) for the G7 countries, the analysis of the relationship between the real and the financial spheres can be done through the study of the relationship between the dividend yield rate and the real economic activity growth rate. In our test, we will initially study cointegration between dividend yield rate and real economic activity growth rate (GDP), then we will use the Vector Error Correction Model (VECM) to identify short and long run dynamics between the studied variables.

The disconnection between real and financial spheres has been confirmed in the American and G7 countries with Binswanger's study. Consequently, our analysis will be limited to the Tunisian context as an emerging country case.

The retained variables in our empirical analysis expressed in natural logarithm are the real stock returns rate (stock market index returns) and GDP growth rate (real economic sphere indicator), on an annual basis. The study period runs from 1969 until the year 2008.

[Insert Table 1 here]

The logarithm of price has a mean of 3.41 and a standard deviation of 0.46 with a fluctuation between a maximum of 4.21 and a minimum of 2.65. The GDP logarithm shows an average of 8.94 and a standard deviation of 1.24. The coefficient of symmetry (Skewness) and of flatness (kurtosis) are different from those of a normal distribution. The Jarque-Bera statistic cannot reject the hypothesis of a normal distribution for both series.

4. Highlighting the disconnection between the real and the financial sphere

4.1 Cointegration test

Before applying the cointegration test, it is wise to test first, the stationarity of the series. Our results based on the Phillips-Perron test, note the existence of a unit root in the series. So we deduce that both series are integrated of order one I (1) or stationary in first difference.

[Insert Table 2 here]

We conclude that the logarithm of prices is not stationary in level but stationary in first difference.

[Insert Table 3 here]

The GDP logarithm is not stationary in level but stationary in first difference. The cointegrating regression residue is not stationary at 5% level. Indeed, the t-Statistic for Phillips-Perron tests is equal to -1.688. The critical value, tabulated by MacKinnon (1991), is -3.3377 at the 5% level. Therefore, since the computed value exceeds the critical one (-1.688759> -3.3377), the null hypothesis of a cointegrating relationship is rejected at the 5% significance level, so the GDP logarithm and log prices are not Engle and Granger (1987)'s cointegrated.

The GDP logarithm, as the variable representing real economic activity, is not stationary in levels but stationary in first difference. Therefore, we can assume that the GDP logarithm is integrated of order one, that we note I (1). The real price logarithm is not stationary in level but stationary in first difference. Therefore, it is integrated of order one I (1).

The presence of unit root in log prices and real GDP is consistent with results obtained by Binswanger (2000, 2004a) in his studies on the most industrialized countries of G7.

The cointegration test between the two variables studied can be conducted either by the Johansen approach (1992, 1995), or through the two-stage test of Engle and Granger (1987). As part of our analysis, we apply the two cointegration tests of Johansen (1992, 1995) (Choi et al (1999), Kwon and Shin (1999) and Rapache (2001)) and Engle and Granger (1987) (Cheung and Ng (1998) and Jafari and Strauss (2000)).

The cointegration test under the Johansen (1992, 1995) uses a vector specification error correction introducing k lags as follows:

$$\Delta z_t = a + bd_t + \Pi z_{t-1} + \sum_{i=1}^{k-1} \Gamma_i \Delta z_{t-i} + \varepsilon_t \tag{1}$$

Where, z_t a vector of order (2×1) variables integrated of order one. The cointegration test in two stages test is based on estimating the following regression:

$$x_t = a + bp_t + \mu_t \tag{2}$$

$$\Delta \mu_t = c\mu_{t-1} + \sum_{i=1}^{k} d_i \Delta \mu_{t-i} + \theta_t \tag{3}$$

Where,

x_t and p_t respectively denote the logarithm of real activity and of the stock prices;

k is the number of lags included in the model;

μ_t and θ_t are error terms.

[Insert Table 3 here]

In the sense of Engle and Granger (1987), cointegration regression residuals are not stationary at the 5% significance level, but stationary at 10%. Therefore, the log GDP and the log prices are not cointegrated in the sense of Engle and Granger (1987) at 5%. To further refine our findings, it is convenient to refer to cointegration test in the sense of Johansen (1992, 1995); results are reported in the following table:

[Insert Table 4 here]

The trace test indicates the existence of one cointegration relationships between the logarithm of GDP and of prices. For a better understanding of the dynamics of short and long term variables studied, it is appropriate to apply the technique of error correction. These results demonstrate the disconnection between the sustainable real economy and the financial sphere in the short run, but in the long run, there is a balance between the real and the financial sphere. To further refine the econometric analysis between the real and the financial sphere, we apply a test that uses Vector Error Correction Model.

4.2 The Vector Error Correction Model

Initially introduced by Sargan (1964) and extended by Davidson et al (1978), the Vector Error Correction Model (VECM) allows modeling adjustments that lead to a long-run equilibrium situation. The VECM has cointegration relations built into the specification, so that it restricts the long-run behavior of the endogenous variables to converge to their cointegrating relationships while allowing short-run adjustment dynamics. The cointegration term is known as the *error correction* term, since the deviation from long-run equilibrium is corrected gradually through series of partial short-run adjustments. It consists on a dynamic model that incorporates simultaneously short and long term dynamics. More formally, for two cointegrated variables, Vector Error Correction Model (VECM) is presented as follows:

$$\Delta X_t = \gamma_1 z_{t-1} + \sum_i \beta_i \Delta X_{t-i} + \sum_j \delta_j \Delta Y_{t-j} + d_1(L)\varepsilon_{X_t} \tag{4}$$

$$\Delta Y_t = \gamma_2 z_{t-1} + \sum_i \alpha_i \Delta X_{t-i} + \sum_j \lambda_j \Delta Y_{t-j} + d_1(L)\varepsilon_{Y_t} \tag{5}$$

Where:

ε_{X_t} and ε_{Y_t}, are two white noises;

$z_t = X_t - aY_t$, designs the cointegration relation residue between X and Y.

The coefficients γ_i represent the retraction force to long term target, given by the cointegration relationship. We

must have $\gamma_i \prec 0$ for $i= 1$ and 2 and $|\gamma_1| + |\gamma_2| \neq 0$, otherwise there will be no mean reversion to equilibrium

behavior.

Given the two relations (5) and (6), the Vector Error Correction Model allows to integrate the short-term dynamics (represented by the variables in first difference) and the long-term dynamics (represented by the cointegration relationship residue). The application of Vector Error Correction Model to our variables leads to the following results:

[Insert Table 5 here]

The table shows the results of the Vector Error Correction Model. The number of time lags is determined using the *Akaike Information Criterion* (AIC). Thus, the lags are chosen such as to minimize AIC. The coefficients γ_i of retraction force to the long-term target in relations (5) and (6) are all under zero (-0.039530 and -0.023288). In addition, the absolute values sum of coefficients (0.023288 +0.039530) equals 0.062818. According to these results, there is a mean reversion to equilibrium behavior. A long-term imbalance between the real and the financial sphere are balanced so that both series have similar trends.

5. Conclusion

Our results confirm the existence of disconnection, at least in the short run, between the real and financial spheres. The two series (log (prices) and log (GDP)) are not stationary but cointegrated. The Vector Error Correction Model indicates that there is a strong reversion to the long-run target: in short run, the financial sphere is not supported by real basis. So we can argue the disconnection between the two spheres. Such disconnection leads us to conclude that Tunisian stock market is not efficient and that stock prices do not depend on economic fundamentals, but they are the consequence of a speculative investor's behavior. This conclusion corroborates that reported by Binswanger (2000, 2004a) in his studies on the United States and other most industrialized countries of the G7 group. It should be noted that this disconnection found between the real and the financial spheres, is the main argument which encouraged the emergence of speculative bubbles theory (Blanchard and Watson (1982) Fung (1999a, 1999b), Norden and Schaller (2002), Evans (1991) and Fukuta (1998)). These results lead us to wonder whether such a disconnection could indicate the existence of a speculative bubble in the Tunisian stock exchange market and so whether this bubble is rational or irrational. After the recent economic and financial crisis of October 2008, the question of the inadequacy between real and financial spheres has more and more interested researchers to find explanation of the crisis and to prevent a future occurrence of it. Moreover, the regulation theory has submerged in order to avoid excessive risk-taking and to reduce this disconnection between the two spheres. We suggest to pay more attention to these subjects and to drive reflections around this interesting and crucial purpose that is the imbalance between finance and real activities.

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Table 1. Descriptive statistics

	LOG(P)	LOG(GDP)
Mean	3.416855	8.945650
Median	3.268883	9.117495
Maximum	4.215515	10.55093
Minimum	2.656578	6.518040
Std. Dev.	0.462362	1.248231
Skewness	0.303178	-0.438138
Kurtosis	1.922803	1.956494
Jarque-Bera	2.546702	3.094603
Probability	0.279892	0.212821
Sum	136.6742	357.8260
Sum Sq. Dev.	8.337381	60.76513
Observations	40	40

Table 2. Testing for stationarity : log (P)

Log (P): level		Adj. t-Stat	Prob.*
Phillips-Perron test statistic		-0.830027	0.3499
Test critical values:	1% level	-2.625606	
	5% level	-1.949609	
	10% level	-1.611593	

Log (P): first difference		Adj. t-Stat	Prob.*
Phillips-Perron test statistic		-3.763909	0.0004
Test critical values:	1% level	-2.627238	
	5% level	-1.949856	
	10% level	-1.611469	

Testing for stationarity : log (GDP)

Log (GDP): level		Adj. t-Stat	Prob.*
Phillips-Perron test statistic		0.027411	0.9953
Test critical values:	1% level	-4.211868	
	5% level	-3.529758	
	10% level	-3.196411	

Log (GDP): first difference		Adj. t-Stat	Prob.*
Phillips-Perron test statistic		-7.259774	0.0000
Test critical values:	1% level	-4.219126	
	5% level	-3.533083	
	10% level	-3.198312	

Table 3. Testing for cointegration :The Engle-Granger test

LOG(GDP)= C(1) +C(2)*LOG(P)

Variable	Coefficient	Std. Error	t-Statistic	Prob.
C(1)	3.745350	0.735402	5.092932	0.0000
C(2)	1.824908	0.255850	7.132730	0.0000

R-squared	0.578951	Mean dependent var		8.907362
Adjusted R-squared	0.567572	S.D. dependent var		1.240495
S.E. of regression	0.815741	Akaike info criterion		2.480480
Sum squared resid	24.62102	Schwarz criterion		2.565791
Log likelihood	-46.36936	Hannan-Quinn criter.		2.511089
F-statistic	50.87584	Durbin-Watson stat		0.131437
Prob(F-statistic)	0.000000			

Testing for stationarity

Null Hypothesis: RESID01 has a unit root

		Adj. t-Stat	Prob.*
Phillips-Perron test statistic		-1.688759	0.0860
Test critical values:	1% level	-2.625606	
	5% level	-1.949609	
	10% level	-1.611593	

Table 4. Johansen Cointegration Test

Date: 03/18/10   Time: 11:18

Sample (adjusted): 1971 2008

Included observations: 38 after adjustments

Trend assumption: No deterministic trend (restricted constant)

Series: LOG(GDP) LOG(P)

Lags interval (in first differences): 1 to 1

Unrestricted Cointegration Rank Test (Trace)

Hypothesized No. of CE(s)	Eigenvalue	Trace Statistic	0.05 Critical Value	Prob.**
None *	0.564041	36.60469	20.26184	0.0001
At most 1	0.124599	5.056783	9.164546	0.2773

Trace test indicates 1 cointegrating eqn(s) at the 0.05 level

* denotes rejection of the hypothesis at the 0.05 level

**MacKinnon-Haug-Michelis (1999) p-values

Unrestricted Cointegration Rank Test (Maximum Eigenvalue)

Hypothesized No. of CE(s)	Eigenvalue	Max-Eigen Statistic	0.05 Critical Value	Prob.**
None *	0.564041	31.54791	15.89210	0.0001
At most 1	0.124599	5.056783	9.164546	0.2773

Max-eigenvalue test indicates 1 cointegrating eqn(s) at the 0.05 level

* denotes rejection of the hypothesis at the 0.05 level

**MacKinnon-Haug-Michelis (1999) p-values

Unrestricted Cointegrating Coefficients (normalized by b'*S11*b=I):

LOG(GDP)	LOG(P)	C
-0.811982	0.101766	9.572662
0.654177	2.883880	-15.80763

Unrestricted Adjustment Coefficients (alpha):

D(LOG(GDP))	0.043894	0.000129
D(LOG(P))	-0.012742	-0.050154

1 Cointegrating Equation(s):	Log likelihood	90.02147

Normalized cointegrating coefficients (standard error in parentheses)

LOG(GDP)	LOG(P)	C
1.000000	-0.125330	-11.78925
	(0.44692)	(1.41335)

Adjustment coefficients (standard error in parentheses)

D(LOG(GDP))	-0.035641
	(0.00530)
D(LOG(P))	0.010347
	(0.01956)

Table 5. Vector Error Correction estimation Output

Cointegrating Eq:	CointEq1	
LOG(GDP(-1))	1.000000	
LOG(P(-1))	-0.156095	
	(0.44586)	
	(-0.35010)	
C	-8.585932	

Error Correction:	D(LOG(GDP))	D(LOG(P))
CointEq1	-0.039530	-0.023288
	(0.01057)	(0.03969)
	(-3.73933)	(-0.58669)
D(LOG(GDP(-1)))	-0.175217	-0.403751
	(0.17086)	(0.64154)
	(-1.02550)	(-0.62934)
D(LOG(GDP(-2)))	0.098497	-0.038001
	(0.16753)	(0.62903)
	(0.58795)	(-0.06041)
D(LOG(P(-1)))	-0.009229	0.431900
	(0.04749)	(0.17832)
	(-0.19433)	(2.42200)
D(LOG(P(-2)))	0.015767	-0.143173
	(0.04754)	(0.17852)
	(0.33162)	(-0.80200)
C	0.109558	0.070691
	(0.02807)	(0.10538)
	(3.90354)	(0.67080)
R-squared	0.519055	0.170732
Adj. R-squared	0.441484	0.036979
Sum sq. resids	0.056167	0.791872
S.E. equation	0.042566	0.159826
F-statistic	6.691300	1.276471
Log likelihood	67.57073	18.61833
Akaike AIC	-3.328148	-0.682072
Schwarz SC	-3.066918	-0.420842
Mean dependent	0.101885	0.033121
S.D. dependent	0.056956	0.162865

Determinant resid covariance (dof adj.)		4.59E-05
Determinant resid covariance		3.22E-05
Log likelihood		86.32917
Akaike information criterion		-3.909685
Schwarz criterion		-3.300148