

# Perspective of The Relationship Between Stock Returns and Macroeconomic Indicators: Case of Tunisia

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## Abstract

First, we will be interested in the statistical properties of the data collected and especially stationarity. The test was used to identify the properties of the previously studied series is the test Adjusted Dickey Fuller (1981). Indeed, the first step is to study the stationarity of individual time series. In addition, they must be non-stationary as a necessary condition to implement causality tests. In a second step; we will choose the Johanson cointegration test to analyze the long-run equilibrium relationship between stock returns and different macroeconomic variables .In fact the cointegration relationships assume that all variables are integrated of the same order: the level integration will be achieved through the implementation of the ADF test .The third step is to test in a uni-frame varied the type of the relationship between the stock index (TUNINDEX) and the two-monetary and economic variables two and the direction and the sign of a possible causal relationship (if it exists). This type of tests are designed to test whether the economic and monetary activity predict stock returns or not. Finally; and in a final stage; we will try to decompose the variance of the forecast error in order to highlight the proportion related to each shock.

**Keywords:** Fellows Returns, Macro-Economic Indicators, Cointegration, Var, Causality, Variance Decomposition.

**Introduction:**

Among the major effects of globalization continues to increase persists at the interpenetration of financial markets and their potencies for emerging countries. This new regime has given some latitude to financial markets for an efficient way to respond to the various changes and broadcasts on the political, economic, social: this is a relevant technique for the different players in the financial market that are designed to revise their expectations and forecast stock prices. Indeed, the different economic and monetary indicators that can tell us about the economy are decisive to anticipate the prices of financial assets; therefore the presentation and publication of these indicators is a fundamental point during opening sessions of the award. To go further in this direction, several research studies have been conducted in this direction to develop better "theory of efficient capital markets": it is based on a main idea shows that the shares fully reflect all information available on the market but the question that arises at this stage, which was the subject of several studies; about the relationship between stock prices on the one hand and macroeconomic indicators on the other hand is it significant? The dynamics of the financial market will be determined on the basis of the answer to the question advanced before; otherwise it agit- an efficient market or not?

Also, another question may arise in this research framework towards better tested the questioning relationship: what are the economic and monetary variables that appear to have a significant impact (positive or negative) on share prices I need regular. !! Answering this question is very important in that the determination of the number of these macroeconomic factors and their natures can intervene in a relevant way in terms of investor expectations, especially with the birth of the model presented by APT ROSS in 1976. in fact, this model is mainly based on the choice of a small sample of the macroeconomic indicators considered most relevant in the context of assessing stock returns while trying to minimize the risk of having erroneous results. Began with several reforms-which form part of a structural adjustment plan, starting in 1989, the Tunisian stock market has become more able to grow and become more consolidated. This present work will aim to answer the following questions for the case of Tunisia: Does the macroeconomic factors that represent real economic activity trigger market activity? If so; that relationship may exist between stock returns and macroeconomic indicators?

**Literature Review:**

Is the financial development essential for economic growth? According to Schumpeter (1911), financial services are necessary for the promotion of economic growth to the extent that they improve productivity through technological innovation and identify entrepreneurs who have the best chance of a successful procedure innovation. Financial development also facilitate the mobilization of productive savings, efficient resource allocation, reduce information asymmetries and better risk management. All these elements can probably create a favorable macroeconomic framework for strong economic growth. Indeed, theoretical models of endogenous growth that take into account the financial shows that it would be a growth factor. Also, although the work of King and Levine (1993), Beck et al. (2000) and Levine et al. (2000) validate the results of endogenous growth models and show their big trend that financial development and economic growth are positively associated, some authors believe that the relationship between the two variables would be non-existent or even negative. One of the arguments advanced by these authors is that the instability linked to financial development penalize economic growth and destroy the positive effects of financial

development. The results of Kaminsky and Reinhardt (1998) and Demirgüç-kunt and Detragiache (1988) validate this assertion in that they find that financial instability would be positively associated with financial development. To this end, the question that remains is arbitrage between financial development and financial instability to ensure optimal growth. The work of Guillaumont and Kpodar (2004) and Loayza and Rancièrè (2004) take into account the financial instability in the analysis of the relationship between finance and growth.

As part of the abundance of economic information on the stock market, Fama (1981) explains the relationship between inflation and stock returns on the basis of rational expectations. A combination of money demand function and the quantitative theory of money provides an anticipated upward growth of real activity has a negative relationship with current inflation Fama (1981). Geske and Roll (1983) present tax policy and stipulate that stock returns and expected inflation are negatively associated because of a series of events. The conclusion is that usually comes stock returns vary inversely with actual inflation, the expected inflation and unexpected inflation. Reilly (1997) showed that inflation and stock returns are negatively correlated. However, Nelson (1976) points out that the forecast error in inflation leads to a negative stock market reaction. According to the advanced search by Geske and Roll (1983), the variable on unexpected inflation represents the variations in expected inflation. Studies of Nelson (1976), Jaffe and Mandelker (1976), Fama and Schwert (1977) justified the general finding that there is a negative relationship between stock prices and realized inflation, expected and unexpected. However, the negative relationship between stock prices and inflation is clearly reinforced by the study that relates to the case of the United States of Fama and Schwert (1977) on the one hand, and in case of Canada Cozier and Rahman on the other hand 1988. Both studies lead to the same result: that the stock returns present a strongly and significantly negatively related to expected inflation and in some measures, unexpected inflation. Moreover, the link between stock prices and the money supply was questioned by Sprinkel's work (1964), Palmer (1970), Keran (1971), Homa and Jaffe (1971), Reilly and Lewis (1971) and Malkiel and Quandt (1972), this research has highlighted two important conclusions: the money supply affect changes in the stock price and change in monetary variables lead changes in the stock price. Fama (1970.1991) proves the efficiency of conventional assumption is that all public information is integrated sufficiently quickly and without bias, at market prices to prevent the ordinary investor to profit.

The first American test-based monetary information, Sprinkel (1964), Homa and Jaffee (1971) show that the money supply fluctuations have an apparent normal effect on stock returns. Against by, subsequent tests Rozeff (1974) and Sorensen (1982) show the opposite. According Mookerjee (1987), some monetary aggregates, including M2 in Canada predict stock prices. In the same market, the study of Jeng et al (1990) indicates that the Canadian stock market is efficient compared to aggregates. However, Darrat (1998-1990), with quarterly and monthly data, finds the purse inefficient relative to the Canadian federal deficit, but it can not reject the hypothesis of no impact of lagged values of M1 on the stock performance. As for Ali and Hassan (1993) deficits of the State, as the monetary aggregates do not help to predict the movements of the TSE 300.

Chen, Roll and Ross (1986) found that industrial production affects stock returns. Friedman and Schwartz (1963) have shown that stock prices and real economic activity are positively correlated. Fama (1981) studied the correlation between stock returns and real activity It analyzes, first that the negative relationship between inflation and makes equity returns hides a negative relationship between inflation and real activity on one hand and a positive relationship between real activity and performance of the other actions. It uses the theory of

the demand for money and the quantity theory of money to explain the negative relationship between real activity and inflation. His reasoning is based initially on a simple application of the theory of money demand. The money supply in real terms is given by the nominal money supply adjusted for inflation. The demand for money increases with the expected real activity and decreases with nominal interest rates. Thus, the volatility of economic and monetary variables have a proportional impact on the volatility of stock returns; Such a result can be interpreted as a connection between the financial sphere and the real economy monetary sphere.

**Methodology and analysis techniques:**

First, we will be interested in the statistical properties of the data collected and especially stationarity. The test was used to identify the properties of the previously studied series is the test Adjusted Dickey Fuller (1981); Indeed, this first step is to study the stationarity of individual time series. In addition, they must be non-stationary as a necessary condition to implement causality tests. In a second step; we will choose the Johanson cointegration test to analyze the long-run equilibrium relationship between stock returns and different macroeconomic variables. In fact the cointegration relationships assume that all variables are integrated of the same order-level integration will be achieved through the implementation of the ADF-test. The third step is to test in a uni-frame varied the type of the relationship between the stock index (TUNINDEX index) and economic variables and monetarism- two by two, and the direction and sign of this causal relationship (if it exists). This type of tests are designed to test whether the economic and monetary activity predict stock returns or not. Finally; and in a final stage; we will try to decompose the variance of the forecast error in order to highlight the proportion related to each shock.

**Hypotheses:**

Our empirical investigation is based mainly around the following assumptions:

Hypothesis (1): stock returns are positively correlated with the monetary aggregates and measurement of industrial production.

Hypothesis (2): stock returns are negatively correlated with measures of inflation and the interest rate.

Hypothesis (3): Equity returns enable us to anticipate changes in various macroeconomic variables.

**Description of data:**

The data are represented mainly by two types of the series: the first is attached to the stock index TUNINDEX while the other series are reserved for the presentation of the Economic and Monetary comments: our research will be directed towards the context of Tunisia on a 15-year study period going from 1995 until 2010; this is the period for which the Tunisian stock market is characterized by a certain dynamic with a rate of more or less regular evolution.

- The Index of TUNINDEX:

To measure changes in market activity, the Tunisian financial authorities introduced an index that is designed to measure changes in the prices of listed securities, which indicates the level of the stock market. The TUNINDEX and Sector indices are indeed more weighted by market capitalization but by floating capitalization. This calculation method, already used by other major indices around the world, will ensure greater coherence between the market reality of companies and its translation in the indices.

- Measurements of different economic and monetary factors:

i. Measures of inflation:

About inflation; we keep the price index IPC consumption [it is consumption (base 100 in 1990)] and in the price index (PPI) [it is finished products (base 100 1990)].

ii. Measures of real economic activity:

In terms of real economic activity, we use only the monthly changes in the industrial production index (IPI) (base 100 in 1990).

iii. Measurements of rising commodity prices:

To measure monthly changes in prices of raw materials, we propose the index of industrial sales price (ISPI). In fact, this index can tell us about all the variations and changes in commodity prices.

iv. Measurements of changes in monetary policy:

To measure changes in monetary policy, we can consider the M1 and M2 aggregates expressed in million dinars (with monthly data). Indeed the choice of these two aggregates is taken-first-on the basis of work that has been developed in this sense that we find that they were considered as predictors of changes in share prices. Second, these two aggregates M2 can be particularly useful in order to create and manage a certain monetary policy.

v. The measurements of the different categories of interest rates used:

To specify the relationship between interest rates and stock market returns, we will examine two interest rate categories: either short term or long term. Furthermore, vis-à-vis the data on the rate of short-term interest, we will make use of the MMR (rates in the money market) as it represents ultimately a benchmark rate for banks in the fixation of their lending and deposit rates as well as when setting the nominal rate of the different issuers of corporate bonds.

MMR is as follows:

$$MMR = \frac{\sum_{i=1}^N WAR_i}{N} \quad (1)$$

Where  $WAR_i$ : weighted average rate on the day to day calculated from information collected on the money market.

This rate is defined as:

$$WAR_i = \frac{\sum_{i=1}^N m_i R_i}{\sum_{i=1}^N m_i} \quad (2)$$

$R_i$ : Amount of transactions daily.

$m_i$ : The rates that correspond to these transactions.

N: number of days of the month.

Similarly, we can retain another measure of short-term interest rates that can influence stock prices, this is in fact the rate of return on savings (RRS) which is pegged to the MMR (RRS = MMR - two points), while for the long-term interest rates, it is recommended to use the weighted Average Rate subscriptions to transferable treasury bills) that benefit from a life of five years.

#### Analytical techniques:

The results of the work were obtained using two econometric techniques which are: causality Granger (1969) and the co-integration technique Johanson (1991 and 1995) that will make object of our empirical investigation.

**Causality test Granger:**

Before developing the concept of causality, it is useful to highlight the concept of VAR modeling [Vector Autoregressive] since the technique of causality is ultimately a certain application to VAR modeling. Indeed a VAR model is a generation autoregressive models in a multivariate framework (usually bivariate as appropriate) .This type of modeling allows to conduct and apply the concept of causality; well understood that the VAR modeling approach requires each endogenous variable in a financial system as a set of lagged values of all other dependent variables. Based on these assumptions, a VAR (k variables and m offset) can be in this way one:

$$Y_t = D_1 Y_{t-1} + \dots + D_m Y_{t-m} + C X_t + \mu_t \quad (3)$$

Where  $Y_t$ : k is the vector of endogenous variables;

$X_t$ : Is the vector of exogenous variables;

$D_1, D_2, \dots, D_m$  And C: are matrices of coefficients to be estimated;

The optimal m delay is one that minimizes the Akaike criteria;

And  $\mu_t$ : is a vector of innovations.

Note that the error terms can be correlated to the current period when they are not for the past values (and all other variables in the equation system VAR) estimating different parameters can be obtained through the OLS technique.

As we mentioned before, the purpose of this empirical study is to apply the concept of causation on a VAR model which includes the stock index (the index TUNINDEX) and other macroeconomic indicators for economic activity and monetary. To do so, we distinguish the causal process that is to run the relationship between the stock index and economic indicators as well as the direction of causality (through the causality test Granger proposed by C.J. Granger (1969). in fact this type of test is to examine the direction of the causal relationship between the two factors-because the principle of this test is to determine if the past can cause / predict the future.

Take the case of a bi-varied VAR (two variables) in order to test the causality between two variables X and Y; are the following two equations:

$$X_t = \alpha_0 + \sum_{j=1}^{m_1} a_j Y_{t-j} + \sum_{j=1}^{m_2} b_j X_{t-j} + e_t \quad (4)$$

$$Y_t = \beta_0 + \sum_{j=1}^{m_3} c_j X_{t-j} + \sum_{j=1}^{m_4} d_j Y_{t-j} + \mu_t \quad (5)$$

Where: X: An economic variable "Economy" or money "monetary sphere."

Y: Changes in the stock index (The TUNINDEX) "financial sphere"

Regarding the first equation, the basic assumption is that the economic or monetary variable does not cause the stock index:  $H_1(X, Y): a_j \neq 0$ . While for the second equation, the null hypothesis postulates that economic or monetary variables do not cause market variable, so the past values of X do not explain the Y  $H_2(Y, X): c_j = 0$  values. This test is performed while comparing the Fisher statistic calculated with the tabulated (all times if  $F \leq F$  tabulated calculated, the null hypothesis is rejected).

**The technique of Cointegration: Method Johanson:**

A second approach is to establish a long-term equilibrium relationship between the Tunisian stock market and macroeconomic variables while using a cointegration analysis to prove whether there are interactions between variables. Indeed the notion of cointegration has



basic assumption that two or more series move together over time to achieve a long-term equilibrium: we can have a short-term horizon divergent evolution of variables but in the long term, we will have the forces that are to be reduced to a state of equilibrium. In this context of cointegration study, two analysis methods can be distinguished: the two-step method of Engel and Granger (1987) and the method of Johanson (1991 and 1995). As part of our empirical validation; we will use the method of Johanson of testing the restrictions on the cointegration vector autoregression (VAR). In addition term, Johanson technique (1988) allows us to estimate and test the long-term relationships between several non-stationary time series: this model is based on a vector error correction model (VECM) we can elucidate the behavior of variables with the same order of integration. Econometrically, the two series integrated of order one X and Y are said to be cointegrated if and only if there exists a unique linear combination of two variables shape  $Z_t = X_t - bY_t$  where b is a constant and  $Z_t$  balance error following a normal distribution centered and reduced: white noise. Two statistics that test the hypothesis of cointegration: Statistics and Statistical track of the maximum eigenvalue.

#### Interpretation of results and empirical validation:

Through several analysis techniques they have been presented at several research works to highlight the problem of the relationship between financial activity and those such real and monetary integration testing, cointegration, causality and variance decomposition analysis ... this empirical validation will be argued by the interpretations and subsequent analyzes.

#### Interpreting From Integration Tests (ADF):

Premium on board, the first step is to illustrate the results of the test dikey-Fuller Augmented (ADF) applied to different sets of observations recueilles before. In fact, it is necessary to study the characteristics of a stochastic series before processing while running the notion of stationarity through the ADF tests and examining the correlogram of the studied series. The study sets questioned (such as AM, CPI, IPI, ISPI, TI, TUNINDEX and MMR) is presented as follows:

Table [1]:

Stationarity test with trend (in level).

Variables	T -Calculé	T-Tabulé (1%)	T-Tabulé [5%]	T-Tabulé [10%]
TUNINDEX	-0,0640	-3,4648	-2,8765	-2,5748
IPC	-1,6155	-3,4907	-2,8879	-2,5809
IPI	-0,6262	-3,4963	-2,8903	-2,5821
IPVI	0,5222	-3,4851	-2,8854	-2,5795
TI	-0,9380	-3,4925	-2,8888	-2,5813
TMM	-0,6828	-3,4652	-2,8767	-2,5749
AM	1,6904	-3,4650	-2,8766	-2,5749

Table [2]:

*Stationarity Test ADF without trend (in level).*

<b>Variables</b>	<b>T-Calculé</b>	<b>T-Tabulé [1%]</b>	<b>T-Tabulé [5%]</b>	<b>T-Tabulé [10%]</b>
<b>TUNINDEX</b>	-10,8611	-4,0470	-3,4336	-3,1406
<b>IPC</b>	-10,2376	-4,0444	-3,4515	-3,1512
<b>IPI</b>	-8,0985	-4,0533	-3,4558	-3,1537
<b>IPVI</b>	-7,1328	-4,0356	-3,4473	-3,1487
<b>TI</b>	-10,2936	-4,0469	-3,4527	-3,1519
<b>TMM</b>	-6,1867	-4,0076	-3,4339	-3,1408
<b>AM</b>	-15,1442	-4,0073	-3,4337	-3,1407

We see that through the results and outcomes presented in the table (I) and (II) that all series that represent the different macroeconomic variables and stock index are non-stationary (whatever with or without trend) view that the basic assumption is accepted (presence of a unit root against the alternative hypothesis of a unit root Absence). In fact, while comparing the calculated values with those tabulated, we can easily deduce that all statistics calculated verify this finding for all thresholds (1%, 5% and 10%). Similarly, if we look at the source of non stationarity using the methodology of Box & Jinks, we note that the effect of the trend is not significant where the source of non stationarity is of type DS (non stationarity stochastic type). In order to stationnariser our process, we will apply the first difference and then we apply again the ADF test in first differences; the results of this test are depicted in the Tables (III) and (IV):

Table [3]:

*Stationarity Test ADF with trend (in difference).*

<b>Variables</b>	<b>T-Calculé</b>	<b>T-Tabulé [1%]</b>	<b>T-Tabulé [5%]</b>	<b>T-Tabulé [10%]</b>
<b>TUNINDEX</b>	-10,8775	-3,4648	-2,8765	-2,5748
<b>IPC</b>	-9,9850	-3,4913	-2,8881	-2,5810
<b>IPI</b>	-8,1333	-3,4977	-2,8909	-2,8528
<b>IPVI</b>	-7,0565	-3,4851	-2,8854	-2,5795
<b>TI</b>	-10,3314	-3,4931	-2,8889	-2,5814
<b>TMM</b>	-6,1722	-3,4652	-2,8767	-2,5749
<b>AM</b>	-14,8306	-3,4650	-2,8766	-2,5749

Table [4]:

*Stationarity test ADF without trend (in difference).*

<b>Variables</b>	<b>T-Calculé</b>	<b>T-Tabulé [1%]</b>	<b>T-Tabulé [5%]</b>	<b>T-Tabulé [10%]</b>
<b>TUNINDEX</b>	-10,8611	-4,0470	-3,4336	-3,1406
<b>IPC</b>	-10,2376	-4,0444	-3,4515	-3,1512
<b>IPI</b>	-8,0985	-4,0533	-3,4558	-3,1537
<b>IPVI</b>	-7,1328	-4,0356	-3,4473	-3,1487
<b>TI</b>	-10,2936	-4,0469	-3,4527	-3,1519
<b>TMM</b>	-6,1867	-4,0076	-3,4339	-3,1408
<b>AM</b>	-15,1442	-4,0073	-3,4337	-3,1407

When studying these tables, it rejects the basic assumption and therefore, we can say that the series became stationary after applying the first difference which leads us to suggest that



all processes are integrated of order unit (following our study will be based on the first differences of the series). After the implementation of the ADF test, we are now invited to identify cointegrating relationships between the different series: This is why we will make use of the Johansen test.

#### Interpretation from the cointegration relationships:

First, we are asked to determine the optimal number of delay of several structural equation modeling VAR (Vector Autoregressive) and this is only possible through the estimation of all models for an order going from zero up 'k (k is the number of maximum allowable delay by economic theory or the available data) .To determine the number of late model, we use the criteria of Akaike [AIC (p)] and Schwarz [SC (p)]; which are calculated as follows:

$$AIC(p) = L(n) \det(\Sigma) \left[ 1 + \frac{2k^2 p}{n} \right]$$

$$SC(p) = L(n) \det(\Sigma) \left[ 1 + \frac{k^2 p L(n)}{n} \right]$$

We distinguish the following results:

<b>AIC (1) = -42, 5783</b>	<b>SC (1) = -40, 9187</b>
<b>AIC (2) = -40, 6633</b>	<b>SC (2) = -37, 7723</b>
<b>AIC (3) = -39, 7653</b>	<b>SC (3) = -32, 2414</b>
<b>AIC (4) = -38, 2213</b>	<b>SC (4) = -27, 6615</b>
<b>AIC (5) = -36, 5432</b>	<b>SC (5) = -25, 1246</b>

Based on these results, we adopt a number of delay equal 1 when the VAR representation (1) shall be chosen. After identifying the nature of our model, it is useful to apply the Johansen cointegration test of setting the number of cointegration relations is therefore:

Table [5]:

*Cointegration test within the meaning of johanssen.*

Rang de la matrice	Valeurs propres	Statistique de la valeur Propre Max	Statistique de la trace
r=0	0,480558	66,812(4623)	211,5564(1256154)
r ≤1	0,386250	49,7930(40077)	144,7464(957536)
r ≤2	0,341853	42,6693(338768)	94,9532(698188)
r ≤3	0,203451	23,2015(275843)	52,2839(478561)
r ≤4	0,127434	13,9043(211316)	29,0823(297970)

We have stated before that the delay that will be used is of order 1 and that beyond that threshold; it is insignificant for the other variables; so we can consider the existence of four cointegration vectors (referring to the test track and the statistics of the maximum eigenvector is taking the first eigenvector because we hold the largest)

Our cointegration vector to be used is: **(1; -39.5147; -251567; 0.6546; 11.7899; -44.9297; 0.0831)**

These values indicate respectively the coefficients of TUNINDEX, TMM, TI, ISPI, IPI, CPI, AM. Our relationship presents itself:

**TUNINDEX = - 39, 5147 MMR - 25, 1567 TI + 0, 6546 ISPI 11, 7899 IPI - 44, 9297 IPC + 0.083 AM.**

Based on the determined results, we can suggest the existence of a long-term equilibrium relationship between the stock index (TUNINDEX) on one hand and other economic and

monetary factors on the other. Indeed, we find that the coefficients corresponding to the index of consumer prices is negative, which is consistent with the results of several research work in the direction to run the relationship between inflation and stock returns. We also include those developed by Chen, Roll and Ross in 1986 in the US financial market; Kaul in 1987..... Without Forgot course work and basic assumptions determined by Fisher in 1930. In this context, FAMA suggests an explanation linking any increase in expected economic activity with another increase in the level of trading volume and this will result in an increase in the real demand for money (in order to meet this increased volume accompanied by higher inflation rates: such a negative relationship between stock returns and inflation has been interpreted in the other more research as a proxy of the relationship between stock returns and real activity. For the co-integration relationship between stock index studied the one hand and the PII and the other ISPI, we note that the coefficients for the latter two factors are positive which brings us to reach a positive relationship significant that reflect a positive reaction of the financial market to all economic changes and mutations that affect the real sector. Such involvement has been well proven in the work of FAMA (1990) for the case of the United States and for the European stock markets (France, Germany, Switzerland ...) through the Research Nasseh and Strauss (2000).

Turning to the monetary sphere, unobstructed cointegration relationship postulates the existence of a positive relationship (either a positive coefficient: 0.0831) .We can explain this relationship that any increase in the level of supply of money must be necessarily accompanied by an increase in the level of liquidity in the financial market and this will lead to a development of stock returns. The Tunisian financial market check out this trick has since observed that following the increase in the money supply; we will have a positive effect on cash flows that are they reduce the negative impact of inflation and consequently have a positive evolution of the stock return. In this sense, FAMA in 1981 justified this relationship via the quantity theory of money in follow the following procedure: following an increase in real activity, we end up with an increase in the real demand for money and therefore the mass monetary increases which lead to an increase in market profitability. In a last, we are interested in the long-term equilibrium relationship between other monetary indicators (IR and MMR) and stock prices: in fact, we notice that it is considered negative for the coefficients for the two indicators already mentioned are negative (-39.514; -25.156.). It should be recalled in this regard that the main players in the Tunisian financial market are the banks that give great importance to the evolution of MMR. In fact, any MMR volatility will always cause a change in expectations on the part of banks to the amount of the money paid to the Central Bank of Tunisia; any time, insofar as the BCT's MMR while acting on liquidity in the interbank market and consequently stock prices react after these changes. Similarly, the change in interest rates is negative on stock prices since the various stakeholders in the financial market on the stock exchange will update their future cashes flows through this long-term rates while anticipating a positive change; stock prices will decline as the equity value will adjust to the downside.

#### **Interpretation of results from causality tests:**

We will consider at this stage of research to different macroeconomic variables that have a significant impact on the evolution of the stock index studied through the application of the causality test Granger (1988):

Table [6]:

*Causality test.*

F. Statistique	Variables	Probabilité
0,8014	TMM ne cause pas	0,07310
0,73385	TI ne cause pas	0,01974
0,78533	IPVI ne cause pas	0,37730
0,83531	IPI ne cause pas	0,07276
2,41483	IPC ne cause pas	0,09729
0,44813	AM ne cause pas	0,01079

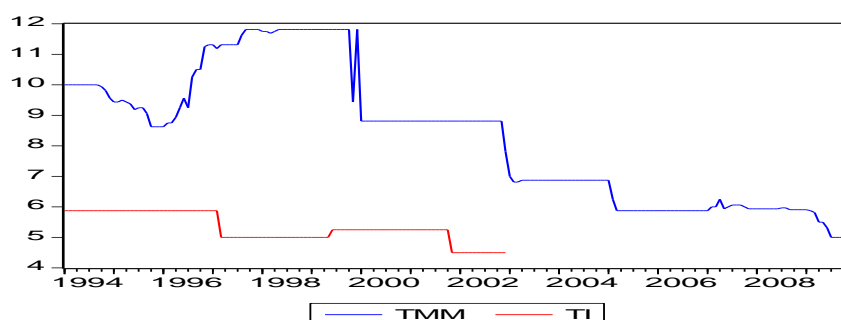
From the statistics, we reject the basic assumption for different significance levels for the following macroeconomic indicators: MMR, TI, CPI, PII and AM from which we can infer that only the latter factors that may have a significant impact on stock prices.

Premium on board, it should be noted that the various stakeholders in the financial market in Tunisia attached great importance to the CPI as a reliable indicator of inflation: it is for this reason that could lead to the identification a causal relationship between changes in the stock index and the percentage change for the index of consumer prices. In terms of companies that are considered among the active players in the financial market; we see a positive significant relationship reflecting the functioning of Tunisian companies while intervening in a direct way in the price valuation of listed shares. The existing relationship between the financial and monetary sphere was found significantly positive view that this causal relationship questioned verifies that the various monetary aggregates are tools and instruments for implementation of monetary policy with the state. Finally, in examining the relationship between the MMR (short-term interest rates) and IR (long-term interest rates) and TUNINDEX via causality test, we find that the impact of two early indicators (whatever long-term or short-term) is negative which is cohérent with economic reality and with reference to the work developed by several authors. We also note that all variations in the MMR (since this is short-term interest rates) will be transmitted in a systematic manner to other long-term interest rate (ie IR) which is confirmed by the graph (I).

From all the above, we can conclude that the stock index TUNINDEX is subject to several impacts of a basket of economic and monetary where each of these variables partially contribute to the observed variation in stock returns but the question that arises at this point is to know the magnitude of impact of each macroeconomic variable on the evolution of stock prices: it is for this reason that we complete our empirical study decompose variance Sholeski using the test to examine the impact and contribution of each indicator to the variance of the TUNINDEX.

#### Interpretation of results from the decomposition of the variance:

The decomposition of the variance of the forecast error aims to calculate for each of the innovations



contributing to the variance of the error [Table 7]. In fact, it seems that the variance of the TUNINDEX explained 75% of its own innovations and 25% of those of macroeconomic variables and we also note that the contribution of economic factors is compared to the factors currency (the real economy impact magnitude is equal to 4.5% against 20.5% in the monetary sphere). In a more detailed way, the contribution of monetary indicators MMR, IR, and AM is up 17.04%, respectively; 2.83% and 0.32%, which generates more importance to short-term interest rate as an explanatory variable in the face of any market evolution. The real sector represents just determinant of stock return since its contribution to the variance of the stock index is quite low (only 4.5%) under that following a shock in the economy is not accompanied by only 4% of the evolution of stock prices: this proposal is distributed on the CPI (3.55%), ISPI (0.6%) and PII (0.32%).

[Table 7]:

*Innovations contributing to the variance of the error.*

Period	S.E.	DTUNINDEX	DTMM	DTI	DIPI	DIPVI	DIPC	DAM
1	18.6950 8	100.0000	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000
2	28.2725 6	98.53608	0.164809	1.129950	0.019550	0.000484	0.052708	0.096416
3	34.7975 0	96.81413	1.034809	1.736809	0.012908	0.001319	0.290820	0.109209
4	39.3212 1	95.18630	2.278586	1.769274	0.037618	0.001038	0.531817	0.195367
5	42.5924 4	92.85454	4.122538	1.813765	0.099082	0.006574	0.849451	0.254052
6	45.1518 5	89.98613	6.337454	1.918607	0.160333	0.029821	1.276829	0.290826
7	47.3137 5	86.65739	8.861976	2.075746	0.210737	0.082112	1.801455	0.310579
8	49.2338 4	83.03502	11.53851	2.288054	0.252838	0.181496	2.384423	0.319655
9	51.0166 4	79.21347	14.29477	2.548200	0.288338	0.349590	2.982264	0.323372
10	52.7220 0	75.31190	17.04025	2.838341	0.321812	0.610327	3.551929	0.325443

### Conclusion:

And since then, there has been a considerable increase in trading activity in the financial market which prompted the Tunisian legislator to give more flexibility to the organization so that it meets international standards and all this will necessarily stimulate trading activity

towards broader investment horizons. In this context it is now looking for work in order to execute the relationship that may exist between stock returns and different macroeconomic variables while specifying the relative impact of each factor economic and monetary volatility of TUNINDEX.

The importance of this subject discussed in this article rooted in the history of financial thought the fact that he has always been a matter of debate and interpretation work theoretically and empirically .dropoff window Moreover; the financial literature is rich in interpretations and suggestions aimed in this direction of research to suggest a significant relationship between the monetary sphere and the real economy on one hand and the financial sector on the other to the extent that all work already developed some thoughts between economic information, money and measurement of financial assets since the expectations of the various players in the financial market are changing in an integral fashion after any changes and Publications macro ads - Economic what postulates the existence of a strong correlation between the various indicators put into question our work will try to validate this hypothesis, but the national level; case of Tunisia.

To examine how the Tunisian market will react to all changes in monetary and economic sphere, we will proceed initially to verify the existence of a long-term cointegration relationship between the variables that we considered them sample through the Johansen test. In fact this type of relationship is checked if all the series have the same order of integration. To do; we made use of tests of dikey - Fuller Augmented that have been applied to the series considered, and this has led us to identify the presence of a unit root which proposes that all observation series are non-stationary and integrated a unit order; for stationnariser was applied the first difference.

Johansen technique suggests through the results provided that the stock index TUNINDEX has a long-run equilibrium relationship with economic variables (CPI, IPI, ISPI) and monetary variables (AM; TMM; TI) which can cause an extension of this research work to clarify if these variables predict market activity or not. A second technique; which is the causality test Granger (1988); just in this direction to clarify the meaning of the causal relationship between the financial and the real. The resulting provided by this test proves the existence of a causal relationship only between the stock index and some other variables (such as AM; TMM; IT; IPC; IPI) which is in contradiction with the notion of efficiency of financial markets (EMH). This type of test does not determine the contribution of each factor in the variation of stock returns; so we considered this aspect by decomposing the variance via the test Shlosqui which allowed a significant contribution to extrapolate relationship in the variance of stock prices to economic factors such as inflation presented by CPI and IPI and especially monetary determinants (monetary aggregates, interest rates on the money market, long-term interest rates).

In conclusion, it should be noted the major contribution da monetary sphere in the observed volatility in stock prices relative to economic and this can be explained by the fact that the reaction of the Tunisian financial market is considered asymmetric economic information .From similarly; all macroeconomic announcements can be interpreted positively as they can be solved negatively. Furthermore, it seems important da treat behavior of investors in measuring their reactions vis-à-vis macroeconomic announcements as seems they are not treated well in the process of market errors, otherwise is- this-that the financial market mistakes can represent an investment opportunity to generate earnings?

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