




# “Quantitative relationship between corruption and development of the Tunisian stock market”

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# QUANTITATIVE RELATIONSHIP BETWEEN CORRUPTION AND DEVELOPMENT OF THE TUNISIAN STOCK MARKET

## Abstract

The aim of this article is to seek especially the impact of corruption on the bond and stock market development. For the methodology/approach, the authors analyze a sample of 20 listed Tunisian firms from the Stock Exchange and Financial market, covering the period from 2006 to 2016 by using pooling cross section techniques. The results find a significant positive effect of the level of corruption on the stock market index and the logarithm of capitalization. This is consistent with the view that corruption accelerates the economic growth by speeding up transactions and allowing private companies to overcome the inefficiencies imposed by the government. Furthermore, the results find a negative association is not significant with the dependent variable of traded value as a percentage of the number of listed companies.

## Keywords

corruption, stock market, Tunisia, economic growth

**JEL Classification** D73, G18

## INTRODUCTION

Many factors affecting stock market development in various countries have received a great deal of attention. Recently, a number of researches have examined the impact of corruption on stock market development. Bolgorian (2012), Jain et al. (2012), Lau et al. (2013), Shahbaz et al. (2013), Chene (2014), Peker et al. (2014), Tunčikienė and Drejeris (2015) are among them. However, Tunisia, the country which has experienced a political, social and economic revolution, has a little interest, given the impact of corruption on the stock market development.

The main aim of this study is to examine the effect of the corruption on the stock market development in Tunisia. So, the authors intend to answer the following question: How the corruption level affected the stock market development in Tunisia?

In fact, corruption, as a concept, has been several definitions; the concise and roughly precise definition is the misuse of public office in order to gain private benefit. Corruption around the world is believed to be endemic and pervasive and a significant contributor to weak economic growth, to stifle investment, to inhibit the provision of public services and to increase inequality to such an extent that international organizations like the World Bank have identified corruption as 'the single greatest obstacle to economic and social development' (Dreher et al., 2007).

Although corruption is a variable that cannot be measured directly, in recent years, some organizations have provided corruption indices across a wide range of countries to qualitatively assess the level of corruption. For instance, one of the most renowned indices is the Corruption Perception Index (CPI) published by Transparency International. This index is an aggregate indicator that classifies countries based on the degree of corruption to which it is perceived to exist among politicians and public authorities. Accordingly, many physicists have shown a considerable amount of interest in the study of macro and micro economic data assuming that trends in the past twenty years continue to hold in the future. Shao et al. (2011) found that after 30 years, both developing and developed EU countries will have comparable values of their per capita gross domestic product.

The study is structured as follows: Section one provides a brief literature review and hypotheses. Section two presents and explains the research methodology. Section three presents the sample and data. Section four discusses the research results. The last Section concludes the paper.

## 1. LITERATURE REVIEW AND HYPOTHESES

While there is a large consensus on the negative impact of corruption on the stock market development, some researchers continue to argue that corruption has a motive factor on stock market development; there are two competing approaches on how the corruption may affect the economic growth: that corruption was able to grease or to sand the wheel of economy.

Several researchers were interested in examining the relationship between the corruption and the macro and micro-economic factors. Some of these studies reported a negative aspect between the corruption and the factors of wealth of the country, as the GDP indicated that a higher level of the corruption thus implied a higher level of poverty (Podobnik et al., 2010; Shao et al., 2007).

Recently, a number of empirical studies examine the effects of the corruption on financial markets. In this context, the prices of assets are determined according to the future cash flows, thus, they are good measures to estimate the cost of corruption from the view point of the investors (Ciocchini et al., 2003; Lee et al., 2005).

Although there is a wide agreement throughout times on the negative impact of the corruption on the financial development, certain researchers keep supporting the idea that the corruption is an important factor for the financial development; in which there are two rival approaches on the way the corruption can affect the financial develop-

ment: the corruption favoring financial market development and the corruption as a disadvantaged element for the stock market development.

Theoretically, corruption cannot be inevitably a bad factor for the stock market development. The first studies find a positive effect of corruption on the stock market development (such as Leff, 1964; He, 1985). The theory pioneer, Leff (1964) declares that corruption works as the engine of the stock market development in the situation where the strict/ineffective regulations are forced by the government, because corruption "Enables the private agents to buy their way out of politically imposed inefficiencies". Ahlin and Pang (2008) assert that corruption raises the need for liquidity and so returns the more powerful financial improvements. Glass and Wu (2002) confirm that the effects of corruption on the IDE are ambiguous, "the corruption does not seem bad for the IDE, but even worse, she can encourage the entrance of the flows of IDE".

Shahbaz et al. (2013) examine the long-term relations between financial development, corruption and economic growth in Pakistan using the ARDL approach, they also apply the tests of co-integration and Granger causality to analyze the direction of causality between variable periods (1987–2009). They notice that an increase of corruption has a positive influence on the financial development. Corruption can have a positive influence on the stock market development because of its impact on the IDE, by acting as a "fat" by accelerating the transactions and by allowing the private enterprises to overcome regulations and

ineffective governmental institutions (Bardhan et al., 1997; Cuervo et al., 2008; Aidt et al., 2009).

Thus in this context, the corruption of countries may have a positive impact on the foreign investment attractiveness. Lau et al. (2013) support that the corruption helps companies to overcome the inefficiency of the economic system and decreases the uncertainty and can deal with positive performance. Oludele and Rano (2008) showed that the corruption has significantly a negative effect on the human resources and the employment, but that it has a positive impact on investment expenditure of the government. The authors also tested directly the relationship between corruption and economic growth and noticed that it is purely negative. So, this context leads us to formulate the following hypothesis that:

*H1: Corruption favors (or disadvantages) the financial market development.*

Also, Oak (2014) argues that corruption can surmount the bureaucratic and institutional weaknesses and “transplant wheels” of the economy in the strongly regulated countries, which have no governmental institutions and effective governance systems. Leff (1964), Huntington (1968), and He (1985) emphasize that the corruption has a positive effect on the economic growth: the corruption and essentially the “speed of the money” increase the economic system efficiency. The government will work better or more quickly with the “speed of money”, which will help to reduce transaction costs and to avoid the delays and the bureaucratic delays. So, this context leads to formulating the following hypothesis:

*H2: Corruption has a positive effect on the volume of transactions.*

A number of studies suggested that corruption has a negative impact on the stock market development. Mashal (2011) argues that the corruption plunders the economic growth by decreasing the competition on the domestic stock market, which was harmful for the efficiency of the state-owned and foreign companies. In addition, corruption causes more difficulties and more costly impact on foreign operations through licensing (Cuervo-Cazurra, 2008). Various studies

suggest an asymmetric impact of corruption on the development of the stock market based on the country’s development, that is emerging or developed. Rosa et al. (2010) showed that corruption has a negative effect on the productivity of the companies of the Central and Eastern European countries.

In the last decades, it became the subject of many learned works, because diverse fields came to recognize it (political, economic and social effects) (Berrios, 2010). Abdul Qadir and Yaroson (2013) indicated the function of certain macroeconomic variables and corruption in the prediction of the stock-exchange development in Nigeria covering the period 1998–2011. These authors noticed that corruption has a significant influence on the stock market development; the rate of rotation in percentage of the GDP used to test the liquidity of the market has a negative influence on the stock market and the real interest rate as well as the direct foreign investment and the value of shares negotiated to be significant in the determination of stock market development in Nigeria. Cherif and Gazadar (2010) examined the relation between the institutional indicators and the stock market development by means of the International Guide of the Country Risk (ICRG) to substitute the corruption. By using the data of 14 countries of the LED region for the period from 1990 till 2007 and by applying panel data and methods of instrumental variables, they notice that corruption and the market capitalization have a negative relationship.

Moreover, Yartey (2010) examines the impact of corruption as a part (party) of the institutional determiners on the development of the stock market by means of a panel data of 42 developing economies for the period from 1990 till 2004. Yartey (2010) finds a negative relationship between corruption and market capitalization. He also proves that the macroeconomic factors such as the level of income, the raw internal investment, the development of the banking sector, the private capital flows and the liquidity of stock markets are important determiners of the stock market development in emerging countries. To verify if there is a negative relationship between the level of corruption and the market capitalization, the following hypothesis is analyzed:

*H3: Corruption has a negative effect on the stock market capitalization.*

Lee and Ng (2006) have studied the effect of the quality of government and the governance of stock markets on the financial market development. In this study, the authors concluded that improved market governance improves capital market liquidity and capital market performance.

This instruction suggests an inopportune correlation between governance and risk. Otherwise, the performance of governance serves to minimize risk and chance. Therefore, in this regard, investors would propose a high rate of return on equities in poorly governed financial markets to support a higher risk.

A valid analysis and assessment of corporate governance and the growth of capital markets around the world was provided by Love (2010). Indeed, the results found suggest similarly that political stability and law enforcement, considered by a system of excellence, an appropriate investor defense and a low tendency to corruption, can support the capital market performance.

Moreover, Li and Filer (2007) conclude that countries that have improved the protection of property rights, balanced legal systems, tend to attract more equity investors. For example, Fan, Fui, and Zhao (2008) state that countries with weak and fragile governance have higher transaction costs and agency costs than countries with a good governance structure. Higher costs are a barrier to investors for investment, so bad government and bad governance has a negative impact on the performance of equity markets.

In the existing literature there are two arguments about corruption, while most researchers claim to say that corruption has a negative impact on the stock market. To confirm if there is a negative relationship between the level of corruption and the stock market index, the following hypothesis will be analyzed:

*H4: Corruption has a negative effect on the weight of listed firms in the stock market index.*

## 2. METHODOLOGY AND RESEARCH APPROACH

Recently, applying pooling data models is very popular in the field of finance and economy. The authors analyze the influence of corruption on the stock market development through the methodology of the panel data, due to the benefits it provides. After specifying the model the authors proceed to the SUR method. In the case of seemingly independent equations (the endogenous one is not explanatory of another), the method, which nevertheless wants to exploit the probable connection of the hazards of the different equations, is called the SUR method "Seemingly Unrelated Regressions" (Zellner, 1962). This methodology section includes the choice of the sample, the definition of variables and models of analysis, as well as the statistical methods applied.

## 3. SAMPLE AND DATA

To estimate the relationship between stock market development and corruption, the authors analyze a sample of 20 listed Tunisian companies, covering the period from 2006 to 2015 using pooling techniques. There was a balanced panel of 200 observations. All data are annual. Data specific to the company comes from the Financial Markets Council (FMC) and the Tunisia Stock Exchange. The financial risk index data come from the ICRG and the CPI obtained by Transparency International (TI).

### 3.1. Model and findings

The model to be estimated is as follows:

$$\begin{aligned} \text{Stock Market develop}_{i,t} &= \\ &= CPI_t + LIQUIDITY_{i,t} + Size_{i,t} + \\ &+ EFFICIENCY_{i,t} + others_{i,t} + \varepsilon_{i,t}. \end{aligned} \quad (1)$$

Thus, to test the effect of the corruption on the financial market development, the equations have been written separately below (Cherif & Gazadar, 2010; Bolgorian, 2011):

$$INDEX_{i,t} = CPI_t + TURNOVER_{i,t} + \\ +VALUE_{i,t} + EFFICIENCY_{i,t} + SPREAD_{i,t} + (2) \\ +YIELD_{i,t} + VOLUM_{i,t} + LOGCAB_{i,t} + \\ +SIZE_{i,t} + MCAB_{i,t} + \varepsilon_{i,t}.$$

$$LOGCAB_{i,t} = CPI_{i,t} + TURNOVER_{i,t} + \\ +VALUE_{i,t} + EFFICIENCY_{i,t} + SPREAD_{i,t} + (3) \\ +YIELD_{i,t} + VOLUM_{i,t} + INDEX_{i,t} + \\ +SIZE_{i,t} + MCAB_{i,t} + \varepsilon_{i,t}.$$

$$SIZE_{i,t} = CPI_{i,t} + TURNOVER_{i,t} + \\ +VALUE_{i,t} + EFFICIENCY_{i,t} + (4) \\ +SPREAD_{i,t} + YIELD_{i,t} + LOGCAB_{i,t} + \\ +INDEX_{i,t} + MCAB_{i,t} + \varepsilon_{i,t}.$$

**Table 1.** Definition of model variables

Source: Authors contribution.

Variable	Notation	Measures
<b>Dependent variable</b>		
Stock market index	INDEX	Index of the stock market
LOG capitalization market	LOGCAB	Domestic credit supplied by banking sector (% of GDP)
Traded value and number of listed companies listed ratio	SIZE	Logarithm of traded value and number of listed companies listed ratio
<b>Independent variables</b>		
Turnover ratio	TURNOVER	The total value of domestic shares
Traded value	VALUE	Traded divided by market capitalization
Stock market efficiency	EFFICIENCY	Total value traded as % of GDP
Spread	SPREAD	The price report of the year T + 1 and the data
Yield	Yield	The relationship between the range and the middle of the range was measured by difference between price in year T and year T – 1 plus dividend
Traded volume	VOLUME	Total volume of the traded as a percentage of GDP
Corruption	COR	Corruption index (COR) = 10 – CPI

## 4. RESULTS DISCUSSION

Table 2 analyzes the descriptive statistics for the authors sample of 20 listed Tunisian companies.

**Table 2.** Variable descriptive statistics

VARIABLE	Mean	Std. Dev.	Min.	Max.
INDEX	0.012	0.022	0.003	0.146
LOGCAB	7.718	0.646	4.096	9.378
SIZE	0.995	1.193	0.007	8.292
IPC	0.041	0.002	0.038	0.046
MCAB	2.173	3.835	0.0002	27.941
TURNNOV	0.384	1.251	0.001	15.349
VALUE/GDP	0.305	0.491	0.0002	5.041
VOLUME/GDP	0.042	0.088	0.00002	0.583
RANGE	0.086	0.170	0.001	1.213
RENDEM	0.994	0.474	-0.652	3.947
EFFICIENCY	0.324	0.616	0.007	8.292

Note: INDEX represents the weight of listed companies to stock market index in Tunisia (TUNINDEX); SIZE is the number of transactions to number of listed companies ratio; LOGCAB is the market capitalization logarithm; IPC is the index of perception of corruption; MCAB is the market capitalization to GDP ratio; TURNNOV is the value traded to market capitalization ratio; VALUE indicates total value traded to GDP ratio; VOLUME represents the volume traded to GDP ratio; SPREAD is the price range; EFFICIENCY is the hope of report of the securities price has T + 1 and any information.

Table 2 clearly shows a level of considerable variation in almost all the variables of the Tunisian financial market. This table presents the descriptive statistics of all the variables during the period of 2006 till 2016; the average, the value min and max of the weight of every company in the stock index is 0,012, 0,003 and 0,146, respectively. As can be seen in Table 2, CPI is the average value of 0.041 and the highest and the lowest values are 0.038 and 0.046, respectively. Generally, this case shows the efficiency (0.324) index is less developed stock market.

**Table 3.** Variable seemingly unrelated regression (three columns of MCO regression)

Regression	M1: Index (7)	M2: LOGCAB (8)	M3: SIZE (9)
Const.	(0.000)***	(0.000)***	(0.000)***
CPI	(0.094)* 0.895	(0.165) -14.524	(0.868) 2.863
TURNOVER	(0.039)** 0.0025	(0.000)*** -0.205	(0.000)*** 0.199
VALUE	(0.000)*** -0.022	(0.035)** -0.215	(0.000)*** 2.107
MCAB	(0.000)*** 0.003	(0.000)*** 0.081	(0.000)*** -0.151



**Table 3 (cont.).** Variable seemingly unrelated regression (three columns of MCO regression)

Regression	M1: Index (7)	M2: LOGCAB (8)	M3: SIZE (9)
SPREAD	(0.414) -0.008	(0.590) 0.111	(0.179) 0.452
REND	(0.445) 0.002	(0.796) -0.001	(0.964) 0.020
EFFICIENCY	(0.047)** -0.006	(0.000)** 0.291	(0.000)** -0.350
VOLUME	(0.424) -0.019	(0.016)** -1.142	—
INDEX	—	(0.000)** 5.558	(0.006)** 6.070
NBRE	(0.006)** 0.005	(0.000)** 0.170	—
LOGCAB	(0.000)** 0.014	—	(0.000)** 0.796
R2	0.393	0.721	0.633

Notes: INDEX represents the weight of listed companies to stock market index in Tunisia (TUNINDEX), SIZE is the number of transactions to number of listed companies ratio, LOGCAB is market capitalization logarithm, IPC is the index of perception of corruption, MCAB is the market capitalization to GDP ratio, TURNOVER is the value traded to market capitalization ratio, VALUE indicates total value traded to GDP ratio, VOLUME represents the volume traded to GDP, SPREAD is the measure of liquidity, EFFICIENCY is the hope of report of the securities price has T+1 and any information. R2 is the adjusted coefficient of determination; *P-values*: \*, \*\*, \*\*\* levels of significance at 1%, 5% and 10%, respectively.

The results are summarized in Table 3. Indeed, Columns (1), (2) and (3) report the results of three pooled MCO regressions. Table 3 presents the model to examine the effect of corruption on the development of the Tunisian stock market. The first dependent variable measures the weight of each firm in the sample selected in the stock market index (TUNINDEX). Next, column (2) measures the financial market development by the logarithm of market capitalization. Finally, column (3) examines this relationship by the number of transactions as a percentage of the number of listed companies.

In the first regression, the results are presented when including the variables of the basic model: corruption, turnover rate, transaction value expressed in GDP, transaction volume expressed in GDP, price range, market capitalization as a percentage of GDP, yield, efficiency, value traded (% of number of listed companies), and the logarithm of market capitalization of each listed company.

The results showed that the turnover rate, corruption, market capitalization (% GDP value traded, % of number of listed companies) and log of capitalization market have a positive and statistically significant effect on the stock market index. These results are coherent with the view of Matthew et al. (2009). These authors found a relationship between the market capitalization of a company in the stock market and its turnover is positive. Indeed, the higher the market capitalization of a company, the higher the funds available for the company and its turnover, *ceteris paribus*.

Thus, the transaction value expressed in GDP, efficiency has a negative and statistically significant effect on the stock market index. These results are confirmed by Leff (1964), Huntington (1968) and He (1985). Moreover, there is a positive effect of yield and a negative effect of spread and volume traded but statistically not significant on the stock market index.

Moreover, in column (2), the logarithm of market capitalization is used as a proxy for the stock market development. So, the same regression (1) is integrated and the stock market index is added as an explanatory variable. The results showed that the corruption and yield have a negative effect on market capitalization. These results are incoherent with the view of Matthew et al. (2009). However, there is a positive statistically insignificant effect of traded value and volume expressed in GDP and turnover rate on the market capitalization logarithm. These results are coherent with the view of Matthew et al. (2009). These authors affirmed the idea that a high market capitalization available to a firm in a particular year, probably due to a good dividend history, which leads to an increase in the price index, will most probably further result in an increase in the company's turnover in the coming year.

The efficiency and spread have a positive but statistically not significant effect on the stock market development. This result was confirmed by the works of Yartey (2010); Cherif and Gazadar (2010) found a negative relationship between corruption and market capitalization.

As a result, in column (3), the traded value was tested as a percentage of number of listed compa-

nies as a proxy for the stock market development. So, the same regression (1) is integrated and the logarithm of market capitalization is added as an explanatory variable.

The results show that corruption has a positive but statistically insignificant effect. Thus, a positive and statistically significant effect is found of turnover ratio, valued traded ratio, stock market index and the market capitalization logarithm on the financial market development.

The result is coherent with Hu et al. (1997), Zhao and Lehn (2003).

Obviously, the results of the regressions are very impressive, with an  $R^2$  between 0.393 and 0.721. Corruption has a positive and statistically significant effect on the stock market index at the 10% level. In addition, corruption has a negative but statistically not significant effect on the logarithm of market capitalization and the value traded and number of listed companies ratio.

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## CONCLUSION

This study examines the influence of corruption on the stock market development, by concentrating exclusively on Tunisia. This article provides empirical evidence concerning the effect of corruption on the financial market development in Tunisia, where the CPI of Transparency International is the measure of corruption. The stock market development was measured by three indicators such as: the weight of listed companies in the stock market index (TUNINDEX), stock market capitalization logarithm and the traded value as a percentage of number of listed companies.

The econometric analysis of this relation shows that the level of corruption in Tunisia is positively associated with the stock market index that confirms the opinion of previous numerous studies, namely Leff et al. (1964), Huntington et al. (1997), Egger et al. (2009) that the corruption greases the wheel of the financial development. However, the corruption had a negative effect on the market capitalization logarithm and number of transactions in percentage of listed companies.

This confirms the view of several other researchers, such as Yartey (2010), Sherif and Gazadar (2010). However, in the countries where the corruption is low, the investors are inclined to participate in “remote” transactions within a stock exchange or within a financial market, convinced that the legal and statutory surveillance will protect suitably their interests. In the countries where the corruption was raised, the trust of the investors was lacking, and the financial transactions were biased towards a culture “interview” of the private transactions.

Leaving these considerations, the stock market capitalization should be correlated negatively in the measure of the corruption index (Transparency International Corruption Perceptions Index). As regards Tunisia, the measure often criticized by the corruption based on the public perceptions, the CPI, can actually explain the considerable variations of the stock market capitalization and the stock market index and the number of listed companies during the period studied, in which Tunisia knows several changes and reforms on all the levels.

This result asks about the argumentation, which recommends avoiding the use of the measure of corruption based on the perceptions in the empirical analysis. Given the reserved empirical results obtained from other studies applied to various savings, it seems that the relationship between corruption and financial market does not take necessarily a similar form in the various savings at some point.

In contrast, it should be highlighted that despite the scarcity of data, the relationship between corruption and financial market development of Tunisia is statistically significant and strong against modifications of the models and specifications. Finally, it is advisable to note that the main element, which complicates the empirical study of the relation between corruption and financial market development, is the fact that both sides of this relation are described by various rival measures.



Consequently, the future researches should pay more attention to the nature of the differences between the various types of measures, in particular those of the corruption, until a specific measure of corruption shows itself superior. The choice measure of corruption will stay an empirical question. The future researches should also try to widen the sample covering a longer period, and the use of the other variables that requires a better access to the economic and financial data for Tunisia.

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