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Impact of Tunisian Revolution on the Relationship Between Macroeconomic Factors and Mutual Funds Performance

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Abstract

This paper aims first at determining the different macroeconomic factors that explain the variability of Tunisian mutual funds (UCITS) returns in the period of 2006 - 2016. Second, the paper tries to determine the effect of the Tunisian revolution on the relationship between the studied macroeconomic factors and returns of these investment funds. To this end, we will compare the impact of these variables on returns during the pre- and post-revolution period. The results show that all the macroeconomic factors significantly explain the variation of Tunisian UCITS funds returns. Moreover, the results reveal that the revolution has a significant impact on the relationship between our macroeconomic factors and returns. We also found that the impact of macroeconomic variables on UCITS funds returns, before and after 2011, is not the same. These findings may bear on the political, security, social, and economic instability that has been observed in Tunisia since 2011 and which has significantly influenced the studied macroeconomic factors.

Keywords: Macroeconomic Factors, Arbitrage Pricing Theory, Regression Analysis, Revolution

1. Introduction

Modern financial theory recommends the intelligent allocation of financial assets to be in line with the risk that the investor is willing to take. This theory assumes that movements of stock prices are very sensitive to the evolution of systematic state variables. The modern financial theory argues that systematic variables are the primary source of risk, in that over the long term, financial returns should reflect the evolution of these variables. These systematic risk factors are often conditioned by economic conditions.

Nevertheless, not all professionals and financiers agree on these factors as constituting financial assets pricing models. It is under this perspective that a large number of researchers have focused on determining why returns vary. Accordingly, a huge financial literature has been developed focusing more specifically on the relationship between exogenous variables, specifically macroeconomic indicators, and stock market returns (Cherif and Gazdar

(2010), Raza et al. (2015), Nisha (2015), Barakat et al. (2016), Ulah et al. (2017), Khan and Khan (2018) and Akbar et al. (2018)). However, despite the panoply of studies examining the effect of macroeconomic variables on stock prices, there is a gap in the literature on the relationship between macroeconomic variables and Tunisian UCITS funds. This latter gap motivated us to contribute to the literature in this area.

Then, our aim is to examine the relationship between macroeconomic variables and the returns of Tunisian UCITS funds during the 2006 to 2016 period. Specifically, we try to determine the relevant macroeconomic factors that explain the variation of Tunisian UCITS returns. Second, we try to determine the impact of the 2011 Tunisian revolution on the relationship between these macroeconomic factors and the returns of Tunisian UCITS funds. The expected results will be useful for investors for two main reasons. First, they can help them bring to the table the best-enlightened investment strategies. Second, determining risk factors will help these investors to estimate returns of assets and funds and to make the most appropriate decisions.

The rest of this paper is structured as follows: section 2 reviews the literature and presents the relationship between these macroeconomic variables and stock returns; Section 3 presents our methodology in terms of sample, models and the used empirical tests; Section 4 reports the results and discusses the relationship between the macroeconomic factors and returns of Tunisian UCITS funds before and after the 2011 revolution; Section 5 concludes the paper.

2. Literature Review:

In the late 1970s, Ross developed an alternative multifactorial model called Arbitrage Pricing Theory (APT). This model was developed to minimize total risk by using macroeconomic variables. It refers to two basic hypotheses. The first hypothesis assumes no arbitrage opportunity. The second hypothesis assumes that it is possible to model the expected profitability of stock by a linear function linking the different macroeconomic or fundamental factors, weighted according to their impact on the stock by a specific beta coefficient. It should be noted that the main difficulty about the use of APT remains the origin and choice of factors. For this reason, APT suggests that understanding the macroeconomic context is essential for investors to make efficient investment decisions. Hence, the criticism to this model is its inability to determine the nature of the risk factors that bear on stock returns.

As a result of the limitations of and the multiple criticisms to APT, advanced research agreed that the factors that affect stock market performance are fundamental and macroeconomic factors. These multi-factorial pricing models are different versions of the APT theory.

To obtain better estimates of risk premiums associated with beta and market anomalies, macroeconomic variables were introduced into performance measures. Chen et al. (1986) are the first to study the impact of macroeconomic models on the returns of US stocks. Their study has had a profound influence, particularly the choice of macroeconomic factors. These authors show that fluctuations in stock market returns are logical responses to changes in systemic economic and financial factors. As a result, financial compensation for holding a risky asset depends on the degree of exposure of that asset to macroeconomic risks. The approach of Chen et al. (1986) consists first of all in identifying the macroeconomic variables likely to have a systemic influence on returns, then in estimating the APT of these variables using monthly data. Chen et al. (1986) conclude that macroeconomic factors like industrial production, changes in future interest rates, changes in expected inflation, unexpected inflation and changes in risk premium correlate with high-risk premiums that significantly explain stock returns. On the other hand, they find that the index of oil price and the market index haven't overall effect on asset pricing. Some researchers added other variables to the Chen et al. 's model. For example, examining the Japanese market, Hamao (1988) added two variables to the Chen et al. 's model. These are investor confidence and the exchange rate. Applying the APT method, the author found that only change in unexpected inflation, default risk premium, and interest rate have a significant effect on the Japanese stock market.

It should be mentioned that the impact of macroeconomic variables on stock market returns is not the same in all countries. According to Drake et al. (2006), there are variables that perfectly explain variation in returns in a range of developed countries and which are not significant in developing countries. Such a difference may be justified

by the fact that most developing countries do not have a well-functioning stock market. Moreover, in these markets, transaction costs are high, while transactions and information are less transparent.

Pilinkus and Boguslauskas (2009) used the APT model to study the Lithuanian stock market. They examined the relationship between the stock market index and 40 macroeconomic variables in order to check whether the chosen macroeconomic variables can explain significantly stock market returns in Lithuania. Unlike Chen et al. (1986), the authors use Granger causality tests to highlight the causal link between these variables. Their results show that only some variables, like GDP (gross domestic product), foreign direct investment and net exports, perfectly explain the change in stock market returns. However, Cherif and Gazdar (2010) examined the macroeconomic variables of 14 Middle Eastern and North African countries. They found that savings rates, banking sector development, and market liquidity have a positive impact on stock market development, while interest rates have a negative impact on stock market development. They also found that the relationship between the inflation rate and stock market returns is not significant in the MENA region, particularly in Tunisia.

Moreover, Raza et al. (2015) studied the impact of some economic variables on the Pakistani stock market between 1976 and 2011. Using a Panel regression, they found that income, savings rate, and liquidity positively affected the stock market. Barakat et al. (2016) examined the relationship between the stock market and macroeconomic variables in Egypt and Tunisia over the January 1998 to January 2014 period. Their results point to a close relationship between the stock market and the different macroeconomic variables, like exchange rate, money supply, and interest rate.

Ulah et al. (2017), examining the 2005-2015 period, show that macroeconomic variables, like exchange rate, foreign exchange reserve, and interest rate, have a significant impact on the stock market returns of South Asian countries (SAARC). However, they showed that inflation has no effect on the stock markets of the same countries. Kwofie and Ansah (2018) used the autoregressive distributed lag (ARDL) cointegration technique and the error correction parameterization of the ARDL model for examining the effect of from January 2000 to December 2013 exchange rate and inflation on stock market returns in Ghana. Their work showed a significant relationship between Ghana Stock Exchange returns and inflation only in the long term. However, their work also presented a significant long- and short-run relationship between stock market returns and exchange rate.

Jeat and Hassan (2019) focused on the relationship between the Malaysian stock market and the interest rate, exchange rate, and money at the period of 2012-2016. They found that the stock market is affected by these three factors but at a different degree. The most influential factor was the exchange rate as the Malaysian Ringgit is decreased in value, transfer the panic to the local market.

Some studies focused on the relationship between a single macroeconomic variable and stock market returns. For example, Fama (1981) identifies the inflation rate as a factor that could affect market returns. They stipulate that an increase in inflation rate negatively affects stock market activity. On the other hand, some authors like Boudoukh and Richardson (1993) examined this relationship in the short and long term. Their results point to a negative relationship between inflation rate and short-term stock returns, but in the long term, this relationship tends to become positive.

There is another trend of research that has focused on the effect of exchange rate on stock market returns. Cho et al. (2016) relate the exchange rate to stock market returns. According to these authors, exchange rate fluctuations affect stock prices because of their influence on cash flow and the international competitiveness of companies, as well as on capital flows both internal and external.

Examining the Indian market, Rafay et al. (2014) found a unidirectional relationship between exchange rate and the Indian stock index. Although much of the literature focuses on a one-way relationship between stock prices and exchange rates, other more recent research, like that of Chkili and Nguyen (2014), admit the joint endogeneity of these two variables.

3. Data and Econometric Methodology

3.1. Study Period

Our study focuses on the Tunisian stock market, in particular, the monthly returns of Tunisian UCITS observed during the February 2006 to December 2016 period. Observations are monthly data on net asset values of Tunisian UCITS funds, collected from the Financial Market Council¹.

It should be remembered that the Tunisian stock market has been recently affected by several shocks. On the one hand, the Tunisian uprising of January 2011 caused a decrease of (-12.74%) in the TUNINDEX index, which induced a considerable loss of confidence and a climate of uncertainty that loomed over the stock market and the entire financial and economic sphere. On the other hand, after the uprising, the country went through a period of difficult political transition, followed by very intense economic conditions and insecurity shocks like terrorism, political assassinations, and social upheavals. These shocks considerably affected the TUNINDEX index, which, after each shock, witnessed sudden falls.

The 2011 and 2016 period is then marked by several disruptions and shocks for the Tunisian stock market, encouraging us to take a closer look at it and compare it to the period preceding January 2011.

During the observation period, the number of mixed UCITS funds in activity is variable, because each year, new similar investment funds are created and others went bankrupt. In order to avoid survival bias problems, and to build up our database, we eliminated all UCITS created after February 2006 and those who disappeared or were overtaken during the study period. Hence, the final sample consists of 22 mixed UCITS funds.

3.2. Methodology

We were inspired by Chen et al. (1986) and Nisha (2015) then selecting the macroeconomic variables that bear on stock market activity. The choice of macroeconomic variables is motivated by two important reasons. First, these variables are commonly used in the literature to examine the theoretical relationships between the stock market and economic activity (Chen et al., 1986, Pilinkus and Boguslauskas, 2009, Nisha, 2015, Barakat et al. 2016 and Akbar 2018.). Second, the data of these variables are available in a monthly frequency either in the Central Bank of Tunisia or in the National Institute of Statistics records.

3.2.1. Regression Model

A regression is used to study the effect of the selected variables on the returns of the 22 Tunisian mixed UCITS funds. The regression equation is a multi-channel function, whose goal is to estimate the 9 beta (β) of 22 UCITS funds observed during 11 consecutive years (2006-2016).

The time-series regression model is as follows:

$$R_{it} = \alpha_i + \beta_{TCM} MIP_t + \beta_{TA} AIP_t + \beta_{INF} INF_t + \beta_{TERM} TERM_t + \beta_{PV} MISP_t + \beta_{MM} MMR + \beta_{TCE} MLBE_t + \beta_S USDTUND_t + \beta_{TUN} TUNINDEX_t + \varepsilon_{it} \quad (1)$$

with $t = \text{February 2006, ..., December 2015}$; $i = 1, \dots, 119$;

Where α_i is a constant term. β_{TCM} , β_{TA} , β_{INF} , β_{TERM} , β_{PV} , β_{TCE} , β_S , β_{TUN} are successively the sensitivity coefficients of macroeconomic factors. ε_{it} is an idiosyncratic error term. The measurements of selected macroeconomic factors are listed in Table 1.

¹ <https://www.cmf.tn/>

Table 1. Macroeconomics variables

Symbol	Factors	Measurement
MIP AIP	Monthly growth rate of industrial production Annual growth rate of industrial production	$\log(PI_t) - \log(PI_{t-12})$ $\log(PI_t) - \log(PI_{t-12})$ IP: index of industrial production.
TERM	Term structure of interest rates	$BTLT_{10t} - TRE_{t-1}$ BTLT _{10t} is the weighted average monthly rate of 10-year treasury bills.
INF	Inflation rate	$\log(IPC_t) - \log(IPC_{t-1})$ IPC: the consumer price index
MMR	Money market interest rate	$MM_t - INF_t$
MLBE	Monthly growth rate of loans granted by banks to the economy	$\log\left(\frac{LE_t}{LE_{t-1}}\right)$ LE: loans granted banks to the economy
MISP	Monthly growth rate of the industrial selling price index	$(ISP_t - ISP_{t-1}) / ISP_{t-1}$ ISP :the industrial selling price index
USD/TND	Exchange rate	$\log\left(\frac{TC_t}{TC_{t-1}}\right)$

4. Interpretation of results:

4.1. Data analysis

Table 2 presents the average monthly returns of the 22 Tunisian mixed funds, and the macroeconomic variables are positive. The results show that the variable (TERM), which represents future interest rates, has a high average of (346%).

The variable (USDTND) has a low average of 0.1%. This factor varies between -1.9% and 0.7% throughout the study period. The average of the other 20 funds does not exceed 5%, and their variances do not exceed 6% except for the variable (TERM).

The Skewness coefficient of the average returns of the UCITS (Ri) is small but positive with a value greater than zero, indicating that the distribution is skewed to the right, while the Skewness coefficient of most macroeconomic variables is negative, indicating that the distribution is skewed to the left.

Nevertheless, the Kurtosis coefficient of all the variables (in particular Rit, MIP, AIP, TCMIP, and TUNINDEX) is greater than 3, which means that the distribution is leptokurtic. As for the variables with a Kurtosis coefficient less than 3, like INF, MLBE, and USDTND, the distribution is platykurtic.

Table 2. Descriptive statistics of macroeconomic variables and Tunisian UCITS returns

Variables	Average	Variance	Min	Max	Skewness	Kurtosis
Rit	0,00285	0,0224	-0,1361	0,1479	0,0092	7,445
MIP	0,005012	0,0561	-0,1674	0,1472	-0,9134	3,768
AIP	0,0202	0,0543	-0,1457	0,15019	-0,1389	3,582
INF	0,0448	0,00988	0,02193	0,0696	-0,1919	2,175

TERM	3,465	0,5977	2,169	4,2	-0,8476	3,015
MMR	0,0424	0,0065	0,02367	0,0548	-0,633	3,015
MISP	0,0036	0,00605	-0,0193	0,02874	0,3087	6,465
MLBE	0,008431	0,00585	-0,0044	0,02302	0,1566	2,6022
USDTND	0,001518	0,00797	-0,01927	0,0248	0,3279	-0,34
TUNINDEX	0,010038	0,0394	-0,1329	0,1001	-0,3406	4,2512

Note: this table reports the descriptive statistics of the average monthly returns of the 22 Tunisian mixed UCITS and of the 9 macroeconomic variables between 2005 and 2015.

4.2. Correlation matrix

In order to check dependency between the variables and UCITS funds returns at the same time, we make recourse to correlation analysis.

Table 2. Correlation analysis of macroeconomic variables with the performance of Tunisian UCITS: Appendix 2

Variables	Rit	MIP	AIP	INF	TERM	MMR	MISP	MLBE	USDTND	TUNINDEX
Rit	1									
MIP	-0,0422	1								
AIP	0,0657	0,1993	1							
INF	-0,051	-0,013	0,0848	1						
TERM	0,0861	-0,1124	-0,0039	-0,1125	1					
MMR	-0,0477	-0,036	0,1535	-0,2112	-0,4269	1				
MISP	-0,0054	0,029	0,2289	0,0828	-0,0905	0,0827	1			
MLBE	0,0198	0,0009	0,0639	-0,1256	0,1676	-0,0307	0,23	1		
USDTND	-0,0143	-0,0046	-0,0187	0,1636	-0,123	-0,081	0,2452	0,1142	1	
TUNINDEX	0,3665	-0,062	0,1032	-0,0536	0,1021	0,0043	0,0335	-0,0257	-0,0375	1

In Table 3, there are some variables that positively (but weakly) correlate with UCITS funds returns. These are monthly industrial production growth rate, savings return rate, credits growth rate, and the benchmark Tunis Stock Exchange index.

The TUNINDEX is the most correlated variable with UCITS funds returns, with a coefficient of (0.3665). Since the correlation coefficient is less than 0.5, this relationship between the returns and the TUNINDEX variables is still low. The positive correlation between UCITS funds returns and the TUNINDEX is predictable, as many of the stocks held by the UCITS are quoted in the TUNINDEX. All the correlation coefficients of the macroeconomic factors are less than 0.79, which means that there is no multicollinearity problem.

4.3. Regression results

In order to take into account the specificity of the stock market and the Tunisian economy, we added some variables to the model of Chen et al. (1986), like exchange rate (USDTND), the credits monthly growth rate granted by banks to the economy (MLBE) and the TUNINDEX returns. The results on the effect of our variables are reported in Tables 4 and 5.

Table 4. Descriptive statistics

	R ²	Prob-F	F-Fisher
Before the Tunisian revolution	0,3314	0	70,92
After the Tunisian revolution	0,0612	0	9,33
The whole period (2006-2015)	0,142	0	48,09

Note: This table presents the coefficient of determination R², the associated probability, and F-Fisher of the time-series regression for 22 mixed Tunisian UCITS between February 2005 and December 2016.

In Table 4, the significance of the model over the entire period is observed as Fisher's statistic is high (48.09), and so is its associated probability (0.000) of less than 5%.

The studied nine independent variables explain 14.2% of the variability of UCITS funds returns, as indicated by the coefficient of determination R² over the entire study period. Before the revolution, exogenous variables account for 33.14% of UCITS returns. However, after the revolution, these variables decreasingly explain 6.12%. Hence, the model's fit before January 2011 is more robust than after January 2011.

This means that after the revolution, some macroeconomic variables become, to some extent, unable to explain returns. This result can be explained by several reasons. The first reason is political, security, and social instability. In fact, political instability as a result of the political transition process, the impact of the unstable situation in Libya and the security threats and terrorist attacks that Tunisia has experienced, threw the country into uncertainty. The second reason is the disruptions that have extremely affected economic activity (mainly trade union demands). This has disrupted industrial production and the export of goods and services in all key sectors. These disruptions have also affected the functioning of several public and private firms and institutions. More specifically, this has affected companies' profitability and competitiveness, which is reflected in stock prices, and eventually in the stock market performance as a whole.

Table 5 reports the results of the estimation of the model's parameters of the macroeconomic factors, after running the time-series regression of the 22 mixed UCITS funds. We note that before the revolution, the macroeconomic variables MIP, AIP, TERM, USDTND, and TUNINDEX are significant, as they perfectly explain the variation of Tunisian mixed UCITS returns.

Before the revolution, the variables most significant at the 1% level are: the monthly growth rate and the industrial production growth rate (MIP), (AIP), future interest rates (TERM) and the stock market index (TUNINDEX). The monthly industrial production growth rate (MIP) has a negative and statistically significant effect on Tunisian UCITS funds returns. This can be translated by a 1% increase in the (MIP) rate, which generates an average decrease in Tunisian UCITS returns by 6%. After the revolution, this rate became insignificant. It is assumed that this negative relationship (before the revolution) is a result of the small number of industrial firms held by UCITS or listed on the stock market. This is because most of the industrial firms in Tunisia are small and medium-sized enterprises. This is being said, and the (MIP) rate does not represent the growth rate of all industrial firms in Tunisia.

Table5. Time-series regression of the macroeconomic variables before and after the revolution

	Before the Tunisian revolution		After the Tunisian revolution		The whole period (2006-2016)	
	β	t	β	t	β	t
MIP	-0,0653 **	0	-0,0133	0,299	-0,01249	0,098

AIP	0,0241**	0,009	-0,074**	0	0,02173**	0,008
INF	0,0746	0,328	0,1808*	0,018	-0,10103*	0,024
TERM	0,011**	0,001	-0,0057**	0	0,000442	0,624
MMR	0,2092	0,163	-0,786**	0	-0,2048**	0,006
MISP	-0,0578	0,549	-0,0595	0,645	-0,09505	0,195
MLBE	0,0447	0,619	0,619**	0	0,0822	0,266
USDTND	0,125*	0,035	-0,221*	0,027	0,02134	0,694
TUNINDEX	0,306**	0	0,244	0,123	0,01173**	0

Note: This table presents the following time-series regression: $R_{it} = \alpha_i + \beta_{MIP} MIP_t + \beta_{AIP} AIP_t + \beta_{INF} INF_t + \beta_{TERM} TERM_t + \beta_{sp} MISP_t + \beta_{LBE} MLBE_t + \beta_s USDTUND_t + \beta_{TUN} TUNINDEX_t + \varepsilon_t$ for each of our 22 reference portfolios. The significance of the coefficients is denoted by *: significant at the 5% level; **: significant at the 1% level.

As for the annual industrial production growth rate (AIP), it has a positive impact on UCITS returns before the revolution. In our opinion, this result reflects the reality of the Tunisian economy. As it is well known that industrial production is the driving engine of economic activity and growth in Tunisia, an increase in this rate implies an increase in growth factors such as investment, savings, and exportation. Consequently, this increase implies an increase in financial returns and of course, UCITS returns.

On the other hand, the variable (AIP) has a negative impact on Tunisian UCITS returns after the revolution. In our view, it seems that after the 2011 revolution, our results reflect a decline in industrial production in the country (due to several constraints such as trade unions' strikes). This decrease forced companies to reinvest their capital gains or place new investments in the stock market or in UCITS. The reason seems to be diversifying investments in other sectors for fear of replacing these funds into the company, as confidence in the economic system is strongly felt by investors. As a result, UCITS returns saw an increase.

We notice that the annual industrial production growth rate (AIP) has a significant effect, unlike the monthly rate. This result is expected because, on the one hand, the impact of industrial activity on the stock market or on the investment fund industry is not immediate, as is often the case with other independent variables. On the other hand, the pace of production of Tunisian companies is an annual output.

Before the revolution, future interest rates (TERM) positively correlate with UCITS returns, whereas after the revolution, they negatively correlate with these returns. Our post-revolution results are consistent with the conclusions of Modigliani (1971), who indicate that when the (TERM) rate decreases, it is obvious that deposit accounts (bank ...) no longer offer an attractive remuneration, which drives savings away from deposit accounts and channels them into the stock market at the expense of banks. Hence the increase in stock prices.

As for the variable (MMR), which is the reference rate that is the closest to the real interest rate, it changed after the revolution, scoring a significant effect. We also note that this variable negatively correlates with Tunisian UCITS returns. As noted above, if the (MMR) decreases, then deposit accounts no longer offer attractive remuneration, which will drive savings out of the deposit accounts and channel them into the stock market at the expense of banks and vice versa. As a result, returns on assets (and mutual funds) have increased significantly.

In addition to the variables (TERM) (MMR), the variable (MLBE) also correlates with the banking sector. It has a positive impact on UCITS returns. This is true after the revolution, as this variable is not significant before the revolution with ($t = 61.9\%$). Being positively correlated with the variable (MMR) (in Table 4), a change in (MLBE) has an effect similar to that of the interest rate on UCITS returns. We assume that when banks grant more loans to companies, this leads them to increase their investments, then invest the generated profits in UCITS or directly on the stock exchange, hence the increase in returns.

Another variable that has a very significant (at the 1% level) and a positive effect on Tunisian UCITS returns before the revolution is the TUNINDEX index growth rate. In other words, an increase in the TUNINDEX by 1% leads to an increase of 30.6% in UCITS returns. It seems to us then that this variable has a significant effect on UCITS returns before the revolution because UCITS invested in most listed companies. However, after the revolution, the relationship between UCITS returns and TUNINDEX is insignificant, as UCITS invested indifferently in unlisted companies and listed companies. One can assume that after the Tunisian revolution, banks, being the main managers of the UCITS, heavily gambled on the TUNINDEX, making its correlation with returns no longer real.

Moreover, the variable that has an effect on UCITS returns significantly at the 5% level is the exchange rate (USDTND). We notice that the effect among these variables varies over time. Prior to January 2011, an increase of this variable by 1% has a positive effect on UCITS returns, which in turn increased by 12.5%. Conversely, after January 2011, this variable has a negative effect on UCITS returns. Hence, an increase of 1% leads to a decrease in UCITS returns by 22.1%.

Tentatively, we also assume that after the revolution, the negative relationship between the USDTND and UCITS returns is explained by two main reasons: on the one hand, by the abnormal and rapid devaluation of the dinar and, on the other hand, by an increase of imports onto the Tunisian market. More specifically, when imports increased, and foreign currency rate (USD / TND) increased too, this has had a negative impact on the returns of importing companies and necessarily on Tunisian UCITS returns. These latter are represented inter alia by importing and exporting companies.

As for Inflation Rate (INF), the results show that before January 2011, this variable has a very low effect. We can even say that this variable is not significant since ($t = 32.8$) is quite high. These results confirm the results of Cherif and Gazdar (2010) on the non-significance of inflation in determining stock market returns in the MENA region and in particular in Tunisia.

In our opinion, before the revolution inflation rate was stable, or we can even say that inflation does not exist. Hence, the reason why this variable is not statistically significant. However, after January 2011, the variable (INF) becomes significant as the inflation rate increased sharply, thus making Tunisian UCITS returns variable. In addition, we found that the sensitivity coefficient of this variable increased ($\beta_{INF} = 0,18$), which means that it positively correlates with Tunisian UCITS returns. The only variable in our model that is not significant before and after January 2011 is the selling price index growth rate (MISP).

5. Conclusion

In order to examine the impact of the Tunisian revolution on the relationship between macroeconomic variables and Tunisian UCITS funds returns before and after the revolution, we applied empirical models and tests inspired by the work of Chen et al. (1986) and Nisha (2015). We drew several conclusions. First of all, we found that Tunisian UCITS returns are not affected uniquely by market risk, but rather by macroeconomic factors. The macroeconomic factors that significantly explain the variation of Tunisian UCITS funds returns are: the monthly growth rate and the annual industrial production growth rate, inflation, future interest rate, and the monthly exchange rate change and the TUNINDEX. We found that the impact of macroeconomic variables on UCITS returns, before and after 2011, is not the same, as significance is lost. Some variables, like (MIP) and (TUNINDEX), significantly explain Tunisian UCITS returns before the revolution and no longer do so after the revolution.

We also found that before the revolution other variables, like (AIP), (TERM) and (USD/TND), had a positive impact on UCITS returns, while after the revolution this relationship became negative. In addition, we found that there are a number of variables (INF, MMR, and MLBE), that were insignificant before 2011, which became later significant. This means that after the revolution, these variables perfectly explain variation in stock market returns. We conclude that each of the studied variables affects UCITS funds returns with a different degree. Finally, we also found that the revolution has a considerable effect on the relationship between the macroeconomic variables and Tunisian UCITS funds returns. This result can be explained by several reasons: indeed, Tunisia evolves in a context of deep changes, which touch upon the social, political, and economic fabric of the country. This is coupled with the international constraints, increasingly observed after globalization and the country's openness to its external environment. Accordingly, political, security, and social instability had a decisive impact on the variation of macroeconomic factors. In addition, it is the turbulent economic activity, including the production and export of goods and services in all key sectors, that affected variables such as industrial production, selling price index, and exchange rate. All this together ultimately affects directly or indirectly profitability of companies and their competitiveness, which will subsequently bear on stock prices, and eventually on UCITS funds returns.

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