The impact of oil prices on economic activity in administrated price structure: the case of Tunisia

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The Impact of Oil Prices On Economic Activity in Administered Price Structure: the case of Tunisia

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Abstract

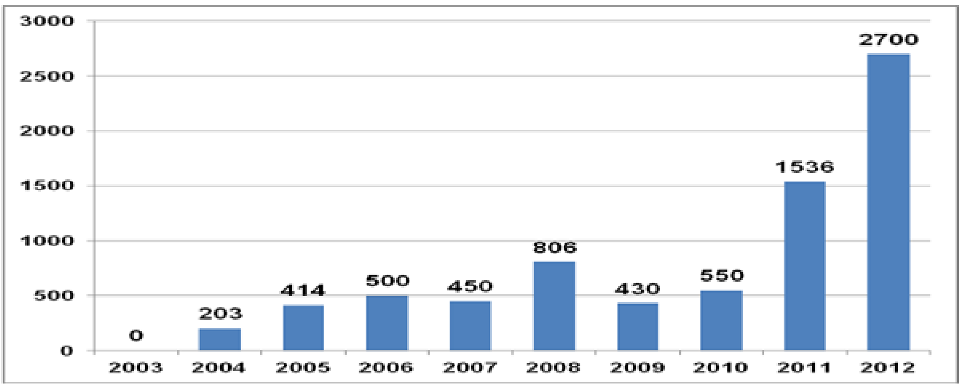
This article has for a core objective the handling of the established relation between oil price variation and certain macroeconomic variables, in this particular case GDP, RMM, CPI, Ex-factory price. The study in Tunisia is based on quarterly and monthly data from the period going from 2000 to 2011 revealed three important facts. First, it showed at the level of the quarterly analysis that the Tunisian authority succeeded in limiting the effect of crude oil price shock, it was approved through an impulse analysis of the dynamic responses, a second important result was revealed at the level of the quarterly analysis and the established long-term relation which showed that the GDP or the industrial production positively and significantly depend on Brent oil price and on the inflation in a structure of administered price. Second at the level of the monthly analysis, the conducted study allowed us to identify the nature of inflation, which is said to the production cost through introducing a new variable which is ex-factory price. Third, the conducted study allowed us to study the asymmetric relation between Brent oil price and the monetary mechanism in an administered price regime.

Keywords: Macroeconomics; oil prices, inflation, asymmetry

1 Introduction

In a context of high and volatile oil prices, the question of inflation sprung into the scene as a supreme requirement of macroeconomic balances stability. In this respect, the Tunisian State which has adopted an administered price regime, for a long time, since its burden of hydrocarbons compensations has spectacularly increased during the post revolutionary period. Such orientation makes us wonder about the performance of this intervention in price stability conservation and its impact on the growth.

Figure 1: Evolution of the burden of hydrocarbon subsidies (in Million Dinars)



According to data extracted from the National Agency for Energy Control

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Nevertheless, the theoretical and empirical consolidations of the Tunisian economy require bringing an adapted study methodology bearing in mind that the empirical link between the behavior of the economic activity and oil price shocks is highly studied in the regimes adopting a flexible pricing structure. However, very few economists have asked themselves this question for the countries adopting a structure of administered pricing.

It is within this general framework of ideas, that this work is elaborated with the objective of studying the mechanism through which oil price affects the economic activity within a structure of administered pricing such as Tunisia, figuring out the measure to which oil price shocks can influence the pricing structure and the inflation through introducing the ex-factory prices and finally studying the reaction of the monetary policy facing price shocks.

To conclude this work, we have opted for 4 distinct stages of decomposition. First, we are going to define oil prices specifications which are going to be used as shocks or oil price measure. The second stage shall be dedicated to the empirical study relative to the objective. The third part is the discussion and finally the conclusion.

2 Literature review

In the literature, several studies have tried to explain the propagation mechanisms of oil price shocks and to suggest several paths to contain them, a number of studies have studied the channels through which oil price shocks are transmitted in the economic activity, including the role of the monetary policy. Other studies have examined the possibility of an asymmetric relation between oil price fluctuations and the global economic activity. Henceforth, the underlying problem in oil price shocks consists in the analysis of the channels through which oil price shocks are transmitted in the real sphere (the economic activity) as well as in the monetary sphere (inflation).

Realizing that the oil market is subject to significant speculation and high price volatility, the theoretical studies have concluded that oil price shocks can have a negative impact on the economy, not only because of price increase, but also because of their volatility[1] (Ferderer, 1996; Lee, Ni and Ratti, 1995). Nevertheless, the impact of oil price varies from one country to the other; this is due to many variables mainly their sector compositions, their relative subsidies of oil resources (importer, net importer, exporter or net exporter) and also the diversity of their fiscal structures. In this context J. Cunado and F.P de Gracia (2003) have associated oil price volatility with the industrial production and the inflation, in a vector autoregressive model, covering six European countries. The authors have concluded that oil prices have permanent effects on inflation; however they have asymmetric effects on production growth rate. Furthermore, the authors have noticed significant differences between the countries' responses to the said shocks. In the same vein, the same authors J. Cunado and F.P de Gracia (2005) have proved the existence of an asymmetric relation between oil prices and the macroeconomic variables in certain Asian countries. The cross-country comparison shows diversity at the level of efficiency as well as at the level of energy costs. Kumarjit Mandal and al (2012) have studied the dynamic effect of oil prices uncertainty on the macroeconomic activities in Malaysia by examining the way the central bank of Malaysia reacted to the shocks emanating from oil price uncertainty.

With the objective of getting closer to the Tunisian context, we are going to review the works realized on the economies sharing some similar characteristics with the Tunisian economy (small economies, energy balance, geographical location, price structure etc.). We start by the case of an energy producing small economy. In this context, Troy Lorde (2009) empirically examines the macroeconomic effects of oil price fluctuations in Trinidad and Tobago. They have generally noticed that oil price is a major determiner of the country's economic activity. Concerning the macroeconomic evaluation of dismantling of Administered Pricing Mechanism (APM) of oil products on the inflation, Kumarjit Mandal and al (2012) have concluded that the vulnerability of the inflation in India (an administered regime) is more and more increasing, in return they have recorded a moderate impact on the industrial production. This is due to the evolution of the economic structure (energetic intensity). For the case of a Mediterranean

[1] In order to measure it, Ferderer (1996) has used standard deviation as a volatility index, whereas Lee, Ni and Ratti (1995) have created three new oil price variables starting from a Generalized Autoregressive Conditional Heteroskedasticity (GARCH) model which are; standardized oil price shocks as well as the positive and the negative parts of this variable. Lee and all have concluded that oil price has asymmetric effects given that, only the variable of the positive standardized shocks is statistically significant.

country, Luis J Alvarez Samuel Hurtado, Isabel Sanchez and Carlos Thomas have assessed the impact of oil price variations particularly on inflation and on consumer prices variation in the Euro zone. They have found that the inflationary effect of oil prices evolution in both economies is limited; even if crude oil prices fluctuations are important engines for inflation variability. The impact on the Spanish inflation is a little higher than in the Euro zone. In both economies, the direct effects have increased in the last decade, which reflects the part of household spending increase on refined oil products, whereas the indirect and second round effects seem to be diminishing.

3 Measuring Oil-Price

In order to achieve a perfect empirical work, one question is worth asking: what oil price shall we use? The answer to this question is a priori complex, since it is multidimensional; indeed, the national prices of oil products are subject to major tax component and exchange rate variations and are closely linked to the fluctuation in international barrel price, what exposes us to two senior choices. Thereby, a major part of the empirical literature which analyzes the effect of oil crises in various economies uses the world crude oil price in US dollar as a common indicator of the world market disturbances which affect all the countries (see, for example, Burbidge and Harrison, 1984), The second part of authors use the real price of crude oil converted into the national currency of each country (Mork and all (1994) and (2001) for the countries of the OECD and the Asian countries).

In the case of Tunisia, which is considered a small economy and can only be a price taker, its monetary policy aims at the stability of money value internally (general level of the prices) and externally (exchange rate). We have chosen Brent price as a reference through which, we shall define several linear and non-linear specifications of price or oil crisis which will be later used in the empirical analysis.

$$\triangle brent_t = ln(brent_t) - ln(brent_{(t-1)}) \tag{1}$$

It is the first log difference of real oil price. The Brent price is chosen because the Tunisian market is related to the European markets where the Brent is the reference.

$$VBP = max(0, \triangle brent_t) \tag{2}$$
$$VBN = min(0, \triangle brent_t) \tag{3}$$

We differently deal with oil price increases and decreases, i.e., we separate oil price changes between negative and positive variation in a thesis stating that oil price increases can have a significant effect on macroeconomic variables, although this is not valid for oil price decreases.

We moreover compose two other variables of net oil price increases and decreases based on Hamilton (1996). For the variable of net increases (decreases), if the observed energy price in a given month is superior (inferior) to the maximum (minimum) recorded price during the previous observations, we calculate the growth rate compared to this maximum (minimum). Contrariwise, if oil price in the month "t" is inferior (superior) to the observed price during the previous observations, the variable takes the value 0. These variables are defined as follows:

$$VBP4 = max[0, ln(brent_t) - ln(max(brent_{(t-12)}, ..., brent_{(t-42)}))] \tag{4}$$
$$VBN4 = min[0, ln(brent_t) - ln(min(brent_{(t-12)}, ..., brent_{(t-42)}))] \tag{5}$$

The last asymmetric measure of oil price is proposed by Lee, Ni and Ratti (1995). Based on the fact that the predictive capacity of oil price shocks on the macroeconomic variables decreases as the data are updated. Lee, Ni and Ratti (1995) similarly invoke volatility argument by asserting that a change in oil price is more likely to have a significant impact in a situation where oil price is stable than in an environment where oil price variations are frequent and irregular.

Only innovations on oil price which have an amplitude superior to the average innovations variance during the recent period are recorded. Besides, their weight is stronger than the increase which is considerable compared with the contemporary variance of oil price development.

$\triangle brent_t = \alpha + \sum_{j=1}^{k} \beta_j brent_{(t-j)} + \varepsilon_t, \varepsilon_t / I_t \mapsto N(0, h_t)$

$$h_t = \gamma_0 + \gamma_1 \varepsilon^2_{(t-1)} + \gamma_2 h_{(t-1)} \tag{6}$$

On the basis of this estimation, we have the opportunity to create an additional variable defined as being the standardized oil price shock.

$$RESISTAND = \frac{\hat{\varepsilon}_t}{\sqrt{\hat{h}_t}} \tag{7}$$

Finally starting with this variable of standardized oil price shock, it is possible to us to create two other additional variables defined respectively as being the positive and negative part of this variable compared with the four previous observations as follows:

$$RSPM = max[0, ln(RESISTAND_t) - ln(max(RESISTAND_{(t-1)}, ..., RESISTAND_{(t-4)}))] \tag{8}$$

$$RSPMM = min[0, ln(RESISTAND_t) - ln(min(RESISTAND_{(t-1)}, ..., RESISTAND_{(t-4)}))] \tag{9}$$

4 Methodology

The interactions between oil price and the different macroeconomic variables are analyzed in short as well as long-term. We have used the following methodology; when there is no co-integration link, the analysis focuses on VAR model through the use of log difference. The objective of this analysis is to study oil price impact on the macroeconomic variables that is to assess this impact over time and to know whether it is decreasing or not over time and whether it is transitory or permanent. Thereby, the approach consists in comparing the models to be assessed by considering the choice of the number of lags which allows us to end in solid results. The aforementioned choice is based on two fundamental principles. The first one is based on information criterion which allows us to determine the optimal number of lags. The second is based on the economic considerations by referring to causality tests in order to prioritize the model's variables and to reduce the estimated number of parameters (Caines & alii, 1981). It is annotated that during the execution of the causalities tests several lags are chosen, either on the basis of various results following the choice criterion, or by referring to the economic intuition. But whatever is the number of chosen lags, the model has to satisfy the stability, non autocorrelation of errors, normality and heteroscedasticity criteria. These same solidity criteria are verified at the level of the estimated equations one by one or even at the vector level (vector portmanteau test).

Once, the list of variables is chosen and the number of lags is determined we can resort, in order to enrich the analysis, to functions of impulsive reactions. However, with the presence of correlation errors of the reduced form equations, it would be difficult to interpret the dynamic answers. This problem is obviated by separating the common components of the developments that are appropriate to each variable. For the needs of our study, we retain Cholesky decomposition which, by imposing linear orthogonalisation constraints, allows identifying the shocks (as well as the immediate impacts of the shocks like the distribution mechanisms).

The applied approach no matter at the monthly or quarterly level consists in:

- Proving causality between one of the oil price specifications and one of the macroeconomic variables;
- If there is a causality between the macroeconomic variables we shall consider it in order to retain possible shocks mechanism;
- Estimating an autoregressive multi-varied model which allows identifying the causal relations in a context of shock mechanism.
- Estimating the long-term relation and short-term dynamics, if possible;
- Deepening the analysis through impulse response analysis.

The list of retained variables at the quarterly level:

- Lbrent : Brent oil price log
- LGDP : GDP log

- Lmrr : MMR log
- LCPI : Consumer Price Index log
- rsmp : maximum standardized residues of the last three quarters (eq 8)
- RESIDSTAND : standardized residues. (eq 7)

List of monthly variables

- VBN : Negative variations (eq 2)
- VBN4 : Net decreases Hamilton (1996) (eq 4)
- DLIPVIIND : log difference of ex-factory price and industrial production
- VBP : Positive variations (eq 2)
- Lmmr : MMR log
- Lcpi : Consumer price index log

5 Quarterly analysis

5.1 Granger causality test

Our first investigation focuses on Granger causality tests.

The test has been conducted on all oil price specifications. It defines the two macroeconomic variables-crossing between them on the one hand and between a macroeconomic variable and oil price specification on the other hand. The two variables-crossing which did not give significant results will not be mentioned in this work.

It seemed to us worth considering a number of lags going from one to eight maximal lags during the tests' execution. To go beyond eight seemed to us absurd because by referring to the literature review, it is unlikely that one of the retained variables can have an influence on the other one over two years.

The table 1 presents the results of the causality tests of oil price on the macroeconomic variables. The multivariate Granger causality tests have shown us that only the standardized residues (RESIDSTAND) (equation 8) have caused log difference of ex-factory price of the industrial products (DLIPVIIND), whereas the maximum of the standardized residues of the last four quarters (RSPM) (equation 7) have caused log difference of inflation and industrial production.

Table 1: Granger causality tests

Nul Hypothesis: :	Prob
RSPM do not cause DLIPC	0,0241
RSPM do not cause DLINF	0,0318
RSPM do not cause DLPROIND	0,0274
RESIDSTAND does not Granger Cause DLIPVIIND	0,0206

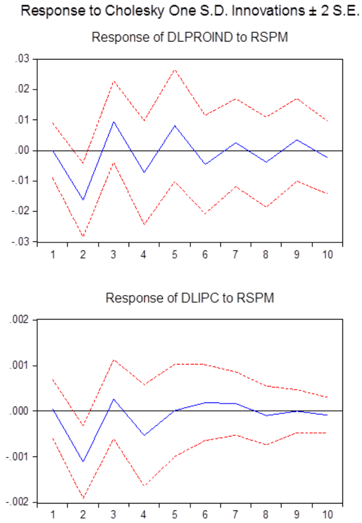
RSPM (equation 7): maximum standardized positive residues over the four last quarters.
RESIDSTAND (equation 8): standardized residues.

Causality according to Granger is highly significant over the three considered " lags ".

5.2 Impulse analysis on first difference

The choice of the number of lags is made at the same time according to Akaike Information criterion (AIC), Bayesian Information Criterion (BIC) and Hannan-Quinn Information Criterion (HQC), based on residues auto-correlation criterion, heteroscedasticity absence (portmanteau test) and Granger causality criterion defined on the chosen[2] two-variable criterion. We consider that the shock amplitude is equal to one time the standard deviation and we focus on the shock effects over ten periods.

Figure 2: Response function of industrial production growth rate and consumer price index after a standard deviation shock on the maximum of oil price positive standardized residues.



According to figure 5.2, it seems to us that a shock on oil price specifications has a little immediate negative impact on the industrial production and that it neutralizes itself as from the fourth quarter. The response function reacts but little significantly.

5.3 Long-term analysis

The used co-integration tests prove a unique co-integration relation within each group of variables, what makes decomposition the easiest to use.

In practice, we have adopted a simple methodology consisting in increasing the number of lags until the specification tests would not let remain any more major problem of autocorrelation, heteroscedastic and non-normal errors and to choose the number of sufficient lags to capture the dynamics of the variables which we are studying.

Table 2: Long-term relation between crude oil prices (Brent), industrial production and inflation log.

LPRODINDS(-1)=	0.357*LBRENT(-1) +
	(0.0974)
	[3.668]
	0.0668*LINFLATION(-1) -8.483337
	(0.17954)
	[0.37223]
	(coefficient de correction d'erreur) -0.2894
	(0.09368)
	[-3.08950]

The chosen number of lags is eight. It is sufficient to demonstrate a non-autocorrelation of errors and a no heteroscedasticity.

The estimated VECM supposes a constant in the co-integration space and at the level of the variables.

At the level of the results of the two long-term relations estimated between the industrial production, the Brent and the inflation on the one hand and the GDP, the Brent and the inflation on the other hand, respectively in table 2 and 3, we notice a significance at the level of the long-term relation coefficients

[2]Granger causality testes of the two-variables are verified for a number of retained lags going from one (1) to eight (8). In general, the results show certain stability while changing the number of lags.

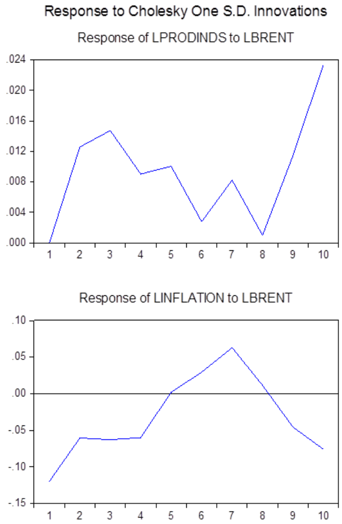
Table 3: Long-term relation between crude oil prices (Brent), GDP and inflation log.

LPIB(-1)=	0.253428 *LBRENT(-1) +
	(0.05559)
	[4.55900]
	0.197811*LINFLATION(-1) -8.483337
	(0.01877)
	[10.5385]
	(coefficient de correction d'erreur) -0.250757
	(0.63454)
	[-0.39518]

which shows that the growth rate of the GDP and the industrial production both positively depends on the growth rate of the Brent price.

At the level of the dynamic answers' analysis, we are rather interested in the reaction of industrial production facing a Brent price shock because the adjustment coefficient is negative and significant whereas the adjustment coefficient of the GDP equation, even if it is negative, remains insignificant. According to figure 5.3, we notice that, after a Brent price chock, the industrial production responded positively with a lag of one quarter and that there will be a shock absorption after four quarters.

Figure 3: response function following an innovation in oil price standard deviation, estimated using a VECM addressing crude oil price (Brent), industrial production and inflation log.



6 Monthly analysis

Since several years, the relation growth-inflation has been widely associated with the role of central banks which, through interest rates, are brought to intervene in the economic sphere in order to assure price stability.

The objective of this section consists in identifying the generation mechanism of an oil crisis on inflation and growth, even though the analysis urges us to reject the traditional distinction between demand-pull inflation and cost-push inflation.

The analysis will first of all focus on net decrease, net increase and oil price. First, we have started by treating the shocks' negative impact. The retained shock specifications are the variables (VBN) (equation 2) and (VBN4) (equation 4) which respectively represent oil price negative variations and oil price net decreases. The two variables which are tested for the presence of a unit root have proven that they are still stationary (Table 4).

Table 4: Stationarity tests:

Null hypothesis: presence of a unit root			
VBN		VBN4	
t-statistique	Prob.*	t-statistique	Prob.*
-2.509791	0.0122	-2.553823	0.0109

To work with stationary series is a necessity which has been imposed by the implemented tools; the two series of the Money Market Rate (MMR) and consumer price index (CIP) are used in the first difference of their log.

The study will focus on VAR in differences, thus we are going to associate with the Brent price net decrease and the growth rate of consumer price index and money supply.

To choose the global number of lags in VAR model, we shall use information criterion. We shall then choose the number of lags which minimizes one of these information criteria (Table 5).

Table 5: The choice criterion of lag order

Choice criterion of the lag order according to VAR model Endogenous variables: DLBRENT DLTMM DLCPI						
Lag	LogL	LR	FPE	AIC	SC	HQ
0	569.0478	NA	1.16e-08	-9.759445	-9.688232	-9.730537
1	589.2453	39.00208	9.56e-09	-9.952506	-9.667652	-9.836871
2	612.8896	44.43487	7.43e-09	-10.20499	-9.706498	-10.00263
3	618.6798	10.58204	7.86e-09	-10.14965	-9.437516	-9.860565
4	637.5760	33.55715	6.63e-09	-10.32028	-9.394500	-9.944464
5	653.5133	27.47803	5.90e-09	-10.43988	-9.300467	-9.977346
6	727.5317	123.7895	1.93e-09	-11.56089	-10.20783	-11.01163
7	767.4360	64.67234	1.14e-09	-12.09372	-10.52703	-11.45773
8	793.3399	40.64244	8.56e-10	-12.38517	-10.60483*	-11.66246*
9	801.7675	12.78672	8.72e-10	-12.37530	-10.38132	-11.56586
10	813.8004	17.63430*	8.37e-10*	-12.42759	-10.21997	-11.53142
11	823.3966	13.56711	8.39e-10	-12.43787*	-10.01661	-11.45498
12	831.0845	10.47150	8.72e-10	-12.41525	-9.780350	-11.34563

According to these criteria, the optimal number of the chosen lags shall not exceed eight lags. Through using the various determined lags, we have conducted Granger causality tests. The best obtained results are presented in the following table (Table 6.

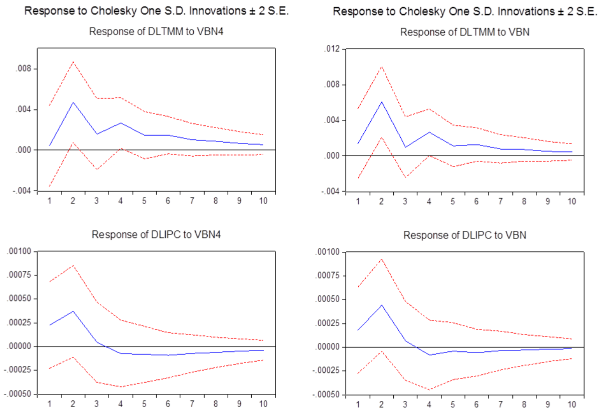
Table 6: Granger causality tests based on monthly data

The chosen lag is of '2' in the Granger causality tests			
Nul Hypothesis:	Obs	F-Statistic	Prob.
DLIPC do not cause VBN4	128	0.99811	0.3715
VBN4 do not cause DLIPC		0.75302	0.4731
DLTMM do not cause VBN4	126	0.04909	0.9521
VBN4 do not cause DLTMM		3.20065	0.0442
DLTMM do not cause DLIPC	126	3.16894	0.0456
DLIPC do not cause DLTMM		0.21167	0.8095
DLIPC do not cause VBN	128	2.30995	0.1036
VBN do not cause DLIPC		1.19669	0.3057
DLTMM do not cause VBN	126	0.00442	0.9956
VBN do not cause DLTMM		4.55218	0.0124
DLTMM do not cause DLIPC	126	3.16894	0.0456
DLIPC do not cause DLTMM		0.21167	0.8095

The examination of the whole retained lags does not show any changes in causality direction with the changes of the number of lags, what is reassuring. Nevertheless, the consideration of the number of lags equal to two allows revealing a significant causality in the order of 5 %. Granger causality tests show that oil price net decrease according to Mork specification causes the growth rate of money supply and that the latter causes the growth rate of consumer price index at the threshold of 5 %.

VAR is estimated in the following order: a specification of negative oil price shock (VBN/VBN4), the Money Market Rate (MMR) and consumer price index (CPI) growth rate. The impulse response according to cholesky decomposition of a standard deviation shock of (VBN/VBN4) on the Money Market Rate (MMR) log difference and the CPI growth rate is represented by Figure 6.

Figure 4: response function following an innovation in oil price standard deviation, estimated using a VECM addressing crude oil price (Brent), industrial production and inflation log.



We notice that, after a Brent price negative shock, the monetary authorities react by increasing the money market rate (MMR) during the first month, then they decrease it while preserving it positive, resulting in a reduction in the growth rate of the consumer price index starting from the first quarter.

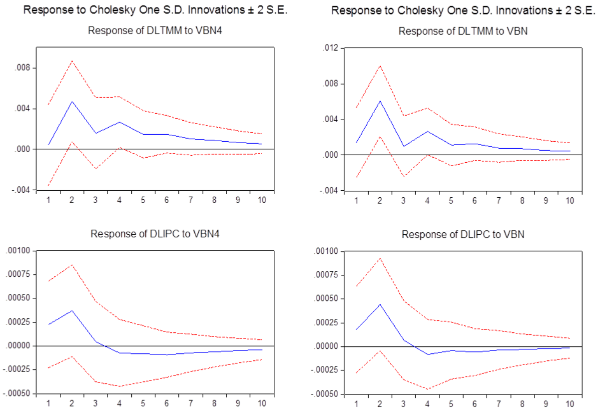
In order to engage in further analysis we have used the ex-factory price index of the industrial production instead of consumer price index. Granger causality tests (Table 7) show that the oil price negative variations (VBN) and the oil price net decreases (VBN4) cause the log difference of money market rate (MMR) and ex-factory price index of the industrial production (DLIPVIIND).

Table 7: Causality tests on monthly data (the specifications of the negative oil price shocks, the growth rate of the Money Market Rate (MMR) and ex-factory price index (DLIPVIIND))

The chosen lag is of 3 in Granger causality testes			
Nul hypothesis :	Obs	F-Statistic	Prob.
DLIPVIIND do not cause VBN	124	0.59988	0.5505
VBN do not cause DLIPVIIND		3.96349	0.0216
DLTMM do not cause VBN	126	0.00442	0.9956
VBN do not cause DLTMM	4.55218		0.0124
DLTMM do not cause DLIPVIIND	124	0.74448	0.4772
DLIPVIIND do not cause DLTMM		0.03567	0.9650

We notice that, even when oil price decreases, the factory does not revise its prices in short-term and this is due to the volatile nature of the oil price and to the instability at the level of the cost. Thus, we notice an increase of the growth rate of the ex-factory price index of the industrial production. Then, we can conclude that when the oil price decreases this would result in inflation due to costs non-revision. In this case the monetary authorities are mobilized to reduce the inflation. The impact of the monetary authorities' reaction results in the reduction in the growth rate of the consumer price index (see figure 6).

Figure 5: Response function of the growth rate of the money market rate (MMR) and the ex-factory price index after an innovation in standard deviation on oil price net decreases and the specification of the negative shock based on Hamilton (1996).



Now, we move to the analysis of the positive shocks impact through oil price net increases (VBP) (equation 2) and of the impact of Brent price (LBrent) at the same time. First, we notice that both variables are integrated of I(1) (Table 8).

Table 8: Stationarity tests on the net oil price increase variable.

Nul hypothesis: presence of a unit root (VBP)	
t-Statistic	Prob.*
-1.360368	0.5995

The Granger co-integration tests identify us a first co-integration relation between VBP, LMMR, LCPI and another relation between LBRENT, LMMR, and LCPI (Table 9).

Table 9: Cointegration tests (tests trace Granger)

Series: VBP LTMM LIPC The chosen lag is: 1 to 2 (first difference) Co-integration test without restriction (Trace)				
Hypothesized	Eigenvalue	Trace Statistic	Critical Value	Prob
None *	0.196459	35.10277	29.79707	0.0111
At most 1	0.054590	8.199381	15.49471	0.4443
At most 2	0.010469	1.294522	3.841466	0.2552
The trace test indicate the presence of a co-integration relation with an error risk of 0,5				
Series: LBRENT DLIPC DLTMM Co-integration test without restriction (Trace) Co-integration test without restriction (Trace)				
Hypothesized	Eigenvalue	Trace Statistic	Critical Value	Prob
None *	0.219180	40.88933	29.79707	0.0018
At most 1	0.076371	10.45789	15.49471	0.2472
At most 2	0.005563	0.686151	3.841466	0.4075
The trace test indicate the presence of a co-integration relation with an error risk of 0,5				

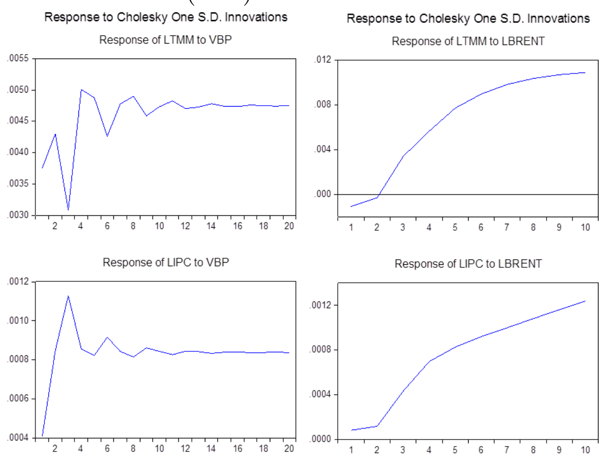
After the estimation of the error correction models, the theoretical link is established by highlighting the various possible causal relations. In this case, Granger causality test within the framework of an error correction model is realized to determine the causality direction through Wald Coefficient Restrictions Test based on the equation of error correction model. This test has revealed the existence of a unidirectional causality of the variable oil price positive variation (VBP) and the Money Market Rate (LMMR) variable towards consumer price index (LCPI) (Table10).

Table 10: Causality tests starting from a VECM: unidirectional causality of VBP and LMMR towards LCPI.

VEC Granger Causality/Block Exogeneity Wald Tests Dependent variable: D(LIPC)			
Excluded	Chi-sq	,df	Prob.
D(VBP)	4.816766	2	0.0900
D(LTMM)	6.303001	2	0.0428
All	10.06361	4	0.0394

The figure 6 shows that Brent price net increase (VBP) as well as the logarithm of Brent oil price level have a positive impact on Money Market Rate (LMMR) and LCPI respectively. We notice that the reaction of both variables, after a shock, takes the same speed, but a shock on the price level is smoother than a shock on the net increase.

Figure 6: Response function after an innovation in standard deviation on oil price net increase and Brent price, estimated as from a VECM addressing the logarithm of crude oil price (Brent), Money Market Rate (MMR) and Consumer Price Index (CPI).



7 Conclusion

The general concept of this work is the conjugation of the primary causes and the propagation mechanisms of oil shock. Indeed, the production process, on the upstream of the market, plays an essential role in price formation. The dissemination of oil price shock both up and down the production line, from production prices and intermediate goods prices to consumer prices and manufactured goods prices is related to the dependency degree of the activities and the economies in relation to oil. Consequently, price stability depends on oil price stability and the monetary authorities are forced to assure this stability.

Concerning the quarterly analysis, the Granger causality multi-varied tests have proved to us that only the standardized residues had caused the log difference of the industrial products' ex-factory price, whereas the maximum of the standardized residues of the last four quarters had caused the log difference of the inflation and the industrial production. According to the obtained structural decomposition, the industrial production reacts negatively and immediately and is only stabilized starting from the fourth quarter. The causality analysis between oil price specifications and the GDP proved no causal relation, but it was possible to find a long-term relation between Brent oil price, the GDP and inflation. This relation was the basis of the structural analysis based on a VECM which has showed that after a Brent oil price shock the GDP reacts only as from the eighth quarter; that is after two years and this can be explained by the administered character of price fixing adopted by the Tunisian state.

Besides, the monthly analysis has demonstrated that the specifications of the negative oil price shocks affect the Money Market Rate (MMR) which, in its turn affects the consumer price index (CPI). This shock diagram represents a monetary policy mechanism which aims at the stability of consumer price index (CPI). In order to determine the source of inflation we have added the model of ex-factory price index. The conducted analysis has proved that oil price decrease causes ex-factory price index. Consequently, oil price decrease causes an inflation caused by the non-revision of costs. In this case, the monetary authorities are mobilized to reduce the inflation. The result of the monetary authority reaction results in the reduction of the growth rate of the consumer price index (CPI). This result contradicts the literature review because several works such as those of Stephen P.A. Brown, Minee K. Yucel (2002) have proved an asymmetric relation between oil price and the monetary policy. On the other hand, at the level of this work we have deducted that the oil price net decrease urges the monetary authorities to take the necessary measures to deal with it.

Inflation targeting leads the monetary authorities to look for indicators which reflect the long-term trend of price increases. One of these indicators is oil price volatility. The principal mission of the Central Bank of Tunisia (BCT) is price stability maintaining; this is why we have advanced the Money Market Rate (MMR) over CPI in Slutsky decomposition. The reaction of the Tunisian central bank to an oil price shock is immediate upward in order to absorb the money supply causing the inflation; that is why we observe a two months gap between the reaction of the Money Market Rate (MMR) and the CPI.

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