Determinants of Inflation in Tunisia: Using Structural Modeling

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Abstract

The aim of this paper is to advance a structural modeling of the monetary politics in Tunisia and to provide elements that contribute to the understanding of the determinants of the inflation. This study is going to refer in relation to the theoretical foundations of the Phillips Curve, to construct the fundamental equation to use by structural macro econometrics models that considers the most direct determinants of the inflation. In section 2 of this paper, the structural models of inflation are exposed in the simplest variant used internationally by the central banks. In section 3, one is going to present the results of the evaluation of three econometrics models with data of the economy Tunisian based on the specification that the Curve of Phillips proposes. Finally, in section 4, the results are analyzed and the implications are valued in relation to the conduct of the monetary politics in Tunisia.

Key words: Tunisia, inflation, structural modeling,

1. Introduction

The control of inflation is, since the reform of 2006, the central objective of the monetary politics in Tunisia. Indeed, under the impulse of International Monetary Fund, the Central Bank of Tunisia began to canalize its efforts in the control of price's variations or a strict control of the inflation. The hold of the decisions for the monetary politics is usually exit from econometrics models that permits to structure the transmission mechanisms of the monetary politics. However, there is no macroeconomic model of structural type capable to structure the mechanism of the whole transmission of the monetary politics instruments to the inflation based on theoretical features.

In this paper, we try to advance a structural modeling of the monetary politics in Tunisia and to provide elements that contribute to the understanding of the determinants of the inflation. This study is going to refer in relation to the theoretical foundations of the Phillips Curve, to construct the fundamental equation to use by structural macro econometrics models that

considers the most direct determinants of the inflation. In section 2 of this paper, the structural models of inflation are exposed in the simplest variant used internationally by the central banks. In section 3, one is going to present the results of the evaluation of three econometrics models with data of the economy Tunisian based on the specification that the Curve of Phillips proposes. Finally, in section 4, the results are analyzed and the implications are valued in relation to the conduct of the monetary politics in Tunisia.

2. The structural models of inflation

Macroeconomic structural models are used to explain the conduct of the monetary politics in a context of behavior aggregated of the economy. It is to note, also, that in many opportunities, models based on microeconomic foundations are drifted. The models structural, as long as they are constructed, are based on the theoretical previous features about the mechanisms of the transmission that explain the inflation. These models abandon the relation between quantity of money and level of price, as the quantitative equation of the currency stipulates it, to solve below to construct a model of which the determinants the inflation is the to the pressures of the demand, the costs and the transmission of the effect of the exchange rate.

Macroeconomic models are developed mainly, in three blocks. The first, representing the monetary decisions guided by some rules, almost always the Rule of Taylor in which is determined the interest rate of the monetary politics, operational nominal objective; variable used in the equation of Fisher for the obtaining of the real interest rate. The second block of the model is formed by the effects of the Demand Aggregated (AD) by means of a Curve IS. To finish, by means of the Curve of Phillips the effect of the unbalances on the Aggregated offer (AO) where the rigidities of the market of labor and the margins of the merchandising will finally determine the inflation. For the case of small and open savings, it is necessary to reflect the mechanism that corresponds to the effects of the monetary politics on the exchange rate also.

In a general manner, this type of model gathers four transmission channels of the monetary politics: the conventional mechanism of the interest rate toward the aggregated demand, the channel of the exchange rate on the external sector, the direct impact of the inflation imported and the channel of the anticipations. Essentially, these macroeconomic models are the type AD-LM-AO neokeynesian in an open economy, and they are structured in 5 fundamental equations:

(1) AO modeled through a Curve of Phillips

$$\pi_t = \alpha_0 \pi_{t-1} + (1 - \alpha_0)\, E_t\,(\pi_{t+1}) + \alpha_1(y_t - y_t^*) + \alpha_2 \Delta s_t + \varepsilon_t \qquad (1)$$

The current inflation (π_t) is estimated according to the anticipations of the inflation, formed by the previous inflation (π_{t-1}) and the one rational [$E_t\,(\pi_{t+1})$], of the gap between the present production and their potential level ($y_t - y_t^*$) and the real exchange rate (s_t). He/it is also included a term of error (ε_t) in which regroups of other shocks of offer.

(2) AD is modeled through IS curve

$$(y_t - y_t^*) = \alpha_3 r_{t-1} + \alpha_4 s_{t-1} + \alpha_5 g_{t-1} + \alpha_6(y_{t-1} - y_{t-1}^*) + \varepsilon_{t-1}^y \qquad (2)$$

Where, the gap of production is a function of the real interest rate (r) that influences negatively on the gap of production (α_3), the investment and the consumption. He/it depends positively on the real exchange rate (s) of which the positive effects on the external sector driven to depreciation and vice versa ($\alpha_4 > 0$). The fiscal expense (g) behaves in an expansive shape ($\alpha_5 > 0$). He/it is also included the gap of the production delayed, as well as a term of the error that represents the shocks of the demand.

(3) The rule of Taylor

$$i_t^{obs} = \theta i_{t-1} + (1 - \theta)(r^* + \pi_t + a(y_{t+1} - y_t^*) + b(\pi_{t+1} - \pi^{obs})) \qquad (3)$$

r * it is the real interest rate of the balance, and the coefficients (a) and (b) indicates the preferences of the central bank as for the stabilization of the production or the inflation.

(4) The equation of Fisher

$$r_t = i_t - E_t(\pi_{t+1}) \qquad (4)$$

Where, r_t the real interest rate is determined according to the nominal interest rate i_t and the value hoped of the inflation in the following period $E_t(\pi_{t+1})$.

(5) The type of the exchange rate

$$e_t = E_t(e_{t+1}) - i_t + i_t^f + \varepsilon_t^i \qquad (5)$$

It is an equation drifted of the model that sustains the theory of the parity of interests ($i_t = i_t^f + (E_t(e_{t+1}) - e_t) + \varepsilon_t^i$), where the nominal domestic interest rate (i_t) writes itself according to the international interest rate (i_t^f), the variations waited of the nominal exchange rate ($E_t(e_{t+1})$), and an early of the risk that is included like one term of error of the equation (ε_t^i). Generally, one imposes to the model a set of balance conditions, to guarantee the convergence toward a stationary state with what is waited long-term in the economy. Thus, it is imposed that the inflation is similar to the inflation of long term, the production aims to its potential level, the rate of unemployment converges to the natural rate, among other. The levels of the balance are

usually projected outside of the model and are imposed in an exogenous way.Then, it imports to analyze in a particular perspective the Phillips curve, as theoretical model that will act as basis to the assessments that will be later taken away for the economy Tunisian.

2.1 The Phillips curve

We notice in the equation (1) that the Phillips Curve displays the inflation like a function of three fundamental components: In first place, the anticipations of the inflation through the delays and the value anticipated of inflation ($\alpha_0\pi_{t-1} + (1 - \alpha_0)\,E_t\,(\pi_{t+1})$). In the second place the shocks of the demand, generally translates by the gap of the production $\alpha_1(y_t - y_t^*)$, and finally the shocks of the offer generally modeled through the variations of the real exchange rate $\alpha_2\Delta s_t$, although in the international experience it is common to find other variables as the price of oil. He/it is also included a term of the error (ε) in which of other shocks of the offer are collected. Numerous studies find the biggest relevance in the anticipatory models of the variations of the variables in the future. While other grant the biggest importance to the behavior of the variables in the past. To reconcile the two approaches, one uses the following specification:

$$\pi_t^e = \alpha_0\pi_{t-1} + (1 - \alpha_0)\,E_t\,(\pi_{t+1}) \qquad (6)$$

The inertial component implies that the agents hope in the current period that the inflation will be at least the rate occurred in the previous period. One owes the introduction of this element to Milton Friedman and its significance inside the model that is drifted of the survey that is about the determination of the real salary. Certainly, since the inflation is a phenomenon that results on behalf of the decisions of the economic agents, the mechanism of determination of the prices always includes, at least, and to a certain extent this component. On the other hand, the projection of the inflation on one posterior period ($E_t\,(\pi_{t+1})$) is based on the critique of Lucas about his formulation of the rational anticipations. According to this context, the agents are capable to foresee the inflation that will happen in the next period while taking as a basis of their knowledge of the economy.
The evaluation of this component could be defined like follows:

$$E_t\,(\pi_{t+1}) = \mu\pi_{t-1} + (1 - \mu)\pi_t^* \qquad (7)$$

Where, π_t^* is the rate of inflation in the state of balance. Insofar as (μ) is nearer to the unit, the goal is less believable and the inflation depends more of the inflation rate in the past. On the contrary insofar as (μ)) stretches to zero the central bank has a bigger credibility and control on the inflation. In the equation (1) the dynamic homogeneity is usually imposed: the sum of the coefficients associated to the retarded inflation and the one targeted is equal to the unit. Thus, the effects of an unbalance coming so many the shocks of the demand and/or offer on the inflation will be permanent. This condition assures long-term the verticality of the curve. The production converges to its potential level being given the anticipation perfected of the inflation. The possibilities of the monetary politics to maintain steady the targeted inflation and to achieve some policies activists will be given by the existence or not of dynamic homogeneity, that is, for the dissolution or persistence of the inflationary effects in the time. If the economic agents are

capable to adapt their waiting to every new level of the inflation and that a permanent effect reproduces, then the monetary authorities won't be able to allow the existence of a positive gap, because the cost of this last would be an inflation every bigger time. In this context, although with less frequency, the dynamic homogeneity restriction also includes the coefficient of the exchange rate. Thus, long-term, the inflation is an average pondered of the nominal variables of the right part of the equation. The gap is probably the most controversial component in the equation. This implies that, when the middle production is above the potential level, then some inflationary pressures appear and vice versa, showing thus, a positive report between the inflation and the production. The transmission mechanism that explains such a report is that, the increase of the production, encourage the demand of work, creating some pressures to the growth of the wages and therefore of the prices. The impact or the springiness of the prices in relation to the gap of production will be determined in short-term by the size of the coefficient. Of this fact, more the coefficient is supple more the prices it will be also, and therefore less odds aura the monetary politics to influence on the production and the use. In long-term, the persistence of the effect will depend in bigger measure on "the memory" of the agents or the coefficients of the left of the past inflation. The calculation of the gap depends on the method of evaluation of the potential production. Mainly two methods are used. A Cobb-Douglas function to estimates the optimal level of production according to the work factor, the technology and the capital. The extraction of the tendentious component of the set is gotten then through various econometrics filter, while being the more used the filter of Hodrick Prescott (HP). Thus, the set gotten by the HP filter is less fowl than the middle data; it is a stochastic tendency that allows capturing the deviations of short term in the economy. To estimate the gap current GDP in relation to the tendentious GDP by the slant of the HP filter, one uses a shape of approximation of the temporary deviations of the economy in the function of the inflation targeted. For the monetary authorities of small open savings, the objective of stabilization of price acquires an a lot more complex dimension, due to the high vulnerability to the shocks of the external sector witch is included in the model of the inflation through the variations of the real exchange rate defined as follows;

$$s_t = \log(e_t) + \log(P_t^*) - \log(P_t)$$

Where (e_t) is the nominal exchange rate, (P_t) is a measure of the domestic prices (the IPC is generally used); and (P_t^*) represent the international prices, we consider in this IPC survey of one of the main commercial partners of Tunisia to know France.
The various channels intervene in the transfer of the exchange rate to the domestic prices. The more considered for the modeling of the inflation that is the effect produces through the cost of the imports.

3. Evolution of the inflation in Tunisia:

In Tunisia, the exam of the evolution of the inflation on the last four decades watch that she/it is curbed, identifying to the rampant inflation with tendencies to the rise different of one period to the other. The period 1963-1972 is characterized by a relatively weak rhythm of inflation. Indeed, the middle rate measured by the indication of the prices to the consumption on this period maintained itself to 3.4 %. It is only from the first oil shock 1973 that the inflation accelerated, reaching 4.1% some 1974. This acceleration of the inflation, generated by the blaze

of the world prices following the increase of the price of oil, had to entail a decrease of the demand and therefore of the economic growth. From l974, the authorities undertook a politics of raise by the demand to stimulate the economic growth. They increased the wages by an increase of the currency offer. This politics dragged an economic growth but, unfortunately, aggravated the inflation, that reached 5.5% in 1975 (Alaya, H (2002, p296 -298)). During the following period (1976 -1978), the inflation decreased substantially and the GDP continued to grow following the enhancement of the products exported and the intervention of the General Case of Compensation (CGC). In fact, this intervention to sustain the prices of the first necessity products corresponds to a mechanism equivalent to an increase in prices, but a repressed temporarily rise since the consumer is going to pay dearer the products thus managed as heavier taxes and a deficit budgetary crescent (Alaya, H (2002, P229)). The period 1979-1982 coincided with the second oil shock, what explains the acceleration of the inflation from 1979, either 10.2% on average and per year on this period. This acceleration of the inflation was accompanied by an unfavorable economic conjuncture. But the active period of 1982-1986 is characterized by a light deceleration. The rates of inflation varying between 4.1% in 1982 and 6.3% in 1986. This landing, relatively elevated, is mainly little due to a prudent monetary politics, resulting in a progression of the faster monetary mass than the one of the GDP to the constant prices (14.7% against 12%), and to substantial increases of the wages some 1982.

The years 1984, 1985 and 1986 distinguish themselves by a clean slowing of the rhythm of the inflation. This evolution could explain itself by the economic resumption that appeared during this period, with the exception of the year l986, following the improvement of the productivity and to the compression of the interior demand through the blockage of the wages from 1984 and the setting in application of the politics of concession of the credits more restraining. Considering a nominal exchange rate fixes in relation to the main commercial partners of Tunisia, the level relatively raised of the interior inflation hindered the competitiveness of the Tunisian products on the world markets, what succeeded in 1986 to an unbearable deficit of the current payments (yearly Reports of the central bank (1981 -1988)). To face the crisis of the balance of payments, the BCT devalued the dinar strongly, modified its monetary politics and started the program of liberalization of prices in the setting of the general economic reforms that has been putted along the period, but won in importance after 1990.
While, 1987-1990 has been characterized by a period of stabilization of inflation rate around an average of 7.4%. This result is attributable to a politics of management of the interior demand based on a compression of the public expenses, a prudent salary politics and, in a least measure, to the bending of the inflation level in the countries partners.

The period 1991-1994 distinguishes itself by a decrease of the inflation rate around 5.7% on average per year this decrease is the result of the pursuit of the restraining budgetary and monetary policies. After having recorded levels curbed during the years 1993 and 1994, either respectively 4% or 4.7%, the increase in prices to the consumption showed certain acceleration. From the second half of the year 1994 to pass to 6.3% in 1995 this evolution resulted from the circumstantial factors, as the increase in prices world for imported most products, and the decrease of the prices of some agricultural products (Study economic of the World Bank on Middle East and North Africa (1996, p l -5)).

The period 1996-2002 knew an important deceleration of the inflation rate, which was located between -1.7% in 1996 and 2.8% in 2002, either 2.9% on average on this period. Among the factors that helped to master the general level of the prices. He/it imports to signal the pursuit of a rigorous monetary politics that is careful to assure an evolution of the liquidities in conformity with the rhythm of creation of wealth. Besides, it is necessary to add the conduct of a

prudent budgetary politics, centered on the rationalization of the public expenses and the improvement of the output of the fiscal system. Apart from the regular provision of the home market so much by the local production that by the recourse to imported them, the backing of the competition and the economic control, the discounts granted by the tradesmen on the selling prices, as well as the politics of change reconciling the safeguard of the national currency value and the preservation of the competitiveness of the economy. This reduction of the inflation observed these last years contributed to creates a favorable and stimulating climate for the private investments and permitted to reduce the interest rates, encouraging the dynamic of the economic activity, the creations of jobs and exports thus (Report of the central bank 2000, p97 - 101)).

These encouraging results concerning inflation deserve, however, in logic of competitiveness to be compared to those gotten by the countries partners and competitors. Fig. n°1 displays the evolution of the inflation during the last two decades for Tunisia and let glimpse the effort that it accomplished these last years for his/her/its mastery since the inflation represents one of the essential determinants concerning competitiveness - price of an economy, and capable to condition his/her/its performances of long term.

Fig. n° 1:
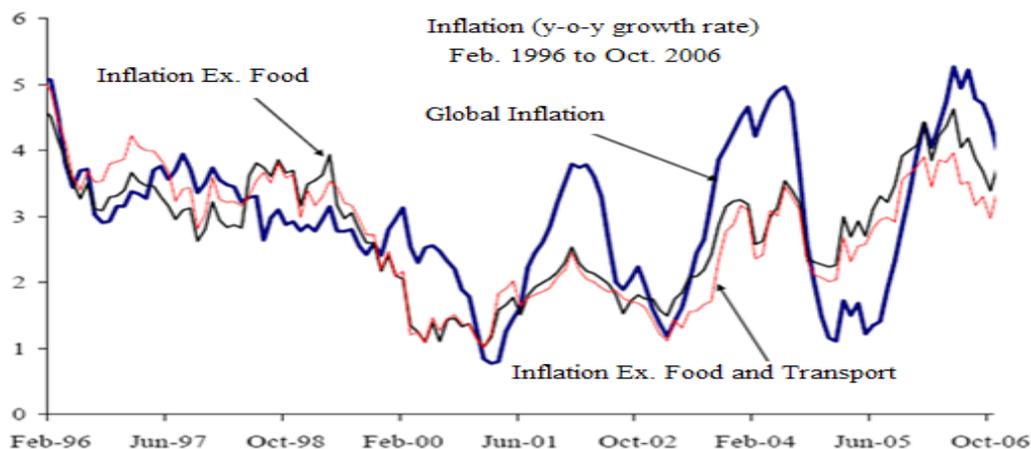
Source: International Monetary Fund (2006): "exploratory findings of the consultation mission interim" November 14, 2006.

Such mastery answers the necessity to reduce the uncertainty in order to facilitate the anticipations and the hold of the decisions appropriated by the economic agents. With regard to Tunisia, his/her/its performances concerning inflation permitted to reduce the differential of inflation in relation to the main partners and competitors who knew an acceleration of the increase in prices. This reduction of the differential of the inflation has been achieved in spite of the negative effects of the rise of the American dollar, the blaze of the courses of oil on the international market, the growth sustained of the interior demand and, especially, of the relatively difficult agricultural seasons, dragging a faster increase of the food prices that passed of 4.5% in 2000 against 2.3% in 1999 (yearly Report of the development bank economic of Tunisia (1999)). However, and even though it is indispensable to persevere the evolution of the inflation in this way, he/it imports to underline that, henceforth, seen the instability of the world environment, it will be relatively difficult to lower the rate of inflation more since the inflationary phenomenon is imported following the fluctuations of the prices of the products exchanged.

However, Fig.n°2 shows that the inflation, during 2009-2010, increased slightly and slowly while remaining moderate. Indeed, the inflation measured by the total IPC (average of the period) was 3.7% in 2009 and increased to 4.5% in May 2010. This increase is largely to the growth of the prices of the food products.

Fig. n°2:
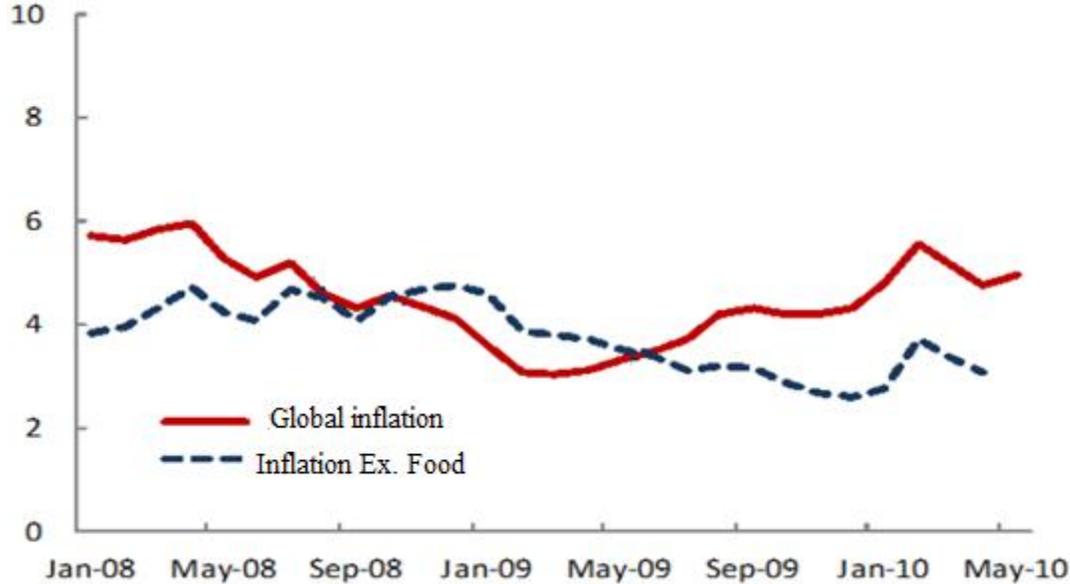
Source: International Monetary Fund (August 4, 2010)

In any case, although the more and more worried Central Bank about the inflation, the definition of an objective of the inflation is a topic in suspense for the monetary politics of Tunisia.

4. Assessment of a structural model of inflation for Tunisia

The special features of the Tunisian economy appear not to allow applying the Curve of such Phillips that appears in the macroeconomic theory, since the theoretical mechanisms that sustain this model are not all adapted to the specificities of the markets in Tunisia, in particular, centralization, the segmentation and the control on the levels of the salary. However, it is probable that this situation doesn't separate the possibility completely that, in a different vision, the process of the inflation can be verified by this type of modeling. Then it will be verified empirically, through the available data for the economy Tunisian, the validity of the Curve of Phillips as structural model of inflation in Tunisia but, with a few new specificities in the model. From the different features that have been advanced us previously don't take for the case of Tunisia that the modeling of the rational anticipations. In the anticipatory model of inflation of rational type, it is necessary that the agents have information about the monetary, fiscal politics, among other macroeconomic indicators and of course, under conditions to be able to interpret them. In Tunisia, the economic politics followed a restricted information strategy in general apart from the experience rare of the population Tunisian to interpret the macroeconomic reports. In the particular case of the monetary politics, it is rare to find in the press of the analyses on the behavior of the inflation or the IPC. This situation puts of advance the inflation in a difficult assessment state.

4.1 Data

The variables used in the model are presented in the Table n°1. The data are yearly and they cover the period 1980 -2007. They are descended of the Statistical reports published by the National institute of Statistics. One uses some variables in a logarithmic shape to reduce the variations and to get the springiness directly.

Table n°1:

Variable	Definition	Order of integration
LIPC	Consumer Price Index	I (1)
(LPIB- LPIB*)	Gap between the production inside ruffian runs and the production to the state of balance (excerpt by means of the filter of Hodrick-Prescott)	I (0)
LTC	exchange rate of the Dinar Tunisian in relation to the euro	I (1)

Through the test of Dicky-Fuller of Stationarity of every variable under his/her/its logarithmic shape, one noticed that except the gap of the production that is stationary, the rest of the variables is integrated of order 1, for it, they are included in the model in difference first. Thus, the risk to do a false regression is eliminated and the theoretical specification of the model is kept.

4.2 The empiric model

The evaluation achieved with the values of the Least Square Plain (MCO) of the Curve of Phillips is the following:

$$\text{Dlog}(IPC) = \underset{(1.4257)}{0.02} + \underset{(3.1465)}{0.26 \, D\log(IPC)_{-1}} - \underset{(-2.4121)}{0.81 \, (\log PIB - \log(PIB^*)} + \underset{(7.5207)}{0.56 \, D\log(TC)}$$

The proposed explanatory variables are meaningful: the inflation possesses an inertial component; it depends on the temporary deviations of the production, as well as of the exchange rate. The model possesses a R^2 of 0.88.

However, the sign of the coefficient associated aside from production is negative, contrary to the positive sign that the theoretical model of reference proposes. The positive sign that the coefficient associated aside from production should present is explained theoretically through the market of work or the determination of the wages is made from the level of unemployment to determine the prices then. As he/it is verified in the logic of the macroeconomic structural models, the unbalances of the demand constitute an incentive to the increase of the production and use, where it is determined the rhythm and the magnitude of the inflation, from the rigidities of the contracts of the salary.

However, the economy Tunisian possesses a different work market, developed for most in the sector of the state in which the salary is an exogenous variable that doesn't depend on the level of the production. The enterprises don't decide the level of the wages but rather they are determined centrally by the state. Also, a contraction of the GDP must not be accompanied by a decrease of the demand, because the state intervenes so that it preserves the level of the employment and the level of the wages.

4.2.1 The alternative models

As the use and the wages are essentially directed by the state, these last can vary regardless of the GDP. Therefore, the GDP doesn't constitute a good measure of the demand. Besides, one must take in consideration the segmentations that exist in the markets in Tunisia between the managerial segment and the segment of the population. The demand of the consumption of the population, that is finally the origin of the inflation, exercises some pressures with certain autonomy of the activity of the managerial state.

Thus, he/it imports to find another approximation of the demand by other indicators of incomes of the households different of the GDP. Of this fact, in a first group of models have been considered the wages and a larger indicator of incomes is included in a second. With these circumstances, it is not obligatory to construct a specification completely different from the curve of Phillips but to consider another measure of the demand different of the GDP. In what follows, a theoretical effort will be provided to explain the new specificities that are used for the empiric assessment of the determinants of the inflation in Tunisia.

The idea is to formulate the gap of middle productivity instead of the potential GDP. This is how forms itself a measure of excess of the demand that is the difference between the variation of the wages and the variation of the productivity. We have then, a measure of the macroeconomic balance more adapted for the economic politics in Tunisia. These are the economic authorities in Tunisia that pursue a rule of politics for the handling centralized of the wages. The general increases of wage make themselves every time that they are supported by increases of the productivity. It is the way centralized to keep the balance between the offer and the demand facing the absence of a work market well developed. Therefore, the model that we estimate then has the utility that he/it contains the rule of politics.

In this survey, one is going to use the yearly set of the middle wages and the productivity of work. Also the sample consists of the period 1980 -2007. While verifying the Stationarity of the two sets under logarithmic shape, a unit root is detected; the two variables will be included in the model in difference first.The evaluation of the model with the alternative gap gave the following   result:

$$\text{Dlog (IPC)} = -0.01 + 0.42\,\text{Dlog(IPC)}_{-1} + 0.17\,\text{Dlog(IPC)}_{-2} + 0.67\,(\text{Dlog(sal)} - \text{Dlog(prod)}) + 0.61\,\text{Dlog(TC)}$$
$$\quad\quad (0.4523) \quad\quad\quad (3.4017) \quad\quad\quad (2.1157) \quad\quad\quad (1.1326) \quad\quad\quad\quad\quad (6.1752)$$

The coefficients of the variable retarded meaningful s6nt. Besides, the inclusion of a second delay of the inflation the inflation improved significativity of the adjustment as well as the execution of the suppositions. In the new specification the gap possesses a logical sign in relation to the theory. While analyzing the t-calculated of Student between parentheses one notices that the gap is not meaningful. However, it can be due to the multicolinearity. Indeed, this present variable a high contemporary interrelationship with the exchange rate. On the other hand, when the exchange rate is eliminated of the model the gap becomes meaningful. The value of R^2 indicates that we are in the presence of a model that permitted a good adjustment. The variations in the inflation are explained in 81% by the set of the explanatory variables. However, the salary is only a portion of the total income of Tunisian households. Of this fact, it would be interesting to estimate a new models that holds in account a bigger part of the incomes of the population (for example the jubilations and pensions, the incomes of the cooperation activities, as well as, of private peasants. Besides, he/it contains the incomes of the households in foreign currencies).

Thus, a new model is considered. And that, while using the gap between the total of the incomes and the productivity of work. One noticed, through the test of Dickey-Fuller the unit root presence for the variable gap (income-productivity of work). Thus, the variable is included in the model in difference first. The result of the estimation with MCO is the next one:

$$\text{Dlog (IPC)} = -0.03 + 0.39 \text{ Dlog(IPC)}_{-1} + 0.18 \text{ Dlog(IPC)}_{-2} + 0.92 \text{ (Dlog(R)} - \text{Dlog(prod))} + 0.42 \text{ Dlog(TC)}$$
$$\quad (-1.379) \qquad (3.7901) \qquad (1.5970) \qquad (2.3139) \qquad (5.1045)$$

All coefficients have the hoped signs and they are meaningful, including the gap. Besides, R^2 is of 0.88. The table n°2 summarizes the statistics fundamental of every model after having abandoned the conventional model following the presence of a sign that enters in contradiction with the economic theory.

Table n°2:

Model	R^2	Akaike		Log Lik
Gap Salary-productivity	0.81	-1.61	0.10	23.92
Gap Income-productivity	0.88	-1.83	0.10	27.45

While achieving a comparison of the models proposed from the presented statistics, the best model according to the R^2 value is the one of which the gap between the total of the incomes mentioned before and the productivity where R^2 reaches an explanatory power of 89% of the variations of the rate the inflation and to level of error below 10%. In the same way, this model presents a value weak Akaike and a bigger value of verisimilitude.

5. Analysis of results

Of bonus on board, he/it has been verified that the inflation in Tunisia is determined by the inflationary inertia, the transmission of the effects of the exchange rate and the excess of the

demand determined by the existing report between the incomes of the families and the productivity of work. The table n°3 summarizes the springiness of the inflation in relation to every explanatory variable. He/it is also calculated the total accumulated of the effects that these variations will produce long-term by means of the values delayed of the inflation.

Table n°3:

	Springiness of term	Springiness of long term
(IPC)	0.39%	
(IPC)	0.18%	
(Come back. Productivity)	0.92%	2.15%
TC	0.42%	0.97%

The springiness of the inflation in relation to the gap is bigger than the one of exchange rate. The transfer of the effect of the exchange rate doesn't end up being complete long-term although it approaches enough. As it has been explained, if the sum of the coefficients of the variables delayed of the inflation adds a dynamic homogeneity, so the effects of the shocks will reproduce permanently in the time. Thus, all the expansion of the demand aggregated would have irreversible effects on the inflation, so that it would be completely incompatible to maintain a weak and steady inflation in the same way in the time to a monetary politics activates.

Besides, through the test of Wald, the restriction made about the sum of the coefficients associated to the two retarded values of the inflation (either equal to 1), the table n°4 indicates that this hypothesis is rejected. He/it indicates that the variations of the gap and the exchange rate don't produce any permanent effects.

Table n°4: Test of Wald

Restriction $\alpha_2 + \alpha_3 = 1$		
	Value	Probability
F-statistical	26.46577	0.0001
Chi-two	26.46577	0.0000

In the diagram 4 the function of impulse is constructed between the gap and the inflation to illustrate the dissolution of the effects of a positive gap. It's observed then, that the inflationary effects of a rate positive of 1% disappear after one year.

Fig. n°4: Response of inflation to a shock of 1% of the gap
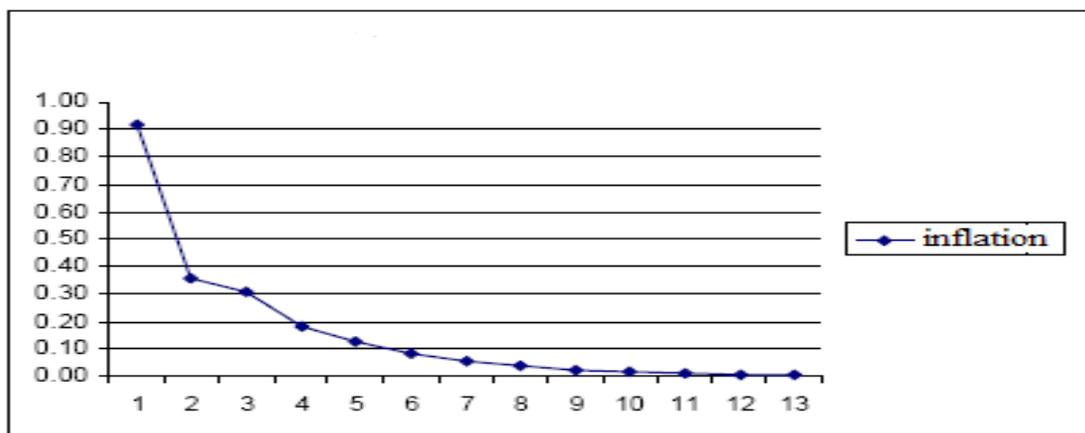
Of this fact, it's possible to maintain a constant margin of increase of the incomes in the same way above the productivity to a steady inflation in Tunisia. By means of an exercise of the dynamic balance one has consequently that: if the monetary authorities thought to reach the goal of a rate of inflation of 2% and to maintain this constant rate through the time, he/it would be completely compatible with a constant gap of the income-productivity of 0.9% and with stationary exchange rate.

$$\pi = 0.39\,(2\%) + 0.18\,(2\%) + 0.92\,(0.9\%) + 0.42(0) = 2\%$$

If one does a similar exercise with the model that contains the gap salary-productivity, while maintaining the rest of the constant incomes, then to reach an inflation of 2% is compatible with an increase sustained of the salary of 1.56% above the productivity of work. However, the possibility to execute this politics depends in big measure, of the availability of international reserves and the external incomes that permits to defend the stability of the exchange rate facing the pressures of excessive demand of foreign currencies. The households have the possibility to dedicate a part of the excess of the demand in the national currency to the acquirement of foreign currencies. This state becomes as critical with the monetary duality. The situation of the external finances and the external trade presents itself, therefore, as other macroeconomic determinants of the inflation. And if these variables are omitted, the monetary authorities would be pushed to devalue the national currency, increasing the inflationary pressures thereafter.

5. Conclusion

To shortcoming this work, a first conclusion clears itself: the conventional specification of the Curve of Phillips cannot be used like a structural model of inflation for Tunisian economy. However, the validation of this model can be made in an alternative path. And that, while giving a new specification to the components of the model as the inflationary inertia, the exchange rate, as well as an alternative measure of the gap or the excess of the demand. The evaluations suggest that the determinants fundamental of the inflation in Tunisia are essentially the incomes of the population, the productivity of work, the influence of the exchange rate and the inertia in the process of the inflation. Besides, it is possible to maintain a constant margin of increase of the incomes above the productivity next to a goal of low inflation. Nevertheless, the possibility to achieve a politics of this type depends to a great extent on the availability of international reserves and external incomes that allow defending the stationary exchange rate before the pressures of the demand of foreign currencies.

The valued model can be useful to achieve exercises of politics simulation aiming to program the increases centralized of wage in the correspondence with the future increase of the productivity, the expansion of other sources of incomes alternative to the salary, the inflationary inertia and the exchange rate. Besides, this model permits to avoid the episodes of volatility of the inflation. It would be as useful at the time of a transition toward a more preventive economic politics, less restraining with the wages and to keep a steady and weak inflation rate.

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