

Adjustment and Growth: Macroeconomic Performance of the IMF and World Bank Integrated model for Selected Mediterranean and MENA Developing Countries

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Abstract

The aim of this article is to study the method of macroeconomic analysis in developing countries which accentuate on the programs advocated by the IMF and the World Bank from the model known as the "Integrated Model IMF-World Bank". This research makes a comprehensive evaluation of the applicability of this model to analyze the performance of adjustment programs in the case of six countries in the Mediterranean and Middle East and North Africa (MENA) region, namely, Algeria, Egypt, Iran, Morocco, Tunisia and Turkey during the period 1974-2006. We analyze also the effects of different policies (domestic credit, government spending, tax proceeds and exchange rate), on three objectives: growth, balance of payment equilibrium and inflation. Regarding to our results, the model gives us good economic comparison among these countries. Turkey is the closet to the anticipation of the model. For all of the countries there is a downward trend in domestic prices. Thus balance of payments is considered as the priority and inflation remains the second goal of the model. Therefore the model is not capable of giving a complete package of policy for no country.

Keywords: Integrated IMF-World Bank Model, Structural Adjustment, Economic Growth, MEENA, Mediterranean.

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1. Introduction

The IMF and World Bank have worked out a policy framework to design the macroeconomic stability and economic growth (Przeworski and Vreeland, 2000). In fact, these two international institutions view external financing and adjustment programs in L.D.Cs (Low Developing Countries), considered as complementary frameworks and they use these programs as theoretical structure to support their lending plans. Therefore, a series of macroeconomic models appeared to evaluate these programs¹. Besides, in the cadre of four main approaches, the “before-after”, the “with-without”, the “generalized evaluation” and the “comparison of simulations”, a lot of research has been conducted to measure the effects of Fund’s programs. Khan et al. (1990) merged the two approaches to provide a policy model known as “Integrated model” (Khan and Haque, 1998). This model is the synthesis of the basic monetary approach which derived from the IMF financial program, based on the Polak monetary model and from World Bank two-gap growth model, or Harrod-Domar model, based on the Revised Minimum Standard Model (RMSM). In fact, this model is the merged of the basic monetary approach, used at the Fund for designing its adjustment programs, and of the growth model, used at the Bank for its macroeconomic projections².

This paper studies the feasibility of the “Integrated IMF-World Bank model” for six Mediterranean and MENA developing countries, Algeria, Egypt, Iran, Morocco, Tunisia and Turkey. These countries have almost similar economic structures and they are situated in the same region; they have not high level of income per capita, state intervention in the economy is considerable and, in terms of technology, they are dependent on developed countries. We consider this model to analyze and evaluate adjustment and growth program for these developing countries (Pastor, 1987)

In Algeria, total debt has become twice from 1985 to 1988 and in 1990 they started the negotiations with IMF in order to rescheduling

their debt. From 1991 to 1992 its economy benefited from the oil price and they had the current account excess and thereby they succeeded again to get help from IMF and World Bank. In 1993, Algeria faced a period of political instability and it turned to planned economy. Also this period was along (accompany) with decrease of oil price and hence the country got into the hard period. Finally, Structural Adjustment Programs (SAPs) were implemented in 1994 when the external debt was extremely high. But the effect of these policies is not evident because Algeria’s economy is heavily dependent on oil and we can see the economic growth in periods of rising hydrocarbon prices and considerable deterioration of the economy when hydrocarbon prices decline. Likewise after 2006 because of the oil price augmentation, the balance of payments restored, the external reserves increased and the external debt declined.

Egypt began the stabilization and structural reform in 1991. The first phase of these programs was applied to 1996, consisted of controlling the fiscal deficits, exchange rate reform, price and interest rate liberalization and privatization (Hutchison and Noy, 2003 and Taylor, 1988). The second phase, after 1996, emphasizes on speed up privatization and pursue other reforms vigorously. But these programs have not been completely put into operation and the country could not provide a good opportunity for private investment, nor for the absorption of private savings and the unemployment rate remain still high. The drastic devaluation in 2002 to boost exports could not have the expected achievements, because of high inflation and parallel exchange market. In addition it should be mentioned that Egypt is the second largest recipient of external financial assistance flows. The proportion of external debt into GDP decreased from 1991 to 2001 but this trend changed in 2002 and Egypt faced critical economic situation. International organization engaged again to allocate the financial aid to Egypt. Then they adopted the flexible exchange rate regime which engenders intensive depreciation, around 25%, in money national. After 2006, the country has tried to restructure its program of privatization and financial liberalization. Economic growth has picked up steadily and unemployment rate reduce from 2006-2007.

Iran has been never under the direction of international institutions such as IMF and the World Bank. Iran, however, has attempted to apply economic policies that indirectly have many aspects of the SAPs. This country has faced two grand events, the 1979

¹ See Khan and Montiel (1981), Aghevli and Sassanpour (1982), Otani and Sassanpour. (1988), Vaez-Zadeh (1989), Khan (1990), Agénor (1990), Reinhart (1990), Haque et al. (1990), Haque et al. (1991), Sushanta and Moor (2008) and Dicks-Mireaux et al. (1997).

² In addition, Berthomieu and Tykhonenko (2006) examined the impact of the Structural Adjustment Programs in the cadre of “integrated IMF-World bank model”, in the case of Russia.

Islamic revolution and the war of 1980-88 with Iraq. After the war, the economy deteriorated and the country's infrastructure weakened. Three five-year plans have been outlined; the first one, for the period 1990-94, targeted economic reforms such as liberalization and reconstruction of war damage. In 1991, the old system of multiple exchange rates was replaced by a triple-rate regime. The plan has not been very successful because its objectives were too ambitious. The second plan, for 1995-1999, was more realistic. But the country faced a debt crisis. The third plan, for 2000-2006, included a major program of reforms such as privatization, unification of the exchange rate and authorization license for private banks. The third plan was more successful than the other two. The fourth plan was coincided with the presidential changes in 2008. The objectives of this plan have not followed by the new government. After the oil price sharp increases, the government took the excessive and ambitious measures of expansionary monetary and budgetary policies which produced high inflation rate.

The period 1972-1982 in Morocco has indicated by high government intervention. In 1983 the economic instability and debt crisis which have been started from the end of 70s and early 80s, made the country to implement the SAPs. These programs targeted the public expenditures, extern commercial, privatization and external investment. In the first step of SAPs implementation they adopted the budgetary policy. The period 1994 to 2006 can be nominated as the second phase of the SAPs in Morocco. These reform programs emphasis on commercial and financial liberalization and privatization. But despite of implementation of these programs the growth rate remained weak and investment kept the same level as before. After 2006 certain signs of economic improvement appeared such as increase in GDP per capita and in international reserves but there is still remained a large gap between urban and urban areas in Morocco.

Tunisian economic can be divided in to five periods up to 1995; the first is "nationalization" from 1956 to 1961, the second is "socialist experience" between 1961-1969, the third is "capitalization under the control" between 1970-1981, the fourth is "economic crisis" between 1982-1986 and the fifth is "economic liberalization" between 1987-1995. Between 1982 and 1986, Tunisia faced an economic crisis, high unemployment, low growth and the debt problem. In 1986 it was officially engaged in the SAPs. After 1987, the country has been progressively oriented towards an open economy,

despite a number of achievements, the unemployment rate remained high. In this period Tunisia signed an accord with European Union to eliminate the customs tariff till 2010. Between 1995 and 2005, the country has pursued its reforms and opening process but despite of the certain successes in privatization and economic reforms the private sector in Tunisia still remained small. Therefore one specific strategy has adopted from World Bank to apply, to help the government to achieve their goals, for the period 2005-2008.

Turkey tried to apply structural adjustment programs in the latest 1980's and particularly after 1990's. In 1980 this country tried to apply the economic reforms by opening its economy and encouraging exportations. In 1988-1993 Turkey has confronted high inflation and real exchange rate depreciation. Turkey has faced three crises from 90's till now; the first one was financial crisis in 1994 which engendered the great slump in its economy. The expansionary monetary and budgetary policy from 1987 accumulated the budget deficit and it has influenced the exchange market and the attack on the national money. The second crisis has it was crisis of demand contraction in 1999. This crisis started from the real sector of economy but it ended in the financial sector which weakened the banking system. The third one it was again a financial crisis, in 2001. The share of public debt and debt interest rate into GDP increased intensively and the financial system deteriorated (Mallick and Granville, 2005). IMF imposed the restrictive budgetary policy which not allowed the government to apply the massive investment. World Bank also disposed the flexible exchange regime. In all of these crises, Turkey has always suffered from high inflation and has tried to implement SAPs to fight against the situations which its economy was faced. In 2002 after great devaluation Turkey has faced the profound economic problem and high inflation because of his fragility banking system. But after 2003 with entering the private sector in investment and the adaptation of appropriate international trade policy the economy started to show a great sign of economic growth.

Section 2 outlines the IMF/World-Bank integrated model and examines its working from the point of view of growth and inflation. Section 3 presents the estimation of the key parameters of the model for these six countries. More precisely, we make a comprehensive assessment of the applicability of this model to analyze the performance of adjustment programs for each country in the period 1974-2006. This section also describes the initial position of the

macroeconomic equilibrium of the country related to economic growth and inflation. Section 4 analyzes the effects of different economic policies, like changes in domestic credit, in government spending and/or tax proceeds and exchange rate, on growth, inflation and balance of payments equilibrium. Section 5 presents concluding remarks.

2. The IMF/World-Bank Integrated Model

The integrated model, which was presented by Khan et al. (1990), has two building blocks: the first one, a monetary block, has been derived from the Fund programs, and the second is a variant of the standard ‘Harrodian’ growth model, which has been derived from the Bank’s programs. The IMF model has been linked the monetary approach to the balance of payments and ensures consistency between the monetary impact of the policy changes and the desired balance of payments outcome. The Bank model is a variant of the two-gap growth model or Harrod-Domar model for an open economy, so called as the Revised Minimum Standard Model (RMSM). The IMF approach is concentrated on financial variables and the World Bank’s focus on real variables so that the result of combining the monetary approach and the Harrodian growth model gives a unified framework in which the domestic price level, the output and the balance of payments equilibrium can be simultaneously determined.

The macroeconomic accounting framework is divided into the four following sectors: the private sector, public sector, the foreign sector, domestic banking sector (Donovan, 1982, 1983).

The private sector:

The private sector is assumed to own all factors of production and disposes from the nominal income. It holds (Y) for providing private consumption (C_p), taxes (T), investment (ΔK), the variation of cash balances (ΔM^d) and of the foreign assets (ΔF_p), minus borrowing of private sector from the banking system ($-\Delta D_p$). Then the private sector’s budget constraint is:

$$Y - T - C_p - \Delta K \equiv \Delta M^d + \Delta F_p - \Delta D_p \quad (1)$$

The public sector:

The public sector received taxes and uses the proceeds for as government consumption. The budget constraint for the public sector:

$$0 \equiv T - G - \Delta F_g + D_g \quad (2)$$

where (T) is the global tax perceived by the

government, (G) the public expenses, (ΔF_g) the variation of the foreign assets detained by the government and (ΔD_g) net of borrowing of public sector from the banking system.

The foreign sector:

The foreign sector receives revenues from of imports purchased by the domestic economy and it spends on domestic exports. The foreign sector budget constrain defines the balance of payment:

$$\Delta R = X - Z - (\Delta F_g + \Delta F_p) \quad (3)$$

X and Z are the values of exports and imports in nominal terms, measured in local currency; (ΔR), measured in local currency, is the variation of the foreign reserves held by the Central bank.

The domestic banking sector:

The Banking sector is simply a financial intermediary which acquires assets in the form of international reserves and claims on the domestic private and public sector and supplies its own liabilities in the form of money to private sector. The variation of the money supply is the consequence of the variation of the Central bank foreign reserves (ΔR) plus the increase of the domestic credit ($\Delta D_p + \Delta D_g$) borrowed by the private and public sectors:

$$\Delta M^s = \Delta R + \Delta D_p + \Delta D_g \quad (4)$$

The fund components:

Following Polak’s approximation, the relation between real (Δy) and nominal (ΔY) variation of output can be written as:

$$\Delta Y = \Delta P y_{-1} + P_{-1} \Delta y \quad (5)$$

P_{-1} and y_{-1} are the last period’s price level and real GDP, respectively (\cdot).

The domestic aggregate price level P varies over time for two reasons: the change of the price of the locally produced goods (ΔP_d) and the change of the international price level through imports. Thus the following price equation obtains:

$$\Delta P = (1 - \theta) \Delta P_d + \theta \Delta \hat{e} \quad (6)$$

where (θ) is the share of imports in the overall price index and (\hat{e}) the exchange rate (the domestic currency price of the foreign currency); in this equation domestic price variation (ΔP_d) is assumed to be independent from foreign prices.

Equation (4) changed to reflect the valuation effects of exchange rate on the central Namk

balance sheet:

$$\Delta M^s = \Delta R + R^f_{-1} \Delta \hat{e} + \Delta D_p + \Delta D_g \quad (4')$$

where $R^f_{-1} \Delta \hat{e}$ is the revaluation of the former reserves.

According to the IMF model, the usual equilibrium condition between supply and demand of money ($\Delta M^s = \Delta M^d$) is introduced in the merged model through the adequate values for ΔM^s and ΔM^d . The variation of the money demand follows the usual monetary equation (the velocity of money is assumed to be constant):

$$\Delta M^d = v \Delta Y \quad (7)$$

where v is the inverse of the velocity of money, which is assumed to be exogenous and constant in short and medium terms. Thus the monetary equilibrium condition is:

$$v \Delta Y = \Delta R + \Delta D_p + \Delta D_g + R^f_{-1} \Delta \hat{e} \quad (8)$$

The exports and imports equations are the following:

$$X = X_{-1} + (X_{-1} + c) \Delta \hat{e} - c \Delta P_d \quad (9)$$

$$Z = Z_{-1} + (Z_{-1} - b) \Delta \hat{e} + b \Delta P_d + a \Delta y \quad (10)$$

where c and b are the sensitivities respectively of exports and imports, in physical terms, to the variations of the exchange rate; a is the marginal propensity to imports ($\Delta Z = a \Delta Y$). ΔF_g and ΔF_p are the net accumulations of the foreign assets held by the public and the private sectors respectively. They have to be revaluated according to the variation of the exchange rate as follows:

$$\overline{\Delta F_g} = \overline{\Delta F_g} (1 + \Delta e) \quad (11)$$

$$\overline{\Delta F_p} = \overline{\Delta F_p} (1 + \Delta e) \quad (12)$$

$\overline{\Delta F_g}$ and $\overline{\Delta F_p}$ are the amounts of the foreign assets demanded before the variation of the exchange rate.

The World Bank components:

The growth of real output as a function of the level of investment may be written as:

$$\Delta y = \rho^{-1} \frac{\Delta K}{(1 + \Delta P)} \quad (13)$$

where Δk is the total domestic investment and ρ is incremental capital-output ratio; in other words, the production function binding capital and output is from a Harrodian type. ΔP denoting the variation of the domestic global price level and Δk is equal to $\Delta K / (1 + \Delta P)$.

Consumption function can be specified:

$$C_p = (1 - s)(y - T) \quad (14)$$

where s is the ratio of private saving to disposable income.

The Intergraded Model:

The joint model is exercise by Khan et al (1990). Real output, in the Fund model, is determined outside the system and prices, in the Bank model, are considered exogenously. The integrated model can determine growth, inflation and the BOP. The merge of the Bank and IMF models divided into a price output, a monetary and an external sector. All equations are drawing from the previous sections.

Investment ΔK is financed by private savings which is in constant proportion to disposable income $s.(Y - T)$; thus from Equation (1) and by rewriting Y as $Y_{-1} + \Delta Y$, we obtain:

$$\Delta K = s(Y_{-1} + \Delta Y - T) - \Delta M^d - \Delta F_p + \Delta D_p \quad (1')$$

Y is the nominal income it holds for providing, C_p , private consumption, T taxes, ΔK investment the variation of cash balances ΔM^d and of the foreign assets ΔF_p , and, finally, the reduction of borrowing from the banking system $-\Delta D_p$.

Finally, the basic structure of the integrated model is given by the thirteen preceding Equations (1) to (13) and it can be summarized like in Table 1:

Table 1: The IMF/World-Bank Integrated Model

Target variables	Endogenous variables	Exogenous variables	Control or decision variables	Parameters
	ΔP	$Y_{-1}; y_{-1}$		ρ
Δy	ΔY	P_{-1}	$T \text{ or } G$	θ
ΔP_d	$\Delta M^d; \Delta M^s$	$X_{-1}; Z_{-1}$	ΔD_p	v
ΔR	$X; Z$	ΔF_p	ΔD_g	a
	$\Delta F_p; \Delta F_g$	ΔF_g	Δe	b
	ΔK	R_{-1}^f		c
	$T \text{ or } G$			s

Source: Authors

The given values of the seven behavioral parameters and of the predetermined variables, the thirteen equations of the merged model help to determine the endogenous variables, conditional to the exogenous ones and the control instruments. Following Khan et al. (1990), “solving the model leads to two relationships between Δy and ΔP_d which can be regarded as the Bank component and the Fund component” of the integrated framework.

The heart of the Bank component is the ICOR relationship (1’); substituting first (7) in (13) and then (2) in the (13) and using the equation (5) for ΔY and substituting ΔP from (6) yield the first relationship between (ΔP_d) and (Δy):

$$\Delta P_d = \frac{-I + (\rho - (s-v))\Delta y}{(s-v)(1-\theta)y_{-1}} \quad (15)^1$$

where

$$I = (1-s)T - G + sy_{-1} - \Delta F + \Delta D + (s-v)\theta y_{-1} \Delta \hat{e}$$

with

$$(\Delta F = \Delta F_g + \Delta F_p) \text{ and } (\Delta D = \Delta D_g + \Delta D_p).$$

The relationship (15) is the equation of a curve, denoted BB, in ($\Delta P_d, \Delta y$) space. Its slope is given by:

$$d\Delta P_d/d\Delta y|_{BB} = \frac{(\rho - (s-v))}{(s-v)(1-\theta)y_{-1}}$$

As we can see, the slope and the position of the curve BB depend on the initial value of output (y_{-1}), the fiscal deficit (determined by tax proceeds (T) and government expenditure (G)), the level of foreign assets (ΔF), the changes in domestic credit (ΔD) and in nominal exchange

rate (Δe), the velocity of money and the structural parameters of production and saving behavior.

The second relationship between (Δy) and (ΔP) is derived from the money-market equilibrium condition (8). By substituting the equation for ΔY into the flow demand for money (7), and the substitution of both couples (9), (10) and (11), (12) in the balance of payments constraint (2) gives an expression for replacing (ΔR) on the money demand side of the equation (8). On the money supply side, the substitution of (5) in (2) yields the value of (ΔM^s) in terms of (Δy) and (ΔP) (with the same normalization ($P_{-1}=1$)⁸ assumed before). The second relationship thus obtained is the “Fund component” of the merged model⁹:

$$\Delta P_d = \frac{E - (v+a)\Delta y}{v(1-\theta)y_{-1} + (b+c)} \quad (16)$$

where

$$E = [X_{-1} - Z_{-1} - \overline{\Delta F} + \Delta D] + [X_{-1} - Z_{-1} - \overline{\Delta F} + (b+c) - v\theta y_{-1} + R_{-1}^f] \Delta \hat{e}$$

The relationship (15) is the equation of a curve, denoted FF, in the same space ($\Delta P_d, \Delta y$) as for BB and its slope is given by:

$$d\Delta P_d/d\Delta y|_{FF} = \frac{-(v+a)}{v(1-\theta)y_{-1} + (b+c)}$$

The slope and position of the curve FF depend on initial conditions, the level of foreign reserves, domestic credit growth, the income velocity of money and the weight of importable in the domestic price index; note that FF is always a negatively-sloped.

The curves BB and FF in ($\Delta P_d, \Delta y$) space depict respectively the real and monetary possible equilibrium and their intercept define the unique macroeconomic equilibrium position for the economy. For the sake of our study, their intercepts with the vertical axis are also meaningful because their sizes depend on the main instrument variables $\Delta D, \Delta E, T \text{ or } G$, which the government has to manage in order to control

¹ Berthomieu and Tykhonenko (2006) have observed that there are two mistakes [or at least two misprints] in the Khan et al. (1990) paper on p.174 : in their expression (28), the term $(1-\theta)y_{-1}$ is replaced by $[v(1-\theta)y_{-1}]$ and, in their expression (15) [to be compared to our expression (E)], the term $(-\Delta D)$ inside the first brackets is replaced by $(+\Delta D)$ and the term (θy_{-1}) inside the second brackets by $[v\theta y_{-1}]$.

and fix the current equilibrium position of the economy. The sizes of these intercepts are algebraically given by $-I / ((s - v)(I - \theta) y_{-1})$ and $E / (v(I - \theta) y_{-1} + (b + c))$ for the BB and FF respectively.

Consequently, the values of the parameters s , v , θ , b , c (as well as the values of the predetermined variables $\Delta \bar{F}$, y_{-1} , X_{-1} , Z_{-1} , R_{-1}^f) appear to be crucial for the size of these intercepts; it is the same for ρ and a , which play a role in the slopes of both curves. Therefore, the empirical values for these parameters have to be estimated for the Iranian and the Turkish economies, in order to apply the model for analyzing the macroeconomic policy implemented during this last decade in these countries.

3. Estimation Results

In a first step, before the assessment of the seven parameters of the model, we examine the

stationarity of all the time series used in our estimation. The ADF Unit Root Test shows that, for the period from 1977 to 2006, most variables are stationary at first difference. We can specify that once variables are considered as variation, they become stationary. In a second step, the parameters are estimated in the linear econometric system with six equations drawn from the model (money supply, price level variation, GDP growth in real terms, consumption, imports and exports), using annual data for the period 1974-04. The estimation of simultaneous equation system, with the two-stage least-squares (2SLS) method, makes it possible to obtain a more efficient and therefore a more reliable economic analysis with a better comparison between the principal parameters of these six countries. Table 2 and Table 3 report major equations and related estimates, respectively.

Table 2: Major Equations of the Integrated Model

Six major equations draw out from the “integrate model”		Parameters	
Money demand	$M = v.Y$		
Inflation rate	$\Delta P = (I - \theta). \Delta Pd + \theta. \Delta \hat{e}$	ρ	Incremental capital-output ratio (ICOR)
Real output	$\Delta y = (\rho^{-1}). \Delta K / (I + \Delta P)$	v	Inverse of the income velocity of money
Consumption	$Cp = (I - s)(y - T)$	s	saving rate
Imports	$Z = Z_{-1} + (Z_{-1} - b). \Delta \hat{e} + b. \Delta Pd + a. \Delta y$	θ	Share of importable in the price index
Exports	$X = X_{-1} + (X_{-1} + c) \Delta \hat{e} - c. \Delta Pd$	c	Sensitivity of export to the domestic prices
		b	Sensitivity of import to the domestic prices
		a	Marginal propensity to imports

Source: Authors

Table 3: The Estimates of the Integrated Model's Parameters

Coefficient	Algeria	Egypt	Iran	Morocco	Tunisia	Turkey
ρ	4.71	1.69	5.49	1.49	1.84	2.23
v	0.76	0.27	0.43	0.43	0.20	0.04
s	0.26	0.08	0.31	0.14	0.23	0.20
θ	0.40	0.12	0.02	0.36	0.52	0.01
c	0.31	0.10	0.19	-0.03	0.06	-0.03
b	0.03	0.09	-0.13	0.23	-0.06	-0.19
a	0.04	0.24	0.02	0.30	0.14	0.54

Source: Authors

According to our results the value of the coefficient (ρ^{-1}) that measures the impact of a unit variation of investment on the GDP variation (correlation between economic growth and that of investment) is 0.21 for Algeria, 0.59 for Egypt, 0.18 for Iran, 0.67 for Morocco, 0.54 for Tunisia and 0.44 for Turkey. As we can see,

ρ is weak¹ in these developing economy; for Iran and Algeria value is slight higher because of the a large share of oil revenues in the GDP, which increases the size of the state and needs large

¹ Montiel and Haque (1991) considered the value of (ICOR) between 4 and 7, which seems too high for our countries.

amounts of heavy public investment and for other countries the factors of production are more efficient.

" v " is an inverse of the circulation of money, indicating the "marginal propensity to hoard" (the tendency of people to keep the cash). According to our results, this parameter is positive for all countries. But in Algeria, this value is greater than in the other countries which can be related to the unstable political situation in this country.

The parameter θ is greater for Turkey and Iran it means the share of domestic prices in the total price index variation is less than other countries. This values for Tunisia is largest, it means that the influence of domestic price in inflation is not considerable.

The two components of the balance of payments (external sector) close the system and it establish a link between the real sector and monetary sector¹. The coefficient " b ", response of imports to the relative prices², is positive for Egypt and Morocco. For Algeria this value is also positive but insignificant. In Turkey this parameter is negative which means that the high inflationary pressure and also an anticipation of a high level of inflation do not allow that the exchange rate change (increase), decreases importations. For Iran and Tunisia is also negative but insignificant.

The parameter " a " represents the marginal import coefficient and indicates the elasticity of imports relative to GDP. For Iran and Algeria it is lower than other countries because of the large share of oil revenue in GDP and Tunisia have highest value which shows this country is more dependent on imports.

The parameter ' c ' is the coefficient which expresses the elasticity of exports over the proportion of the exchange rate on the domestic price index³. This coefficient is negative and

insignificant for Turkey and Morocco, in other words, despite higher prices, this country seems to keep the same level of exports. In other countries this parameter is positive.

3.1. The Baseline of the Model

In this section, we simulate the integrated model by giving the values of the estimated parameters to the policy instruments: monetary expansion (ΔD), fiscal policy (T or/and G) and exchange rate policy (Δe). The macroeconomic equilibrium baseline is important in order to analyze the impact of these policies on target variables of the model, inflation rate, growth and balance of payments (Goldstein and Monteil, 1986 and Gylfason, 1987). The intersection of the two curves, raised from equations (14) and (15), labeled by BB and FF in $(\Delta P_d, \Delta y)$ space, determines the macroeconomic equilibrium position.

In this case, the sign of the $(s-v)$, the difference between the marginal propensity to save (s) and marginal propensity to hoard the inverse of the income velocity of money (v) is determinant to specify the sign of the slope of the BB curve.

For the case of Algeria, Egypt, Iran and Morocco, this difference is negative and therefore the slope of BB is also negative, which means an increase in saving induced by an increase in nominal GDP is completely absorbed by the induced inflation. For Turkey and Tunisia, this difference is positive and the slope of BB is then positive and it has a higher slope than FF (in absolute value) for all countries. The slope of FF , derived from the money-market equilibrium condition, is negative or all of our selected countries. Substituting their numerical values for the parameters, one obtains the slope of BB and FF for these six countries as below (Table 4):

¹ For best results, we use the logarithmic form and therefore the coefficients express the elasticity.

² According to the logarithmic form of the model, one unit change in the variation domestic price causes " b " unite changes in importation.

³ Depending on the model, a variation of one unit of exchange rate causes a " c " unite changes in exportation.

Table 4: The slope of BB and FF

	Algeria	Egypt	Iran	Morocco	Tunisia	Turkey
$d\Delta Pd/d\Delta y _{BB}$	$-43.05/y_{-1}$	$-17.29/y_{-1}$	$-57.31/y_{-1}$	$-6.7/y_{-1}$	$145.48/y_{-1}$	$12.86/y_{-1}$
$d\Delta Pd/d\Delta y _{FF}$	$-1.83/y_{-1}$	$-1.9/y_{-1}$	$-2.22/y_{-1}$	$-2.47/y_{-1}$	$-3.53/y_{-1}$	$-12.53/y_{-1}$

Source: Authors

In order to locate the equilibrium point we calculate Δy^* and ΔPd^* at the intersection of BB and FF as:

$$\Delta y^* = \frac{[(s - v) \cdot (1 - \theta) \cdot y_{-1} \cdot E_1 + v \cdot (1 - \theta) \cdot y_{-1} \cdot I_1 + (b + c) \cdot I_1]}{v + a) \cdot (s - v) \cdot (1 - \theta) \cdot y_{-1} + [\varphi - (s - v)] \cdot [v \cdot (1 - \theta) \cdot y_{-1} + (b + c)]}$$

$$\Delta P^* = \frac{[\varphi - (s - v)] \cdot E_1 - (v + a) \cdot I_1}{(v + a) \cdot (s - v) \cdot (1 - \theta) \cdot y_{-1} + [\varphi - (s - v)] \cdot [v \cdot (1 - \theta) \cdot y_{-1} + (b + c)]}$$

In the equilibrium position D and F are supposed to be constant ($\Delta E = \Delta D = \Delta F = 0$). Therefore, the adequate values for I and E at the equilibrium point yield:

$I_1 \sim I'_1 = T - Cg + s \cdot (Y_{-1} - T)$ and $E_1 \sim E'_1 = X_{-1} - Z_{-1}$. The coordinates of the equilibrium, in our selected countries, have shown in Table 5:

Table 5: Theoretical Macroeconomic Equilibrium Points

	Δy^*	ΔPd^*
Algeria	$\frac{-0.299y_{-1}E_1 + 0.455y_{-1}I_1 + 0.346I_1}{2.131y_{-1} + 1.802}$	$\frac{5021E_1 - 0.804I_1}{2.131y_{-1} + 1.802}$
Egypt	$\frac{-0.172y_{-1}E_1 + 0.24y_{-1}I_1 + 0.811I_1}{0.365y_{-1} + 1.529}$	$\frac{1.88E_1 - 0.509I_1}{0.356y_{-1} + 1.529}$
Iran	$\frac{-0.117y_{-1}E_1 + 0.419y_{-1}I_1 + 0.057I_1}{2.303y_{-1} + 0.529}$	$\frac{5.614E_1 - 0.451I_1}{2.303y_{-1} + 0.319}$
Morocco	$\frac{-0.185y_{-1}E_1 + 0.274y_{-1}I_1 + 0.201I_1}{0.345y_{-1} + 0.357}$	$\frac{1.78E_1 - 0.726I_1}{0.34y_{-1} + 0.357}$
Tunisia	$\frac{0.02y_{-1}E_1 + 0.097y_{-1}I_1 + 0.0002I_1}{0.180y_{-1} + 0.0036}$	$\frac{0.8E_1 - 0.344I_1}{0.180y_{-1} + 0.0036}$
Turkey	$\frac{0.162y_{-1}E_1 + 0.038y_{-1}I_1 + 0.193I_1}{0.174y_{-1} + 0.399}$	$\frac{2.067E_1 - 0.579I_1}{0.174y_{-1} - 0.399}$

Source: Authors

In the case of Algeria Δy^* is always positive. The determination the sign of ΔPd^* is function of the sign of the trade balance ($X - Z$), and this leads us to two different results. Thus, for the periods (1981-1984) and (1997-2006), when the trade balance is positive, the sign of ΔPd^* is positive. In contrast in the periods (1974-80), 1999 (1985-96), when $(X - Z) < 0$, the sign of ΔPd^* is negative. This shows the important role of the trade balance on the location of the

equilibrium point. Figures (1) and (2) represent the two possible situations in Algeria.

In the case of other countries the denominators are positive and the signs of nominators depend on the budget deficit and trade balance. For the production variation, the sign of nominator is positive but for the price variation, nominator is negative. For the five other countries Δy^* is always positive and ΔPd^* is always negative (Figures 3 and 6).

In Iran the sign of $(T - G)$ is always negative⁹. That is to say that, in Iran, the level of public expenses is already very high, even before taking into account public investment. Turkey is the closest case to (and the most compatible with) the expectations of the integrated model. The absolute values of the slopes of the BB and FF curves are almost the same. But the theoretical macroeconomic equilibrium, according to the integrated model, for all countries is characterized by a negative price variation at the equilibrium point and there is a downward trend in domestic price variation.

The estimated parameters and the equilibrium point localization, in the previous section, are now used to illustrate some policy issues who arise from the stabilization program designed to improve a country's disequilibria intern and extern (Montiel and Haque, 1991). The object of this section is to simulate the integrated model in the case of these six countries in order to test the impact of some adjustment policies. We consider the three policies proposed by the integrated model: an increase in domestic credit, devaluation and a decrease (increase) in government spending (taxes).

3.2. Policy Impact

a) Reducing the Fiscal Deficit:

In the integrated model, a decrease in government spending or an increase in taxes shifts only the locus BB to the right and the FF's position remaining unchanged¹⁰. But for knowing the exact impact of this policy on output and inflation, we should analyze and

determine the coordinates of the new equilibrium point (Table 6 and Figures 5 and 6).

A decrease of public expenditure (or an increase of tax) decreases the "intercept" of the curve BB, which means that it moves "to the right" and the production variation increases and the inflation level decreases in all of countries (Figures 7-12).

In Algeria, the effect of this policy is positive on production and lead to lower inflation in both periods but the comparative analysis shows that this policy is more effective when the trade balance is positive (Figure 13). The negative slope of BB in Morocco and Egypt is lower than in Iran and this makes this policy more favorable in these countries (Figure 14)¹¹. The comparative regard shows that the application of this policy is more effective for Iran and Tunisia than for Turkey (Figures 15 and 16).

Also, we can analyze the effect of an increase in the tax proceeds¹². As for a decrease in government spending, an increase in fiscal revenues shifts the locus BB to the right. As a result, the inflation rate ΔP_d decreases and the decrease in real GDP becomes less important.

⁹ We can divide the period into three parts: between 1980-1993 when the trade balance was negative ($X - Z < 0$), and between 1974 -1979 and then 1994 -2006 when the trade balance was positive ($X - Z > 0$).

¹⁰ The multipliers of the government expenditure on the target variables for the locus BB are:
 $d(\Delta P_d) / d(\Delta Cg) / BB = 1 / (s - v)(1 - \theta)y - 1$
 $d(\Delta y) / d(\Delta Cg) / BB = -1 / [\rho + (v - s)]$

¹¹ The increase in production in Iran is lower than in the other two countries ($g < f$) and lower inflation is also less strong ($e < h$)

¹² The multipliers of tax proceeds : $d(\Delta P_d) / d(\Delta T) | BB = (1 - s) / [(v - s)(1 - \theta)y - 1]$
 $d(\Delta y) / d(\Delta T) | BB = (1 - s) / [\rho + (v - s)]$

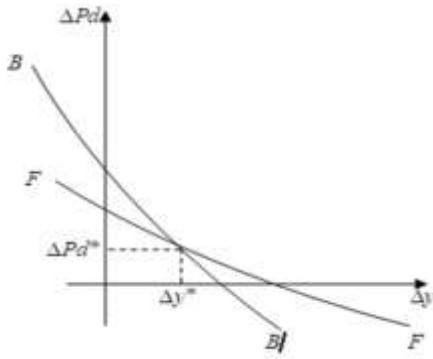


Figure 1: Algeria over the periods 1974-80, 1999 and 1985-96
 Source: Authors

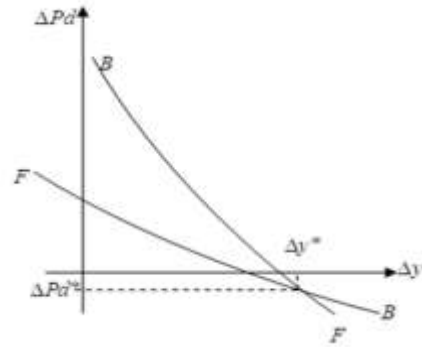


Figure 2: Algeria over the periods (1981-1984) and (1997-2006)
 Source: Authors

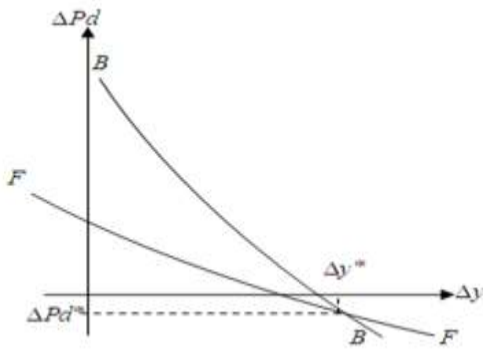


Figure 3: Egypt and Morocco over the period (1974-2006)
 Source: Authors

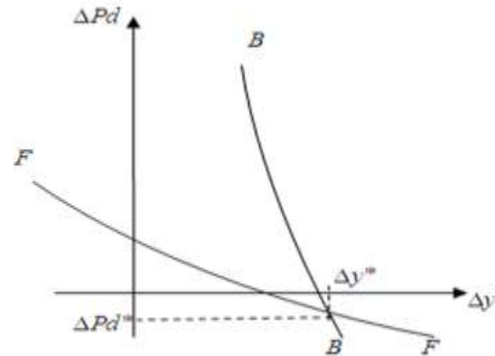


Figure 4: Iran over the period e period (1974-2006)
 Source: Authors

$$d(\Delta y^*)/d(\Delta Cg) = \frac{-[v \cdot (1 - \theta) \cdot y - 1 + (b + c)] \cdot Cg}{(v + a) \cdot (s - v) \cdot (1 - \theta) \cdot y - 1 + [\varphi - (s - v)] \cdot [v \cdot (1 - \theta) \cdot y - 1 + (b + c)]}$$

$$d(\Delta P^*)/d(\Delta Cg) = \frac{(v + a) Cg}{(v + a) \cdot (s - v) \cdot (1 - \theta) \cdot y - 1 + [\varphi - (s - v)] \cdot [v \cdot (1 - \theta) \cdot y - 1 + (b + c)]}$$

Table 6: The new equilibrium points through a decrease in government spending

	$d(\Delta y^*)/d(\Delta Cg)$	$d(\Delta P^*)/d(\Delta Cg)$
Algeria	$\frac{-[0.455y_{-1} + 0.346]}{2.131y_{-1} + 1.802}$	$\frac{0.804}{2.131y_{-1} + 1.802}$
Egypt	$\frac{-[0.240y_{-1} + 0.811]}{0.365y_{-1} + 1.529}$	$\frac{0.509}{0.365y_{-1} + 1.529}$
Morocco	$\frac{-[0.419y_{-1} + 0.057]}{2.303y_{-1} + 0.319}$	$\frac{0.451}{2.303y_{-1} + 0.319}$
Iran	$\frac{-[0.274y_{-1} + 0.201]}{0.354y_{-1} + 0.357}$	$\frac{0.726}{0.354y_{-1} + 0.357}$
Tunisia	$\frac{-[0.097y_{-1} + 0.002]}{0.180y_{-1} + 0.0036}$	$\frac{0.344}{0.180y_{-1} + 0.0036}$
Turkey	$\frac{-[0.038y_{-1} - 0.1933]}{0.174y_{-1} - 0.399}$	$\frac{0.579}{0.174y_{-1} + 0.399}$

Source: Authors

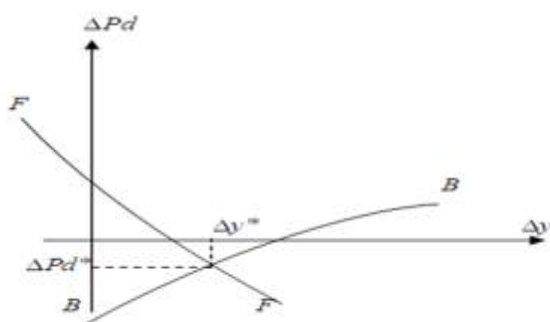


Figure 5: Tunisia over the period (1974-2006)

Source: Authors

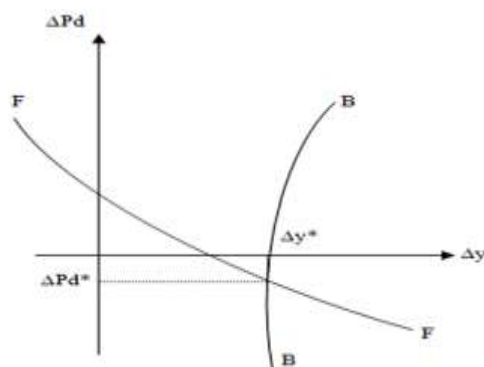


Figure 6: Turkey over the period (1974-2006)

Source: Authors

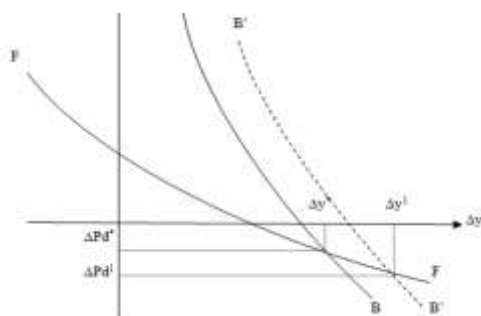


Figure 7: The effect of a government expenditure decrease for Algeria over the periods (1981-1984) and (1997-2006)

Source: Authors

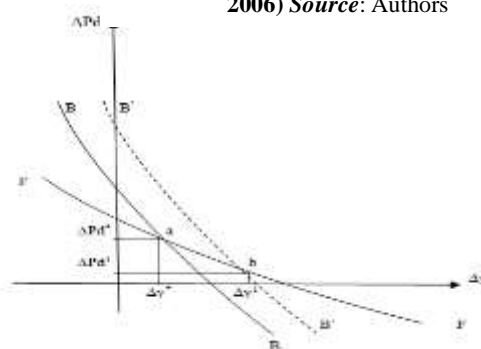


Figure 8: The effect of a government expenditure decrease for Algeria over the periods (1974-80), 1999, (1985-96)

Source: Authors

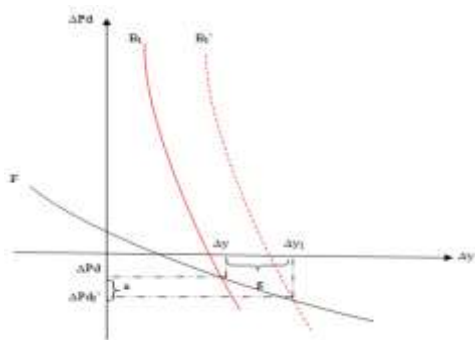


Figure 9: The effect of a government expenditure decrease for Egypt and Morocco over the period (1974-2006)
 Source: Authors

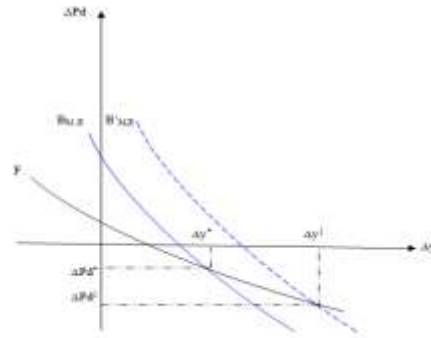


Figure 10: The effect of a government expenditure decrease for Iran the period (1974-2006)
 Source: Authors

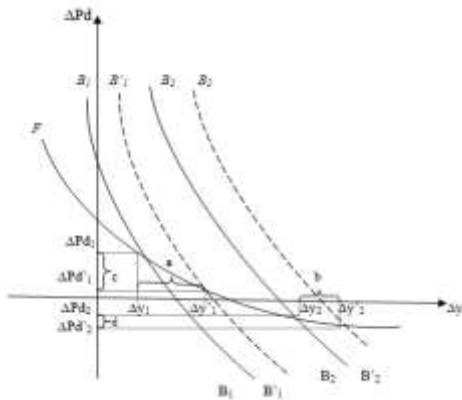


Figure 11: The effect of a government expenditure decrease for Tunisia over the period (1974-2006)
 Source: Authors

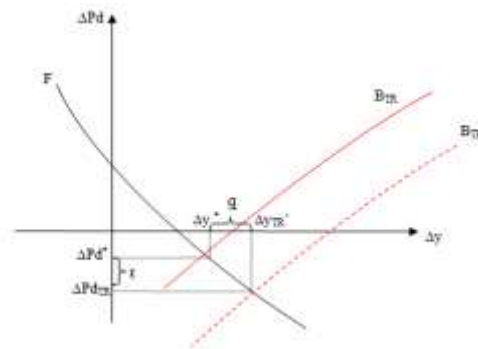


Figure 12: The effect of a government expenditure decrease for Turkey over the period (1974-2006)
 Source: Authors

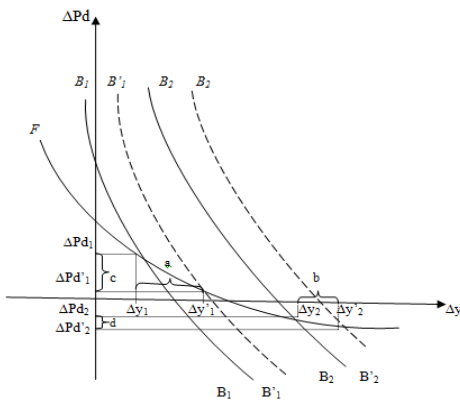


Figure 13: Comparison of the effect of a government expenditure decrease between two periods in Algeria
 Source: Authors

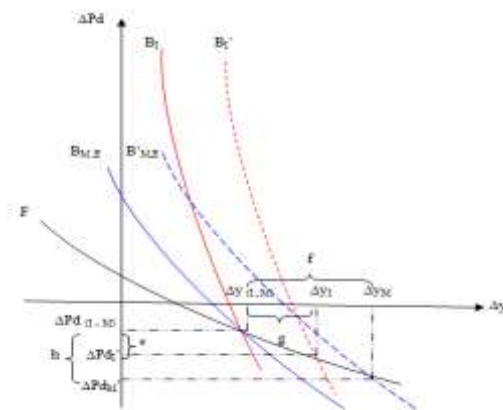


Figure 14: Comparison of the effect of a government expenditure decrease between Iran and Egypt and Morocco
 Source: Authors

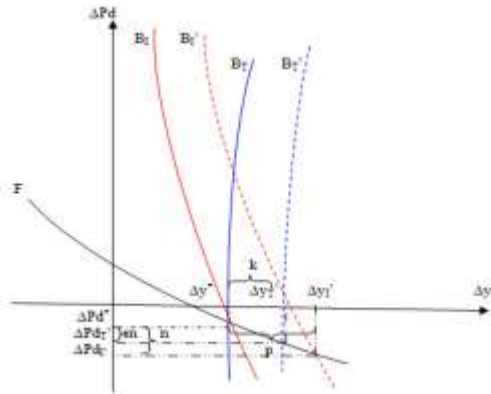


Figure 15: Comparison of the effect of a government expenditure decrease between Iran and Tunisia
Source: Authors

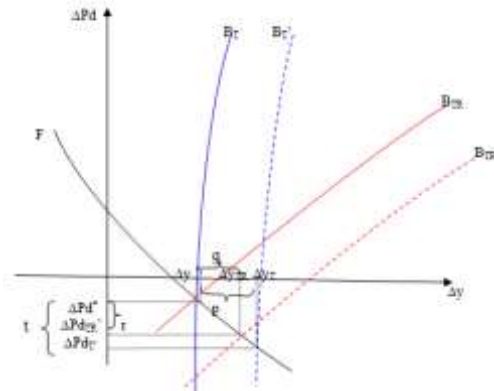


Figure 16: Comparison of the effect of a government expenditure decrease between Tunisia and Turkey
Source: Authors

b) A Decrease in Domestic Credit

In the integrated model, an increase in the domestic credit, assumed to go to private and public sectors, create a flow of an excess supply of money. This policy modifies the position of both curves (their slopes remain unchanged but their intercepts shift) and shifts the macroeconomic equilibrium position.

These modifications induce an augmentation of the price level which, in turn, increases the money demand. The domestic credit multipliers, along BB, on the changes in domestic prices and in real GDP are respectively:

$$\begin{aligned} d(\Delta P_d) / d(\Delta D) \Big|_{BB} &= -1 / (s - v) \cdot (1 - \theta) \cdot y_{-1} \\ d(\Delta y) / d(\Delta D) \Big|_{BB} &= 1 / [\rho - (s - v)] \end{aligned}$$

In its turn, the “reaction” of the locus FF on the increase of the rate of domestic credit expansion depends on its multipliers:

$$d(\Delta y^*) / d(\Delta D) = \frac{s \cdot (1 - \theta) \cdot y_{-1} + (b + c)}{(v + a) \cdot (s - v) \cdot (1 - \theta) \cdot y_{-1} + [\varphi - (s - v)] \cdot [v \cdot (1 - \theta) \cdot y_{-1} + (b + c)]}$$

$$d(\Delta P^*) / d(\Delta D) = \frac{\varphi - s - a}{(v + a) \cdot (s - v) \cdot (1 - \theta) \cdot y_{-1} + [\varphi - (s - v)] \cdot [v \cdot (1 - \theta) \cdot y_{-1} + (b + c)]}$$

Substituting the parameters by their values yields two positive multipliers. Consequently an increase in the rate of domestic credit expansion shifts to the right the macroeconomic equilibrium position defined by the intersection of the two

$$\begin{aligned} d(\Delta P_d) / d(\Delta D) \Big|_{FF} &= 1 / [v(1 - \theta)y_{-1} + (b + c)] \\ d(\Delta y) / d(\Delta D) \Big|_{FF} &= 1 / [v + a] \end{aligned}$$

However, to determine the impact of this monetary policy on the target variables, we have to analyze the new macroeconomic equilibrium. The abscissa of the two loci intersections moves to the right on the horizontal axis, but the displacement of its ordinate on the vertical axis is ambiguous. In the other hand, despite the fact that we can predict in what direction the curves BB and FF move, we cannot determine the precise displacement of both curves BB and FF. To get the exact effect of this policy on the macroeconomic target variables (ΔP_d^* and Δy^*), we should determine the inflation and output variations for the new equilibrium point; then, we calculate the theoretical multipliers for inflation and growth:

curves. These two multipliers are positive; that means that inflation and output variations increase if is applied a policy of increase in the rate of domestic credit expansion (Table 7).

Table 7: The new equilibrium point in an increase of domestic credit

	$d(\Delta y^*)/d(\Delta D)$	$d(\Delta P^*)/d(\Delta D)$
Algeria	$\frac{0.155 y_{-1} - 0.346}{2.131 y_{-1} + 1.802}$	$\frac{3,866}{2,131 \cdot y_{-1} + 1,802}$
Egypt	$\frac{0.677 y_{-1} - 0.811}{0.365 y_{-1} + 1.529}$	$\frac{1.377}{0.365 y_{-1} + 1.529}$
Morocco	$\frac{0.0907 y_{-1} - 0.201}{2.303 y_{-1} + 0.319}$	$\frac{1.079}{2.303 y_{-1} + 0.319}$
Iran	$\frac{0.302 y_{-1} - 0.043}{0.354 y_{-1} + 0.357}$	$\frac{5.163}{0.354 y_{-1} + 0.357}$
Tunisia	$\frac{0.1097 \cdot y_{-1} - 0.052}{0.180 y_{-1} + 0.0036}$	$\frac{0.48}{0.180 y_{-1} + 0.0036}$
Turkey	$\frac{0.201 y_{-1} - 1.807}{0.414 y_{-1} + 3.838}$	$\frac{1.578}{0.414 y_{-1} + 3.838}$

Source: Authors

With increase of domestic credit moves the curve BB and FF to the right and it tends to higher inflation rate but to positive changes in real GDP (Figures 17-22).

Regarding the results, this policy in Algeria is more favorable when the trade balance is negative (Figure 23). The comparative regard between Iran, Egypt and Morocco shows that this

policy is more efficient in Iran than in Egypt (Figure 24). The comparative regard shows that this policy is more efficient in Turkey than in Iran and Tunisia (Figure 25). Because the effect of this policy on inflation is more considerable in the case of Iran and Tunisia and also the output augmentation is less Turkey (Figure 26). Hence, this policy is more efficient in Turkey.

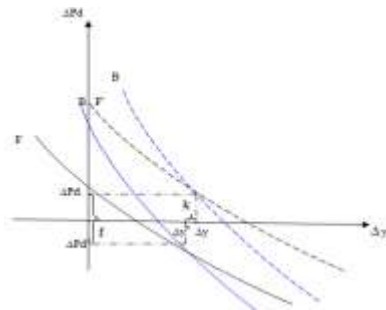


Figure 19: The effect of an increase of the domestic credit for Egypt and Morocco over the period (1974-2006) Source: Authors

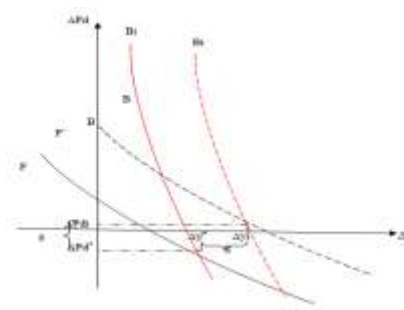


Figure 20: The effect of an increase of the domestic credit for Iran over the period (1974-2006) Source: Authors

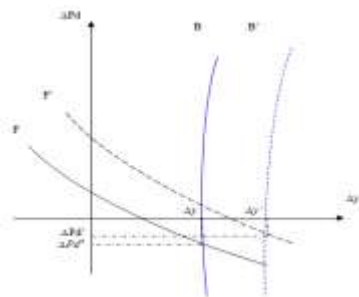


Figure 21: The effect of an increase of the domestic credit for Tunisia over the period (1974-2006) Source: Authors

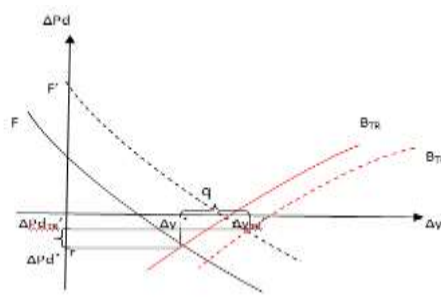


Figure 22: The effect of an increase of the domestic credit for Turkey over the period (1974-2006) Source: Authors

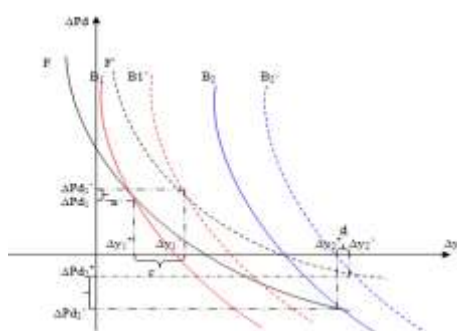


Figure 23: Comparison of the effect of an increase of the domestic credit between two periods in Algeria
Source: Authors

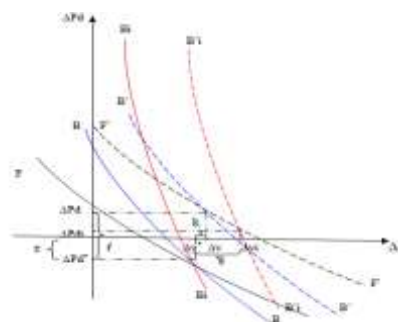


Figure 24: Comparison of the effect of an increase of the domestic credit between Iran, Egypt and Morocco
Source: Authors

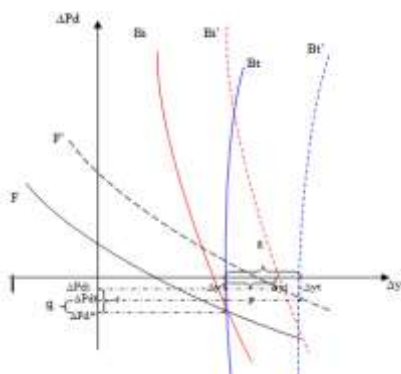


Figure 25: Comparison of the effect of an increase of the domestic credit between Iran and Tunisia
Source: Authors

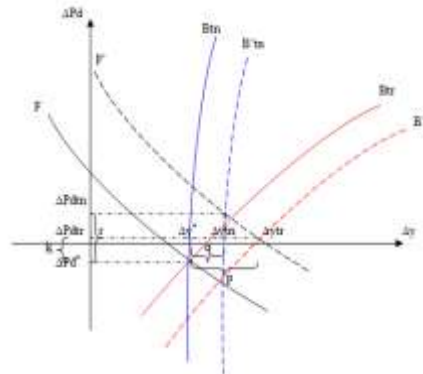


Figure 26: Comparison of the effect of an increase of the domestic credit between Tunisia and Turkey
Source: Authors

4. Conclusion

The purpose of this article was first to estimate the adequacy of the Integrated IMF and World Bank model for six developing countries and then by using the calibrated model for each country, to simulate the impact of the implementation of various macro-economic policies (fiscal, monetary and exchange rate policies) on the key macroeconomic variables such as output, growth and inflation [see Barro and Lee (2002), Bagci and Perraudiu (1995) and Conway (1994)].

In Algeria officially SAPs were implemented in 1994, in Egypt these programs were applied in two phases in 1991 and in 1996, in Morocco they implemented in two periods between 1983-1993 and 1994-2006, Iran which has never been directly under some so-called adjustment programs, however tried to adopt, more or less, many elements of these adjustment programs in its economy, In Tunisia after the economic crisis in 1986 they officially undertaken in the SAPs

and finally in Turkey the structural adjustment and liberalization started from the 80's.

It is not easy to evaluate merely the effect of these programs in these countries. For example, the experience shows that changes in oil prices in the medium term can be very varied, in the last ten years the price has changed from 8.5 to 150 dollars a barrel, so in Iran and Algeria, two countries which their economies are heavily dependent on the oil incomes, it is complicated to evaluate the stabilization programs. With the lack of enough severity in the operation of economic programs the oil revenue can change the direction of the programs which have been already planned. SAPs in Egypt had not been completely put into operation and the country could not provoke the private investment, nor for the absorption of private savings. In Morocco we cannot see considerable evolution in the growth rate during these programs. After large period of close economy, the country has attempted to implement economic liberalization and open his

economy, while Turkey has tried to apply SAPs several times but always the country has faced economic problems.

The estimated values of the parameters arisen from the model provide us the possibility of an accurate comparative analysis between countries. Regarding the estimated parameters the value of ICOR in Algeria and Iran is higher than other countries because of the large share of oil income in its economy.

In Algeria, because of political instability, the tendency to keep the cash (inverse of the circulation of money), is greater than other countries and inversely for Turkey is less than other countries.

The share of the domestic price index variation θ is greater for Iran and Turkey, it means that for both countries, the share of the domestic inflation in the total variation of the consumer prices index is more important than the imported inflation.

In Iran inflation is rather the result of an excessive seigniorage or due to unfinished projects which were initiated by the State or by companies dependent on it. Because the oil price variation has direct impact on public expenditure and in particular on investment. The government is taking excessive commitments and therefore during the years of falling prices it is obliged to reduce its expenditure on investment therefore it remains large number of unfinished projects.

According to the results for Turkey, inflation and production increased in 1989, 1995 and 2002, the years just after the implementation of the devaluation policy, In particular, in 2002 after a devaluation of about 50%, this country has experienced serious economic problems (one million Turkish liras for one euro) because of the great fragility of the banking sector. For the remainder of the period, the effects of devaluation that we have found are contractionary in Turkey. In Iran, the effect of this policy on the target variables follows the situation of the balance of payments. As we have seen, the model cannot clarify the effects of devaluation on the target variables. Generally, the devaluation policy should apply parallel with appropriate monetary and fiscal policies.

The elasticity of imports with respect to the exchange rate variations for Turkey is negative, because of the pressure and the anticipation of high level of inflation and production cost

increase in parallel with the price imports.

The elasticity of exports with respect to an exchange rate variation turned out to be negative and non-significant in Turkey. In fact, exports in Turkey are more affected by European bilateral trade agreements with this country than with exchange rate policy variations. In Iran, the elasticity of exports with respect to an exchange rate increase is not enough positive. This shows the high effect of oil revenue in the combination of Iran exports. Consequently the policy of devaluation may not be a suitable policy to boost exports and restrain imports in this country. In Tunisia is more dependent on importation comparing with the other countries.

According to the model a contractionary fiscal policy reduces inflation and can increase output growth in all countries. In Egypt, Morocco and Iran, this policy is more effective, because the production augmentation is more significant than other three countries. In Iran the sign of (T - G) is always negative, in other words the level of public expenditure is always very high.

The expansion of domestic credit increases production and price variation similarly in all countries. But, comparative result between these countries shows that this policy is more effective in Turkey than other countries because the production augmentation with respect to the price augmentation is higher. That means that, in Turkey, this policy may cause lower inflationary pressures.

As we have seen, there is a downward trend in domestic prices. This underestimates the real price variation that comes from the study of the interaction of both curves BB (the condition of a balanced growth) and FF (the balance of the goods and services). In this context, the equilibrium of the balance of payments is considered as the priority, and inflation remains the second goal of macro-economic policy that can be well analyzed by means of the model.

Accordingly, the results may show a "divergence" gap with the actual situation of the economy. In the integrated model Fund-Bank does not incorporate macroeconomic features such as wages and the direct effects of the interest rate. In addition, from our point of view, the consideration of external debt is the first change that can be applied in the model to improve the results of our estimations.

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