The fiscal stimulus in Algeria between 2005 and 2014: A predictable failure

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Abstract

This paper tries to show that the massive public expenditures incurred in Algeria, during successive growth programs since the early 2000s, didn't give rise to the economic growth rates that could justify such a vast amount of expenditures. This situation poses a problem of rares wasted resources and poor performances. With little effect on economic growth, increased income distributed during these programs have given rise, however, to an unprecedented increase in imports of goods and services. From a purely theoretical point of view, this situation is paradoxical but not impossible. A simple IS-LM model made it possible to predict this outcome. The structural and institutional constraints of the Algerian economy, clearly indicated the likelihood of such an outcome. From the beginning, the instigators of this economic policy should know its limits and choose another one. That is very important for a country like Algeria whose economy is weak and dependent. Ultimately, it is the strategy of insertion of the Algerian economy into the global economy that, finally, will determine the outcome of any growth policy.

1. Introduction

The March 17, 2019 edition of the Bloomberg agency said that Algeria is becoming the sixth member of the "shaky five" of OPEC[1]. The article refers to the political crisis that has shaken the country since February, following the outgoing president's desire to run for what would have been a life-time presidency. This crisis is likely to aggravate the decline in oil production (a drop of 400,000 barrels/day since 2014). This political crisis occurs in a very gloomy economic context, due to a drop in Algerian financial revenues, following a sharp fall in oil prices.

In fact, the causes of this spring 2019 citizen uprising are not only political. The economic factors played a key role in this major event. The economic crisis that hard hit the country following the brutal turnabout of the international oil market, since 2014, has various aspects: huge foreign trade and fiscal deficits, running the printing press and rampant inflation, economic stagnation, austerity policies and aggravation of unemployment, etc. This crisis comes after a period of splendour, from 2001 to 2014, when exceptional oil prices allowed the country to gain considerable sums of international payments. During that period, this financial windfall was used

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[1] The other five are Iran, Venezuela, Nigeria, Libya and Angola.

by the public authorities for the prepayment of Algeria's external debt, the constitution of foreign exchange reserves, and funding the development and modernization of infrastructures (BP, 2014, p.17).

As will be indicated in the text below, the expected results of these public expenditure programs never materialised. The economic growth rates have been very disappointing given the amount spent, and unemployment has remained at high levels. However, this is not the main issue of the article. The most interesting part of the article is to show that, theoretically speaking, relying on a simple *IS-LM-BP* model, the unsatisfactory results achieved by these programs were predictable. This failure, beyond the relevance of the mode of economic governance who has endorsed such a strategy, calls into question, above all, the legitimacy of the political authority under the responsibility of which this policy was conducted.

This issue may seem rudimentary and rather unambitious. However, if we put the subject in the local context of the period, the importance of our article appears more clearly. The economic crisis in which Algeria has been plunging since 2014 is a direct consequence of the policy that has been followed throughout the previous decade. If, therefore, the outcome of the strategy that guided economic policy for such a long time was known in advance, the interest in the article becomes all the more certain, as some oil-producing countries like Venezuela, Nigeria and Angola face similar challenges. The article also makes it possible to provide an answer to the question that was raised by many Algerians, at the height of the ongoing political crisis, about the fate of the amounts spent during this economic strategy: " What has happened to the 1000 billions of dollars? ". It is the suspicions of the widespread corruption and mismanagement surrounding the spending of these amounts that would be one of the factors behind the outbreak of the citizens' revolt during this spring 2019.

It should also be noted that the data of the article stop at the year 2014 because, from this date, the government expenditures changed logic. They went from an expansionary one, allowed by the budget surpluses of the previous period, to a logic of mitigating the effects of the crisis that began that year, by means of the fund of the State regulation receipts which was instituted years ago.

2. 2005-2014: a strong inflection in the curve of public expenditures

In 2005, the Algerian authorities have decided to launch a program of public spending primarily focused on the development and modernization of infrastructures and public facilities. Initially valued at $ 45 billion, subsequently increased to $ 155 billion to cover the period 2005-2009, the *Program for Growth Support*, was renewed in 2010 as part of a five-year plan called *Public Investment Plan* with an amount of $ 286 billion.

Figure 1 reflects the evolution of public spending from 1980 to 2014. On the first side, it shows a very contrasted evolution between 1990 and 1980 decades, and in the other side, the period 2005-2014. Like other oil countries, government expenditures are highly correlated to changes related to oil taxes through the international oil prices[2]. The government spending changes during the first period fits perfectly with the evolution of oil prices in international markets. We notice perfectly the successive and opposite impacts of the oil crisis on the evolution of government spending.

From this point of view, the successive increases in public spending occurred since 2000 can be seen as a catch-up effort from delays in infrastructures and public facilities accumulated for nearly two decades due to the government shrinking tax revenues following the oil crisis of the late 1980s[3].

If the fact that public spending rerises after a long period of austerity is something quite normal, however, the increase rate in these expenditures, very high in recent years, is not without posing the problem of the rationality of such a contrasted trend. This one goes against the recommendations of international financial organizations that require to the governments of countries facing severe economic fluctuations - the oil countries are a perfect illustration - to ensure that the state budget serves as countercyclical stabilizer. A proportion of the financial surplus of good years is to be set aside to finance the deficits of lean years.

In Algeria, this precautionary principle was put into practice, officially from 2000, with the creation of the Receipts Stabilization Fund (RSF). The latter is supplied from the difference between budgeted oil taxes, drawn up on the basis of a barrel at 37 dollars, and the real oil tax, resulted from oil sales calculated on international markets average price[4].

Taking advantage of external financial upturn of the 2000s, the Algerian government has increased the allocation of the RSF, from 453.2 billion Dinars, the year of its creation to 7.917 billion Dinars in 2012[5].

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[2] The oil tax is 76%; from 2009 to 2013, for example, it represented between 58 and 40% of total government revenues. Ministry of Finance.
[3] For 2013, the exception that represents the decline in the level of public spending is due to the non-enactment of a complementary finance act, a practice that has become the norm for many years.
[4] Until 2008, the government budget was issued on the basis of $ 19 a barrel of oil, then $ 37 since this year. These levels are well below the average real price of oil on international markets.
[5] That is $5.86 billion and $ 102 billion respectively.
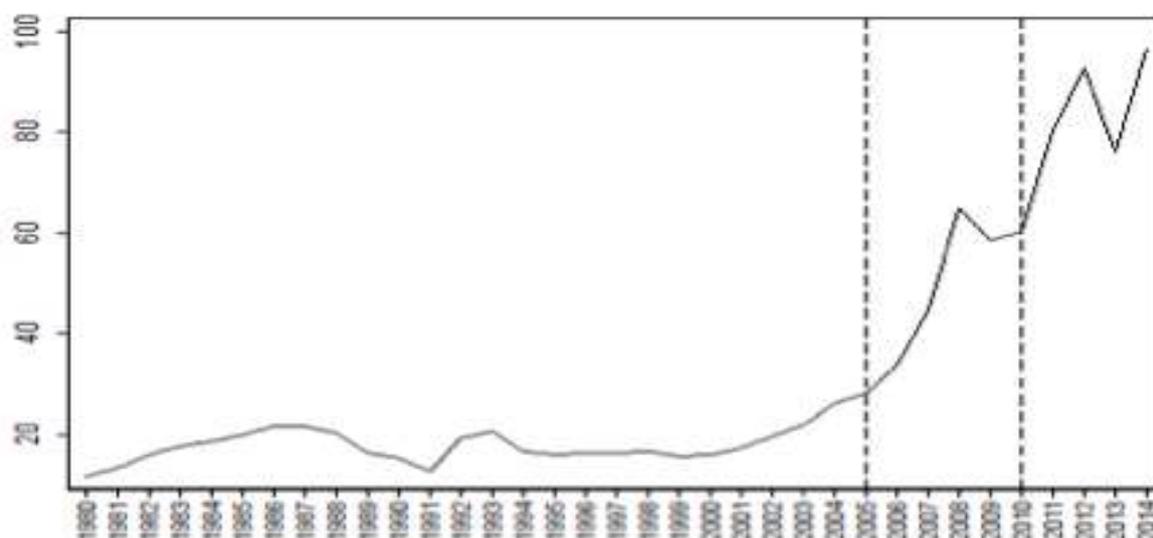
Figure 1: Public expenditures in the period 1980-2014 (billion of current USD)[6]

Source: *World Development Indicators*, World Bank.

In the following paragraphs, when talking about budget deficits, we need to understand that they are fictitious deficits insofar as the real revenues of the government exceed its overall spending.

Table 1. The assets of the Receipts Stabilization Fund, 2000 - 2012 (billion of dinars)

2000	2001	2002	2003	2004	2005	2006	2007	2008	20009	2010	2011	2012
453	356	198	477	944	2090	3640	4670	5503	4681	5635	7143	7917

Source: Ministry of Finance

In 2011, Algeria budget revenues reached 3.4738 billion Dinars while the government spending attained 5.9304 billion Dinars; this led to a final deficit of 2.4566 billion Dinars. The assets withdrawn from the RSF to pay off the public deficit reached 2283,2 billion Dinars in 2012, the most important since 2000. The withdrawn in 2012 appear largely up to those recorded in 2011, when they reached 1.7614 billion Dinars[7]. In late 2012, the RSF assets after withdrawal were amounted to 5.6337 billion dinars against 5.3817 billion Dinars at the end of 2011. The surplus on oil taxes, usually supplying the RSF reached 2.5353 billion Dinars in 2012. For 2013, this tendency to massive use of the Stabilization fund has not been contradicted. Thus, an amount of 2.1324 billion Dinars was deducted from the RSF assets to cover the 2.3104 billion Dinars public deficit (Ministry of Finance, 2013).

These assets were used in the early years to prepay the debt of the state, which was a foreign debt mainly. This one has decreased from $ 23.3 billion Dollars in 2003 to 17,19 billion in 2005 and 5.6 billion in 2006 (Bank of Algeria, 2006). From 2006, the RSF has changed its vocation. Its funds were exclusively used to cover the Treasury budget deficit, induced by the five-year development programs. Since 2006, the assets' withholdings remained at a significant rate due to the worsening of the budget deficit.

Data from the Ministry of Finance (2013) indicate that the RSF was requested to cover the Treasury deficit to an amount of 91.5 billion Dinars in 2006, 531.9 billion Dinars in 2007, 758.1 billion Dinars in 2008, 364 billion Dinars in 2009, 791.9 billion Dinars in 2010 and 1761 billion Dinars in 2011. Thus, the oil barrel price which

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[6] Public expenditures are generally expressed in local currency. We preferred to express them in current dollars because the Dinar devaluations that took place in the early 1990s may make it less readable the real evolution of public spending. See the link on this subject: http/perspective.usherbrooke.ca

[7] The budget of Algeria soared in 2012 because of the financial impact of the application of compensatory regimes and special status resulting in an overall deficit Treasury amounting to over 25% of GDP, largely filled by RSF savings. Wages of the Civil Service thus increased, between 2008 and 2012, from 1126 billion Dinars to 2850 billion Dinars.

balances the state budget rose to $ 21.32 in 2004, $60.58 in 2010, $68.46 in 2012 and over than $71 in 2013–[8]. The regulatory amendments introduced in the function of the RSF since 2006 to enable public authorities to freely dispose the funds that it holds, finally put an end to the pro-cyclical savings function assigned to this financial instrument (Boukelia, 2013, p.21).

The capital contributions mobilized during these equipment programs are, in all respects, very important and likely to remain unprecedented. The Ministry of Finance report quoted above indicates that in 2013, State spending for direct and indirect public subsidies for the essential goods (milk, water, bread, fuel, energy) and social programs (education, housing, health, higher education) reached 1.603 billion Dinars more than $ 20.5 billion, that's the equivalent of 22% of the budget State and 9.3% of GDP.

3. The impact on economic growth and external balance

Beyond the direct cost representing the public spending weight for the economy through this policy, the latter was conducted over a relatively long-time interval to allow making a first estimate. We do here a first evaluation of performances in terms of economic growth and the current account balance, which are the two most relevant criteria for this study.

3.1. Feeble rates of growth

Concerning the first objective, from 2004 to 2013, the GDP real growth rate has hovered around an average of 3.3% (IMF, 2005-2013, pp. 56-57). During this period, as shown in Figure 2, the Algerian economy did often less than other regional economies, and compared to African countries south of the Sahara, Algeria's growth rates are very disappointing.
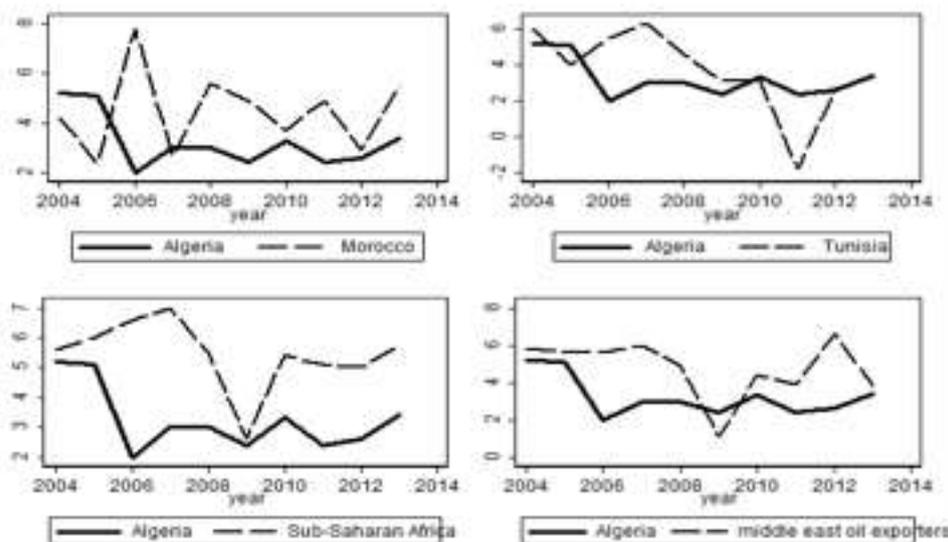
Figure 2. Comparison of economic growth rates in Algeria with neighbor countries and regional subsets (2004-2013)

Source: FMI, *World Economic Outlook*, Annual Reports

Thus, countries belonging to the same geographical or economic area as Algeria, mostly without having the same economic and financial strengths, achieved higher growth rates[9].

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[8] Calculations done by the authors.

[9] The few times where the Algeria growth rate is higher, it coincided with unusual or unpredictable factors that have severely affected these countries: weather conditions in Morocco, political crisis in Tunisia and the global economic crisis consequences for the sub-Saharan African countries and Middle-East oil exporters.

Table 2. Evolution of GDP and public expenditures measured in constant 2005 dollars (billion of Dollars)

	2005	2006	2007	2008	2009	2010	2011	2012
GDP	102,3	104,3	107,5	110	112,7	116,7	119,6	122,5
Public expenditures	27,9	30	35,2	41,5	47,3	42,6	48,2	53,6

Source: *World Bank* and calculations made by the authors based on data from the Ministry of Finance

As evidenced in Table 2, the Algerian growth, rather modest, is derived primarily from the increase in the contribution to the national income of public expenditures. They remain, with exports of hydrocarbons, the main component of Algerian GDP.

These two variables have grown in a relatively divergent way; indeed, they all have both increased throughout the period, but the growth of public spending is much stronger. On an annual average, the GDP grew by 2.55%, while government spending increased by 10.14%. Each year, it needs, on average and in real terms, to spend four points more to get a point of extra income.

In Algeria, the coefficient of correlation between these two magnitudes, $\square$, calculated on the basis of *World Bank* data (2013, p.79), is estimated to 0.64, which is significantly positive[10]. This situation is also confirmed through the evolution of the government spending ratio to GDP, which shows the presence of a strong and growing proportionality between public expenditures and domestic product.

In the identity that expresses the equation of national income, the increase of the public spending/ GDP ratio is necessarily at the expense of the share of other components in the national income.

Table 3. Changes from 2006 to 2012 in the components of the national income (%)

	2005	2006	2007	2008	2009	2010	2011	2012
Household Final Consumption	33,8	31,8	31,3	30,2	37,6	34,3	30,2	32,9
Gross Accumulation of Fixed Capital	18,5	15,5	14,8	11,7	20,2	22,2	20,9	17,2
Public Expenditures	27	28	31,4	38	41,9	36	40	44
Net Exports	20,7	24,7	22,5	20,1	0,29	7,5	8,9	5,9

Source: Bank of Algeria and National Statistics Office

Table 3 shows two major trends; from 2006 to 2009, due to a large surplus in the trade balance, the share of total government spending rose steadily, but at the expense of investment that fails to follow the rapid pace of national income. After 2009, the additional income dispatched through the public expenditure programs causes a significant increase in imports, which reduces the contribution of net exports to GDP. We will see later that these developments occurred in accordance with the scenario predicted by economic theory.

To conclude this section, we must say that this situation is not unique to Algeria. Generally, macroeconomists are skeptical about the possibility for a macroeconomic policy to affect the long run rate of economic growth (Rodrik, 2004, p.67). For them, there is in fact an uncoupling between economic policy (budget deficit, taxation, money supply), which should mainly affect prices and income stability, and long-term growth that should only depend on the structural characteristics of the economy (respect of property rights, market structure, market mobility, etc.) [(Easterly, 2005, p. 1037); (Acemoglu et al, 2003, p.13); (Aghion, 2007, pp. 284-285)].

What made the Algerian case special, is the extremely sensitive nature of the assets used during this policy and the memorable nature of it. This policy is being whacked on another obstacle, which is the unfavorable trend in the country's trade balance (Ames, 2001, p.21).

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[10] This coefficient, significant at 1%, was calculated by the Spearman's formula using data covering the period 2004-2012.

3.2. The trade balance under pressure

On the balance of payments front, as shown in Table 3, several highlights need to be emphasized. First, exports and imports evolved almost parallel. The two quantities are experiencing very strong growth, which is more outstanding for exports in the early years of the period. In annual rate average of growth, exports increased between 2005 and 2013 by 7.8%, while imports grew by 14.7%. However, while exports of goods (mainly hydrocarbons) are experiencing a real slowdown in recent years, imports of goods continue to grow significantly[11]. For 2013, the data shows that imports reached a record level of $ 55 billion against a level of exports falling to about $ 67 billion, largely as a result of a downward trend in the production of hydrocarbons.

Table 4. Evolution of foreign trade and foreign exchange reserves (billion Dollars)

	2003	2004	2005	2006	2007	2008	2009	2010	2011	2012	2013
Exports Fob	24,47	32,22	46,38	54,74	60,57	78,58	45,18	57,09	72,88	71,73	67
Imports Fob	13,32	17,95	19,57	20,68	26,35	37,99	37,40	38,88	46,92	51,59	55
Exchange Reserves (excluding gold)	32,92	43,1	56,2	77,8	110,1	143,1	148,9	162,2	182,2	190,6	194
In months of goods and non-factor services imports	**24,3**	**23,7**	**27,3**	**36,6**	**39,7**	**34,9**	**36,4**	**38,3**	**36,7**	**36,5**	**36,07**

Source : Bank of Algeria

This upward trend in imports of goods, is the most distressing because it combines with an equally significant increase in imports of services. These, which were $ 2.44 billion in 2001, have continued to increase, reaching in 2011 the sum of 12.55 billion. Thus, the deficit in this post that oscillates around $ 8 billion last years undermines all the surplus in the trade balance, itself showing a definite drop from the record level of 2008. It becomes more difficult in these conditions to continue to feed foreign exchange reserves. Their level, sharply increasing since 2001, peaked at $ 194 billion in 2013, and since 2014 have continued to decline to $ 79.8 billion in January 2019[12]. In the first half of 2013, the balance of payments has recorded a deficit of 1.2 billion, the first one since many years (Bank of Algeria, 2013).

It now appears that the achievements made during the two five-year plans, 2005-2009 and 2010-2014, were funded by using foreign currency at a rate of 65%, while 55% to 60% of domestic bank loans related to financing imports [13]. This was predictable because of the very precarious situation of the national productive apparatus, weakened by over two decades of crisis(Bradford, 1991, p.481) . Professor Lamiri considered that the economic elite of the country has failed in its mission of critical and impartial observer by giving a "total" support to government stimulus plans that, according to him, have cost the country "15 years and $ 500 billion for nothing."[14]

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[11] In Table 4, we find that foreign exchange reserves continue to grow in 2011 and 2012, while the number of months of imports that can cover is itself declining.

[12] The amount of foreign exchange reserves is really important only for a country, like Algeria, which is highly dependent on its exports of raw materials, whose prices may fluctuate significantly in the short term. This importance becomes quite relative when it comes to a country well integrated in the global economy.

[13] The Financial Times. May 12, 2014.

[14] *Liberté* newspaper. January, 08, 2014.

4. A predictable outcome: what we learn from the Mundell-Fleming model

The following paragraphs were inspired by J-O Hairault (2000, p.128). In this section, we will use an *IS-LM* model to try to show that Algeria's current macroeconomic situation matches the lessons learned from this theory[15]. Despite its limitations, mainly related to an analysis focusing too much on a global and static approach to be in position to take account of microeconomic agents choices, let alone expectations they are required to do, however, this model offers a quite solid theoretical framework to achieve conclusions consistent with those that concern us here (Langot, 2000, pp.151-154). It should also be recognized that this model is the product of an analysis, which is set in a market economy whose institutional framework is fully completed. This is not the case of the Algerian economy which can be seen, under analytical standards, as an atypical economy due to the absence of significant arbitration mechanisms like the financial market and the exchange market. We face here a situation where unrealistic assumptions still allow achieving meaningful results[16].

In this model, Algeria will be considered as a small opened economy, changes in its macroeconomic variables have a negligible effect on the rest of the world. This openness is rather relative especially with regard to capital movements. This is not a fatal handicap to the extent that the chosen model includes the situation of countries with low capital mobility.

The *IS-LM* model in an open economy is built around three equations, *IS*, *LM* and *BP*, each representing the balance between supply and demand in the relevant market[17]. These are, as everyone knows, markets for goods and services, currency and foreign trade, respectively. We will describe briefly the *BP* equation, the one related to the balance of payments, and we settle for a simple presentation of the first two because of the elementary nature of these. According to this model, the *IS* equation describes an equilibrium in the market of goods and services in which firms, constrained on their supply outlets, produce the required amount, Y, to meet aggregate demand Y_d.

In a closed economy, the *IS* equation can be written as:

$Y = Y_d = C\,(Y - T) + I\,(r) + G$

where :

Y: total income

C: the function of household consumption, $C = C_0 + c\,(Y - T)$

where c is the marginal propensity to consume,

T : taxes

r : the real interest rate

I : firms' investment whose function is : $I(r) = I_0 - a_1 r$;

$a_1 > 0$ being the degree of correlation between investment and interest rates.

G : Public expenditures, considered as an exogenous variable, *i.e.* $G = G_0$.

The steady state income is then expressed as:

$$Y = \frac{A - a_1 r}{1 - c} \qquad\qquad (IS)$$

with, $A = C_0 + I_0 + G - cT$

A is the autonomous component of demand or, in other words, the determinants of demand that do not depend on the interest rate or income.

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[15] Proposed by Sir John Hicks in 1937 in his article, "*Mr. Keynes and the Classics*". Despite the many criticisms it has received, this model is very taught and is propaedeutic for dynamic macroeconomic models. In a later article, Hicks admitted he has omitted and misunderstood some of the arguments of Keynesian thought, especially that of uncertainty (John Hicks, 1980-1981).
[16] Milton Friedman (1953, p.283) was originally of a major theoretical controversy by considering that the realism of the assumption of perfect competition does not really matter insofar as the conclusions of the theory are operational.
[17] They are in fact two separate authors' works, Mundell (1963, p.475), and Fleming (1962, p.371).

The equilibrium on the monetary market expresses the equality between the money supply, created by the State, and the stock of money held by households. The motives for holding money shows that the demand for money, M_d, increases with real income, Y, (motives of transactions and precaution) and decreases with the interest rate, r, (motive of speculation). The motives for holding money assets show that the demand for money, M_d, increases with real income, Y, and decreases with the interest rate, r. With P the index of goods and services prices consumed by households, the demand for money can be defined by the following equation:

$$\frac{M_d}{P} = L(Y,r) \quad ; \quad L1(Y,r) > 0, \quad L2(Y,r) < 0$$

As the equilibrium on the monetary market implies $Md = M$, it can be written:

$$\frac{M}{P} = L(Y,r)$$

The *LM* equation implies a relationship between income and the interest rate. It is possible to simply lay down the direction of this relationship by assuming that the demand for real balances has a linear form: $L(Y,r) = \ell_1 Y - \ell_2 r, \quad \ell_1 > 0 \quad \ell_2 > 0.$ The *LM* equation becomes:

$$r = \frac{1}{\ell_2}\left(\ell_1 Y - \frac{M}{P}\right) \qquad\qquad (LM)$$

The relationship between the interest rate and income is increasing. Indeed, when income increases, the demand for money increases; households, therefore, sell their securities which reduces their prices and increases the interest rate, allowing a return to equilibrium in capital markets.

In this case, the multiplier of public expenditures that are financed by borrowing, $(\Delta Bg / P)$[18], which is the implicit methode of funding in the *IS-LM* model since the stock market does not appear explicitly, and by considering only the coefficient on public expenditures in the income equilibrium equation, is equal to[19]:

$$\left(\frac{\Delta Y}{\Delta G}\Big|_{\Delta G = \frac{\Delta Bg}{P}}\right) = \frac{1}{(1-c) + \frac{a_1 \ell_1}{\ell_2}} \qquad\qquad (1)$$

In an *IS-LM-BP*- model, the openness to the rest of the world adds a double constraint to it; a real constraint and a financial constraint, which has as consequence the necessity to take into account new variables for working out equations that define the equilibrium of the model and its new properties[20]. The real constraint appears through goods and services exports and imports. The financial constraint, which should not be viewed independently of the previous one, establishes the methods of funding an opened economy (Frieden, 2020, p.8).

4.1. Behavior assumptions

Assumptions relative to consumer behavior, investment, money demand, public spending and taxation are not affected by the openness of the economy; so, they remain the same as in the previous paragraph. We assume for simplicity that the government does not take taxes, that $T = 0$, and that autonomous demand components are negligible, which gives: $I_0 = C_0 = 0$. The money supply function does not remain the same in an opened economy, which requires redefining and specifying the imports, exports and capital movements functions.

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[18] The size of the multiplier depends on the value of the four following parameters: the marginal propensity to consume c, the sensitivity of investment to interest rates $a1$, the sensitivity of money demand to income, and to interest rate. In summary, the fiscal stimulus will be more efficient that the investment is very sensitive to changes in interest rates (resulting from behavioral changes in money demand by households as a result of initial increased income, ΔY). Its effectiveness will be maximum in the elementary Keynesian model, where the investment is a purely exogenous variable, $I = I_0$ ($a_1 = 0$), in which case the crowding-out effect (anti-Keynesian effect) is nil.

[19] In the Algerian case, the increase in public spending is not financed through the use of public debt. However, debits made on this occasion on the RSF, which is a sovereign fund to cover part of the needs of future generations makes the two situations somewhat equivalent. This corresponds, in an overlapping generations model, to a situation where future generations will have to pay the debts of the current generation. Robert Barro (1974, p.1102).

[20] Mundell and Fleming keep most of the IS-LM model assumptions. Additional assumptions related to the liberalization of foreign trade, are usually adopted; we note in particular that relating to the perfect substitutability between domestic and foreign securities, which implies the parity relationship of interest rate not covered in exchange. We also retain that the purchasing power parity is not checked; thus, if E is the exchange rate quoted on the uncertain and P^* the general level of foreign prices, then $EP^* \neq P$.

4.1.1. Supply of money

In an opened economy, the domestic money supply is affected by international payments that give rise to currency movements whose reserves appear on the assets side of the Central Bank, and on the debit side of the aggregate banking system, making them a counterpart of the money supply. The money supply behavior can be defined by the following equation:

$$M^S = \bar{M} + M^R$$

where $\bar{M}$ is the stock of money issued in exchange of credits to the economy and M^R is the stock of money issued in exchange of foreign currency purchases. If we note M_0^R the stock of money corresponding to foreign exchange purchases held at the beginning of the period and ΔR variations in foreign reserves during the period, then: $M^R = M_0^R + \Delta R$. We assume for simplicity that, $M_0^R = 0$ et $M^S = \bar{M}$.

It should be noted that under flexible exchange rates, the foreign payments equilibrium is achieved by variations in the exchange rate, which has the effect of exempting the Central Bank to intervene on the foreign exchange market through the use of its foreign exchange reserves. In a fixed exchange system, variations in reserves are not nil, and affect the supply of money.

4.1.2. The current account

Its two components are exports, X, and imports of goods and services, Z. These quantities depend positively on the size of the market to which they are addressed, and negatively on the relative price, here the real exchange rate Q, of the domestic and foreign goods respectively:

$$\partial X / \partial \dot{Y} > 0, \quad \partial X / \partial(1/Q) < 0$$

with, $\partial Z / \partial Y > 0, \quad \partial Z / \partial Y^* < 0,$ for the imports and, $\partial X / \partial Y^* > 0, \quad \partial X / \partial(1/Q) < 0,$ for the exports. For imports, the competitiveness indicator is the ratio of foreign prices, expressed in domestic currency, EP^*, by domestic price, P, that is the real exchange rate Q.

For the exports, this term of competitiveness is given by the ratio of domestic prices by foreign prices expressed in dinars, or the inverse of the real exchange rate $(1 / Q)$.

The foreign trade balance can be described by the following linear function:

$$BC = xY^* - zY + \rho Q$$

where Y^* and Y designate foreign and domestic incomes, respectively, and $Q = EP^*/P$ is the real exchange rate, E the nominal exchange rate, being listed on the uncertain. x, z and ρ are positive parameters respectively measuring the sensitivity of exports to foreign income, the propensity to import of the domestic agents and the sensitivity to the real exchange rate of the foreign trade balance. The parameter ρ being positive, we assume, therefore, that the Marshall-Lerner condition or the theorem of critical elasticities is verified[21].

4.1.3. The capital balance

We consider that the flows of international funds depend on the differential of nominal interest rates between countries and the anticipation of the exchange rate depreciation. On the assumption that prices are fixed, it follows that inflation expectations equal zero, which implies that real and nominal interest rates coincide. Net capital inflows, denoted K, constitutes an increasing function of the difference $r - r^* - \dot{E}^a$, where $\dot{E}^a$ is the expected exchange rate variation, $(E^a - E)/E$. Then, we can write:

$$K = k \left(r - r^* - \dot{E}^a \right)$$

with $k \geq 0$. So, as long as $r \neq r^* - \dot{E}^a$, capital moves from one country to another because of the assumption of assets perfect substitutability. If there is any restriction to the capital mobility, capital flows will cease once

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[21] Marschall-Lerner's Theorem, named after the two economists Alfred Marshall and Abba Lerner (1952, p.11) which were the first to highlight it, is a condition that tells us under what circumstances a devaluation has a positive effect on the trade balance (Rose, 1991, p.309).

equilibrium is reached, that is, when $r = r^* - \dot{E}^a$. However, if capital mobility is not perfect, a difference of rate, even important, may then remain.

4.2. The equilibrium conditions

4.2.1. The equilibrium on market of goods

The equilibrium condition employment-resource is now written as follows:

$Y = C + I + G + X - QZ = C + I + G + BC$

By using the function describing the foreign trade balance of the previous section, we can write the equilibrium condition of the market for goods and services in the following form:

$Y = cY - a_1 r + G + xY^* - zY + \rho Q$

Thus, the *IS* equation curve becomes:

$$Y = \frac{C + xY^* + \rho Q - a_1 r}{(1 - c + z)} \qquad (IS)$$

Here, the *IS* curve is identical to that described by the equilibrium equation of a closed economy, except that unlike the latter, it includes the trade surplus as a component of the demand. The Marshall-Lerner condition being assumed to be verified, a depreciation ($\Delta E > 0$) shifts the *IS* curve to the right because, by improving the trade balance, it increases the revenue for a given interest rates.

4.2.2. The equilibrium on monetary market

The equilibrium condition on the monetary market is given by the equality between demand and supply of real money, *i.e*:

$\frac{M^S}{P} = \frac{M^D}{P}$, that is $m^s = m^d$

Lower-case letters denote real balances. This equilibrium condition implies:

$$\bar{m} + m^r = \ell_1 Y - \ell_2 r \Leftrightarrow Y = \frac{1}{\ell_1}(\bar{m} + m^r + \ell_2 r) \qquad (LM)$$

This equation defines the *LM* curve in the plane (*Y*, *r*). This is an increasing curve that an increase in foreign exchange reserves or in $\bar{m}$ moves to the right.

4.2.3. The aggregate balance equilibrium and the balance of payments

The equilibrium on the foreign exchange market is a situation where the balance of payments is cleared. This is done either by movements in the exchange rate in a flexible exchange regime, or by variations in foreign exchange reserves in a fixed exchange rate regime[22].

Assuming that income transfers are not taken into account, and where there is no distinction between capital movements in the long and short term, the net aggregate balance, (noted *BG*) corresponds to the sum of the trade balance and net capital inflows:

$BG = BC + K$

The (*BG*) curve is refered in the following to the set of pairs (*Y*, *r*) that, for a given level of the real exchange rate, ensure equilibrium in the aggregate balance. For the functions outlined above, it gives the equation of the (*BG*) curve below:

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[22] The equilibrium in a position of fixed exchange rates is characterized by the existence of two different situations: a short-term situation where the aggregate balance is not in equilibrium, the balance being offset by changes in reserves to equilibrate the balance of payments, and a long-term situation where the aggregate balance is finally balanced thanks to past variations in foreign exchange reserves, while the money supply has completed a full adjustment. The latter situation corresponds to an equilibrium obtained for a variation of reserves equal to zero. To display this distinction, it is necessary to consider both the amount of the balance of payments (BOP) and that of the aggregate balance (BG). While in a regime of flexible exchange rates, these two balances merge, in the fixed exchange rate regime, they are not equal until the money supply is fully adjusted to restore balance to the aggregate balance.

$$xY^* - zY + \rho Q + k(r - r^* - \dot{E}^a = 0$$
$$\Leftrightarrow Y = \frac{1}{z}\left(xY^* + \rho Q - k\left(r^* + \dot{E}^a\right) + kr\right) \qquad (BG)$$

The balance of payments surplus or deficit, *BP*, is defined by:

$$BP = BG - \Delta R = BC + K - \frac{\Delta R}{P}$$

Remind that the (*BG*) curve corresponds to the exchange market equilibrium calculated under the assumption that variations in reserves are nil. According to the details noted in footnotes below, this curve describes the external long-term equilibrium. Short-term equilibrium on the exchange market is defined by the balance of payments equilibrium through removing the constraint of the nullity of the exchange reserves variations.

The balance of payments equation will be of the form:

$$xY^* - zY + \rho Q + k\left(r - r^* - \dot{E}^a\right) = \frac{\Delta R}{P}$$
$$\Leftrightarrow Y = \frac{1}{z}\left(xY^* + \rho Q - k\left(r^* + \dot{E}^a\right) + kr - \frac{\Delta R}{P}\right) \qquad (BP)$$

The (*BP*) equation indicates, for each level of the real exchange rate and variations in foreign exchange reserves, the pair (*Y, r*) that corresponds to the equilibrium on the foreign exchange market. The curve it traces is an increasing straight line in the plane (*Y, R*) and parallel to the (*BG*) curve. It is located above or below this one according to whether reserves variations are positive or negative[23].

Since the straight line *BG* is linking all the couples (*Y, r*) compatible with long term external equilibrium for a given level of the real exchange rate, any point outside this curve is either a deficit (right of *BG*) or surplus (left of *BG*) in the aggregate balance. Also, the parameters Y^* and r^*, which are in the equations of the curves *BG* and *BP*, imply that a decrease in the foreign interest rate, or an increase in foreign income, leads *BG* and *BP* to move to the right.

4.3. Macroeconomic equilibrium in a fixed exchange regime

We believe that Algeria external economic relations are managed in a way that corresponds more with a fixed exchange rate regime. Over the past decade, the balance of payments recorded surpluses, sometimes very important, without leading the exchange rate of the Dinar to undergo changes that match up these surpluses. It is rather the changes in foreign exchange reserves, which is the main instrument in a fixed exchange regime that served as the main lever of the exchange rate policy leaded by the Bank of Algeria to defend the Dinar's parity.

Thereby, when a money supply deficit occurs in return for an external surplus, the central bank must sell domestic money by buying foreign currency to avoid currency overvaluation; its foreign exchange reserves increase.

It is foreign exchange reserves variations that allow the adjustment. M^R becomes endogenous and varies in accordance with the evolution of the foreign trade situation. The macroeconomic equilibrium in a fixed exchange rate regime is defined by a system of three equations, *IS*, *LM* and *BG* or *BP*, with three unknowns, national income, *Y*, the interest rate, *r*, and the currency issued in return for variations in exchange reserves, M^R.

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[23] The slope of the curve BG, and thus that of BP, equals. It depends on the parameter *k*, which measures the degree of capital mobility. For a perfect mobility of capital, corresponding to the case where $k \rightarrow \infty$, the slope tends to 0, and straight lines BG and BP are horizontals in the plane (Y, r). It is also verified that in this case, the equilibrium of the balance of payments implies because the interest rate is now fixed at the level prevailing in the rest of the world.

4.3.1. Short term equilibrium

The short-run equilibrium is a situation where the Central Bank must intervene to reach the balance of payments equilibrium, *i.e.* the aggregate balance is not at equilibrium (Artus, 2003, p.37).

According to the equation of the straight line *BP*, we deduce the expression of reserves variations in function of income and domestic interest rates:

$$m^r = xY^* - zY + \rho Q + k\,(r - r^*)$$

that can be used in the *LM* curve to express *r* and *Y* according to exogenous variables only:

$$r = \frac{(\ell_1 + z)Y - \bar{m} - (xY^* + \rho Q - kr^*)}{k + \ell_2}$$

It is thus possible to derive a system of two equations with two unknowns by using the equation of the *IS* curve:

$$\begin{cases} r = \dfrac{G + xY^* + \rho Q - Y(1 - C + Z)}{a_1} \\[2ex] r = \dfrac{(\ell_1 + z)Y - \bar{m} - (xY^* + \rho Q - kr^*)}{k + \ell_2} \end{cases}$$

$$\begin{cases} Y_E = \dfrac{G + \frac{a_1}{k+\ell_2}(\bar{m} - kr^*) + (1 + \frac{a_1}{k+\ell_2})(xY^* + \rho Q)}{1 - c + z + \frac{a_1(\ell_1 + z)}{k + \ell_2}} \\[3ex] r_E = \dfrac{G + \frac{(1-c+z)}{\ell_1+z}(\bar{m} - kr^*) + \frac{(\ell_1 - (1-c))}{\ell_1+z}(xY^* + \rho Q)}{(1 - c + z)\frac{(k+\ell_2)}{\ell_1+z} + a_1} \end{cases}$$

Changes in reserves that ensure the exchange rate immovability are finally deduced from the equilibrium values thus obtained:

$$m^r = xY^* - zY_E + \rho Q + k\,(r_E - r^*)$$

4.3.2. Long-term equilibrium

The long-run equilibrium is a situation where the surplus or deficit of the aggregate balance is nil and the foreign exchange reserves remain constant. The adjustment of the money supply is accomplished, complete, and ensures to reach this long-term equilibrium. The system to be solved to determine this equilibrium is:

$$\begin{cases} r = \dfrac{G + xY^* + \rho Q - Y(1 - c + z)}{a_1} & (IS) \\[2ex] r = \dfrac{\ell_1 Y - \bar{m} - m^r}{\ell_2} & (LM) \\[2ex] 0 = xY^* - zY + \rho Q + k(r - r^*) & (BG) \end{cases}$$

IS and *BG* curves allow to determine r_E and Y_E, and we deduce m^r from the *LM* curve equation. The equilibrium income is finally:

$$Y_E = \frac{G + \frac{k+a_1}{k}(xY^* + \rho Q) - a_1 r^*}{1 - c + z + 1 - c + z + \frac{a_1 z}{k}}$$

It is now possible to examine the demand stimulus policy effectiveness that has been pursued since 2004 in the light of short term and long-term expressions thus defined. According to the multipliers expression obtained from the expressions of short and long-term equilibrium revenues, it appears that the stimulus strategy by using an expansionary fiscal policy has an overall positive effect on income. This, however, depends on the degree of capital mobility. If capital is not very mobile, that is to say where $k < z \, \ell_2/\ell_1$, it is the short-term effect that prevails. To understand it, we must examine the underlying economic mechanisms (Bec, 2000, p.67).

An increase in public spending, shown in the graph below, shifts the *IS* curve to the right, and causes an increase in income and interest rate similar to those that occur in a closed economy.

The internal equilibrium point, *A*, can be either a deficit or a surplus in the aggregate balance.
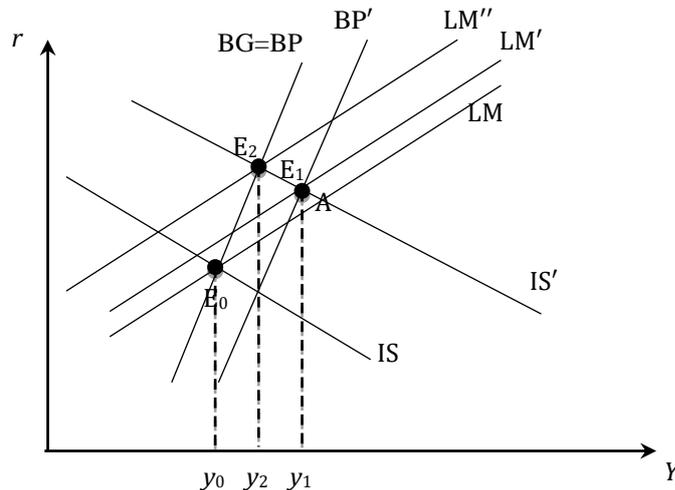
Figure 3- The effectiveness of fiscal policy in fixed exchange
and low capital mobility

Indeed, the increase in income leads to increased imports, which tends to degrade the foreign trade balance and hence the one of the aggregate balance. However, the increase of the interest rate encourages foreign capital inflows, which improves the aggregate balance. Here we are, as in a flexible exchange rate regime, in front of two contradictory effects on the external balance.

In case where capital is very mobile, the first effect dominates and fiscal policy generates an external deficit (point *A*). Facing the excess supply of domestic money, the central bank has to fight against the depreciation trend by buying domestic money against foreign currencies, thus reducing its foreign reserves. The latter effect decreases then the money supply leading to an increase in the interest rate resulting in a strengthening of the crowding out effect.

In the short-term equilibrium, E_1, $B^{\acute{P}}$ is at the right of *BP* because of negative changes in foreign reserves and $L^{\acute{M}}$ at the left of *LM* due to the corresponding decrease in the money supply. Once the monetary adjustment completed, *i.e.* when the aggregate balance is in equilibrium, the economy is at the point of long-term equilibrium E_2, where income is lesser than the short-term one ($Y_2 \, \square \, Y_1$). Here, the fiscal policy has a limited efficiency compared to a closed economy (Beaud, 1983, p.123).

A. Benassy-Quéré (2012, p.156) who worked on the subject, but using arguments that refer more to the global economic crisis in 2007-2009, reaches the same result.

This pattern, which matches a situation of fixed exchange rates and low capital mobility, indicates that an expansionary fiscal policy has the effect of increasing national income and encouraging imports thus creating, in the first instance, an excess of supply of domestic money because that capital is very mobile. At equilibrium, in a second stage, when the monetary adjustment is complete, the long-term impact is lesser than the short term one (Prest, 1968, p.11).

This theoretical configuration is a grid of analysis simple but convenient to capture some overall characters (David Romer, 2000, p.159).

With reference to the Algerian economy, some of its features make the results of this analysis even more pronounced. We refer in particular to the existence of a very strict exchange control that leaves the domestic agents with any possibility of capital mobility. The rent nature of the Algerian economy and the inelasticity of its productive apparatus makes the probability of balance of payments deficits more than likely in case of sharp decline in oil prices. All this is that after the money supply adjustment, at the long-run equilibrium E_2, income level returns almost to its original level ($y_0 \ \Box \ y_1 \approx y_2$); the point E_2 being vertically or almost of E_0. In the long term, fiscal policy has only limited effectiveness.

It is clear that things went according to the predictions of the chosen theoretical model. The keynesian theory in open economy is, therefore, a good scientific framework to predict the fate of the policy that has been implemented in Algeria over a relatively long period, and mobilized very considerable amounts. It also highlights the main inadequacy in the reasoning behind this strategy (Blanchard, 2000, p.1398). Indeed, the policy implemented, inspired by Keynesian economics, corresponds to an underemployment equilibrium. However, the situation of the Algerian economy never fit with this theoretical scheme. The algerian foreign payments crisis from 1986 to 2000, created a situation of chronic underinvestment. Even though the country lagged behind in terms of public infrastructure and facilities, it was not the public spending policy alone that could adress the problem of deep economic stagnation that the country had been struggling with for so long (Cnes, 2002-2005, p.21). It seems that political considerations have tipped the scales in favor of this controversial choice[24]. As Avinash Dixit says (1996, p.89): « when the reality of most countries' policies is so blatantly contrary to all the normative prescriptions of the economist that there is no way to understand it except by delving into the politics ».

5. Conclusion

To conclude this article, we can say that the strategy that consisted during the period 2001-2014 to use the development of infrastructures and public facilities as a main tool to restore global economic growth, has not been inspired by economic common sense. Economic theory anticipates it easily. Certainly, the country was lagging far in this area. Dense and modern infrastructures and public facilities are a major factor of the global productivity of any economy. However, these public investment plans, based upon the development of basic infrastructures, have been developed and implemented in a very unfavorable institutional and economic context that considerably limited their impact. These equipment programs were necessary but not sufficient; reforms were to be implemented previously in order to modernize the institutional framework so that its governance and arbitration mechanisms offer microeconomic agents the ability to act and interact in ways that maximize their utility but with less possible opportunities to do so at the expense of the public good. The senior government officials have decided otherwise, and used instead public spending programs as political and economic argument to avoid initiating and completing these reforms.

Thus, a brief review of the budget acts that marked this period shows that the primary motivation of algerian decision makers was determined, fundamentally, by constraints linked to preservation of national security, subsidies and social transfers. In addition, the obsession of political power to keep a tight control over the economy, for fear that wealth creation spiral out leads to the autonomy of the economy and the society from the supervision of the State, did not leave much room for a supply policy likely to put the country on the path of self-sustained economic growth.

When the oil counter-shock of 2014 came about, it found the Algerian economy totally disarmed to face it. Five years later, in this 2019 spring, the shock wave of this economic crisis hits the political sphere hard and ends the rule of the caste that was meddling with the 2001-2014 economic policy.

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[24] The current of thought from the new political economy no longer consider, as before, the policy maker as a benevolent agent who only cares about the public welfare [(Laffont, 2000, p.124), (Pisani-Ferry, 2008, pp. 402-403), (Nordhaus, 1975, p. 182), (Buchanan, 1975, p.227), (Downs, 1957, p.167), (Alesina and Drazen, 1991, p.1179)].

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