

A New Macro Model for Libya with the Measurement of the Economic Policies Effects

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Abstract

This study attempts to form an economic model illustrates the relationships of macroeconomic variables to each other in the Libyan economy and examines its ability to interpret the effect of some economic policies conducted recently by the Libyan authorities. The study relied on the analysis of macroeconomic equilibrium according to the simple Keynesian model, which describes the real aspect of the economy.

The results showed that the effect of the household heads provisions policy (HHP) was positive on the Libyan economy, but its effectiveness was less than the commercial and personal provisions policy (CPP). The results illustrated that the efficiency of CPP and HHP policies depends on the ability of the CBL to cover the total demand of foreign exchange and this ability is constrained by the volume of oil exports, and therefore the monetary and fiscal authorities may have replaced those policies by the importing provisions policy (IP) at the lowest levels of oil exports. The results have showed also that the CPP policy may play the role of an alternative to the policy of financing the public deficit by borrowing from the CBL, while the effects of latter and imposing customs new duties on the Libyan economy were negative.

The study concluded that fragile structure of the Libyan economy, due to large overdependence on oil incomes, and there is no opportunity to raise the economic level except by increasing oil exports, which are dependent on world oil markets, and this link works to further deepen the weakness of the Libyan economy, and to delink with oil export, the economic diversification has become an important development goal of Libyan State,

Keywords: New, Macro-model, Libya

1. Introduction:

This study developed a theoretical macroeconomic model that includes all effective economic sectors in the Libyan economy, the study relied on the analysis of macroeconomic equilibrium according to the simple Keynesian model, which describe the real aspect of the economy, which is the market for goods and services only, however, this model was criticized for ignoring the supply side, which depends on the factors of production, such as labour market, the model also is limited the demand side of product markets without taking the money market in its consideration.

The study put all these criticisms in its consideration when designing and building its economic model. The study tried to develop economic model based on simple Keynesian model as this model in the basic level is suitable for reflecting the equilibrium of the Libyan macroeconomic, because the labour market in Libya is inefficient and does not depend on wages and productivity criterion. In addition, there is no market for stocks or bonds and the monetary tools have a weak impact on aggregate demand in the market for goods and services by influencing return on investment such as the interest rate, discount rate, reserve requirements and open market operations. (Alhasia, 1979)

The study aims to form an economic model that includes the relationships of macroeconomic variables in the Libyan economy, the model interpret the effects and trends of the main variables

that control the goods and services market in the Libyan economy and helps decision makers to make decisions and adopt correct economic policies. To achieve that goal, the study attempted to combine an academic and practical method that is easy to understand by economic decision makers.

The study also aims to provide economic literature with an economic model that explains the Libyan economy used by academics interested in conducting studies about Libyan economy such as econometric studies that aiming to estimate economic relations and forecast the effects of some economic policies on economic activities, as this model is the first real attempt to create a bridge between the academic efforts and the needs of the executive authorities for research advices when making macroeconomic decisions.

Based on the researcher's information, this study is considered the first attempt to present a complete economic model that explains the equilibrium of the Libyan macroeconomic, where, the previous studies attempted to adopt macroeconomic models for measuring the effects of some economic variables with each other.

The study relied on descriptive analysis using charts and mathematical equations in developing a theoretical model for the Libyan macroeconomics, considering that economic models are a set of economic variables relationships that describe the economy; it can be expressed in words, tables, charts and mathematical equations.

2. The previous studies:

The study relies on the Keynesian model in designing and building its economic model and made some development on that model according to the requirements of the Libyan economic situation while maintaining the nature of the macroeconomic relationships contained in the literature review, in order to come out with customized economic model has the ability to understand the economic events and phenomena experienced by the Libyan economy and giving the correct interpretation of the effects of the policies adopted by the Libyan economic authorities on the macroeconomic level.

The aim of this section is to present some previous studies attempting to build an economic model for explaining some of the macroeconomic relationships in Libya economy and this study is not an extension of these studies and does not deny nor support its findings:

Study conducted by Twari, N. & Amer, S. (2018) "The Role of Private Investment in Economic Growth in Libya", the study aims to measure the impact of domestic investment as one of the determinants of Libyan economic growth using Cobb Douglas function to analyze the relationship between real GDP per capita (Y) and real domestic investment (K) and the number of workers (L):

$$Y = AK^{\alpha} L^{(1-\alpha)}$$

The study concluded that the changes in GDP per capita is more flexible for investment than work changes in the long and short term and the effect of investment and work on the growth of GDP per capita does not exceed 44%, the work factor has only a small impact due to the accumulation of the number of workers more than required led to poor productivity of these workers.

Study on the role of the public budget in achieving sustainable development in Libya was conducted by Khairy, S. & Alqatous, S. (2018) used a simple model relies on the assumption that there is a relationship between revenues (X1), the public expenditure (X2), development public expenditure (X3) and GDP (Y) as dependent variable:

$$Y = f(X_1-X_2) \quad \& \quad Y = f(X_1) \quad \& \quad Y = f(X_2) \quad \& \quad Y = f(X_3)$$

The study concluded that the public finance exposed to major shocks that affected negatively to the public revenues, which was reflected to the general level of the prices and led to the suspension of the completion of development projects.

Study conducted by Almbrook, R. (2017) aimed to estimate the functions of imports and exports demand the model was based on the assumption that: The imports are a linear function of gross domestic product (GDP), the general price level (PiL) and the official exchange rate of Libyan dinars (E). The oil exports (TvEoi) are a function Linear for both the real GDP of the euro-zone countries and the oil prices (PiKo):

$$TvLi = f(GDP, PiL, E) \quad \& \quad TvEoi = f(GDPp, PiKo)$$

The results revealed that there is Positive relationship between GDP and the imports demand and there is Negative relationship between oil exports demand and their prices, while the relationship between real foreign income (euro-zone countries GDP) and the value of real oil exports is Positive.

Study estimated the function of consumer expenditure using the relative income hypothesis, conducted by Yakhlif, Y. (2016), aimed to identify the income earned by individuals in the Libyan economy and its impact on consumer expenditure (Cons). The model was formulated according to the relative income hypothesis that consumption depends on current income (Y₀) and past peak income (Y₁), where (Y) personal disposable income:

$$Cons = f(Y_0, Y_1)$$

The results revealed a long-term relationship between consumer expenditure, current personal disposable income and the past peak income, the study recommended that more studies be conducted on the function of consumer expenditure and its determinants in the macroeconomic to help decision makers and policymakers in shaping economic policies.

Study measured the impact of the Oil price vulnerability on economic growth in Libya, conducted by Abuazoum, A. (2016), attempted to provide an explanation of the relationship between crude oil prices and economic growth of GDP as an indicator of economic development in the Libyan economy, the simple model based on the hypothesis that the Libyan economy is greatly affected by the fluctuations in oil prices (X).

$$GDP = f(X)$$

The study concluded that the shocks in the international markets have had strong effects on oil prices and the Libyan economy suffers from symptoms of the Dutch disease that made the services sector is larger and faster growing than the commodity-producing sectors. The study recommended the necessity of working to find new sources for financing the public budget, by

diversifying the sources of income, through developing non-oil exports and raising the percentage of its contribution to the GDP.

Study conducted by Yakhlif, Y. & Sassi, S. (2016), analyzed and measured the relationship between unemployment and inflation in Libya. The study relied on formulating its economic model on the theory of the Phelps curve based on the existence of a correlation between the unemployment rate (UN) and the inflation rate (INF).

$$INF = f(UN)$$

The study concluded that there is no relationship between employment and increase the general prices level rates, as the study recommended that more studies be conducted separately on the problems of unemployment and inflation with a view to tracking the reasons for these two phenomena and their impact on economic growth in Libya.

Study on determinants of private investment in Libya conducted by Ali, S. (2014), relied on the Flexible Accelerator Investment Model is that the big difference between the current capital stock and the required capital stock is what will push institutions to increase their investments through their desire to reduce the size of this gap. This model may be included the output, internal funds (and the cost of external financing as determinants of the required capital stock.

$$Pi_t = f(GDP_t, GDP_{t-1}, GI_t, PS_t, CPI_t)$$

The study found that private investment responds positively to GDP_{t-1} and public investment (GI) in the long-term period and responds negatively to the general level of prices (CPI) in the short-term period. The study also pointed to the problem of the stability of the debt interest rate for long periods of time and loans provided to the private sector forms a small percentage of the total loans granted for economic activity.

3. The economic models in literature review and the Libyan case:

This section concerns with defining a model for the Libyan economy that helps to identify the suitable economic policies for determine macro equilibrium and disequilibrium in Libyan economy.

The ground for building the economic model for the goods and services market in Libya depends on the Keynesian macro model. Based on this model, the aggregate supply is determined by the sum of the market values of goods and services produced in a country during a specific period of time typically one year and the aggregate demand is containing four macroeconomic sectors, three domestic sectors: household, business and government and one foreign sector or net exports. The simple linear equation below uses the general form of the relationship between income (or aggregate supply) and total expenditures (or aggregate demand) in the analysis of macro equilibrium.

$$Y_t = C_t + I_t + G_t + (Exp_t - Imp_t)$$

The aggregate supply (Y) is the market value of all final goods and services produced in a country during a period of time (t). The aggregate demand side is what the economic sectors spend to purchase those goods and services during the period (t), where (C) the households sector, (I) the businesses sector, (G) the government sector, (Exp-Imp) is the net foreign trade sector.

The equilibrium of product market achieves three macroeconomic goals of growth, low inflation, and low unemployment. In the disequilibrium macroeconomic condition, the unemployment and inflationary problems will be happened with other macroeconomic problems. The most important goals of economic policymakers is to achieve a macro equilibrium in order to get economic stability by keeping low unemployment and inflation rates and supporting stability of foreign reserves which leads to economic growth. (Edgmand, 1983).

When analyzing the Keynesian simple linear equation and measuring its ability to explain the Libyan economic condition, we can realize the following:

3-1. Aggregate supply:

- a) The crude oil and nature gas production forms the main share of the GDP in Libya, which amounted about 73% of the total market value of domestic production during the average of the pre 2011 period, (Central Bank of Libya (2019)), that value is not included in the calculation of the total supply value in the domestic goods and services market, as it is directed to foreign markets.
- b) The real market value of oil and gas production for the current period is exceeding 90% of GDP, as the real value of oil and gas production is valued in US dollars, as the global oil markets deal in the US Dollar and the amounts of the oil and gas production, that shown in the official Libyan reports, are denominated in the Libyan Dinar on the basis of the official exchange rate of 1.40 LYD for one US Dollar, while the value of the US dollar in the official commercial price is close to 4 LYD, thus the real market value for oil and gas production may be equal to three times the value shown in official reports.
- c) A very small amount of crude oil production is directed to local use, as it does not exceed 37 million barrels annually and goes to local refineries; this percentage does not exceed 12.5% annually of the total oil and gas production (Report of Libyan Audit Bureau, 2017).
- d) The national sectors are offering the small share of non-oil products in domestic markets and these products are highly dependent on production factors imported from foreign markets and their added value represents a very small amount in Libyan economy.

$$Y_t \approx 0$$

(Y_t) The total market value of the final goods and services that produced by national sectors in the period (t).

3-2. Aggregate demand:

3-2-1. The consumption expenditure of the households sector:

According to the previous studies experience, there are no accurate data on consumer spending for the Libyan family sector and it can be said that most of the data related to this variable were estimated and does not reflect the true volume of Libyan family consumption. Since this paper tries to build a logical economic model that reflects the Libyan economy, this variable

will be presented by the volume of public expenditure on salaries, due to the following considerations:

- a) The number of public sector employees is approximately 2 million employees¹ and this number is large in a society with a population of no more than 6.5 million people. These figures indicate that the overwhelming majority of the Libyan heads households are employees in the public sector, and therefore the spending of these families on consumer goods and services mainly depend on public sector salaries.
- b) Families obtain some additional income in deferent forms, for example child bonuses or income obtained from selling the dollar allocations of the heads of households, however, the salaries is considered as permanent income and additional income is transitory income, according to Permanent income hypothesis, the transitory income does not affect the volume of permanent consumption of the families, (Permanent income theory, M. Friedman - Edgmand, 1983).

$$C_t = f(Y_p)$$

(Y_p) permanent income, (C) permanent households consumption.

- c) Monthly salaries of the Libyan heads families are considered a permanent income and the limited value of public sector salaries constrains the ability of families to keep a portion of their monthly income in the form of savings and consequently the largest percentage is allocated to consumer spending, thus, the marginal propensity to consume of these salaries is close to 100%.

$$C_t = n y_t \longrightarrow C_t = G1_t \quad (y_t = G1_t \ \& \ n \approx 1 \ \& \ S_t \approx 0)$$

(y) household personal income², (G1) public expenditure payroll Chapter 1, (S) savings and (n) marginal propensity to consume.

3-2-2. The investment expenditure of the business sector:

There are no accurate data on investment spending for the business sector in Libya and no other variables can be obtained that present the value of this variable separately of other economic variables and at the same time, there are no logical economic indications showing

¹ According to the statement of the Minister of Finance of GNA in the press conference held on March 3, 2020, the number of public sector employees reached 2 million employees, including 1.8 million employees in ministries and government agencies and the legislative authority and 2 hundred thousand in Parastatals (companies owned by government).

² The personal income is the basic salary of the employee and the disposable income that is equal to personal income minus the income tax and other deductions, such as social security, social solidarity and jihad tax. The income tax is calculated (after deduction of the exemption) by multiplying the first 1000 YLD by 5%, and more than that is multiplied by 10%. However, if the total deductions and income tax for the average salaries of the public sector (less than 1000 YLD) does not exceed 10%, then the basic salary can be used to measure the income of Libyan households that spending on consumption.

the distinguished role played by this variable in estimates of the aggregate demand of goods and services in Libya. Since this paper attempts to build a realistic economic model that reflect the Libyan economy, it is closer to reality excluding this variable from the effective components in aggregate demand, due to the following considerations:

a) Confusion on the results of estimating economic relations with the products market:

Several studies concerned with private investment in Libya have relied on the variable of gross fixed capital formation (GFCF) as proxy to private investment, the (GFCF) measures the value of acquisitions of new or existing fixed assets by the governments, business and households sectors, such as (Elbeydi, 2014). In fact, this variable does not reflect the reality of real growth in the annual demand for goods and services in Libya in order to invest in the Libyan private sector in a way. Plus there is no realistic updated data on the (GFCF) variable in Libya, where the last official data about Libyan national accounts was published in 2006, (IMF Country Report 2007). However, there are attempts by some international organizations to provide some estimates of national accounts, as they relied on some mathematical formulas and models that they use to find estimates of this variable for all countries that do not have national accounts such as the Libya.

In addition to the lack of realistic independent data that can be used in estimates of investment spending for the Libyan business sector, it is not possible to use some of the determinants of private investment mentioned in the literature such as the interest rate and the annual values of bank loans granted to the business sector for investment, due to the stability of the interest rate at commercial banks before its cancellation by Law No. 1 of 2012, and the lack of transparency of the purposes of bank loans granted to the business sector, as there is a large percentage of loans provided for business purpose used for other purposes.

b) The investment spending of the Libyan business sector is very small and does not have an effective role in the economy:

Investment activity comes in the third rank in the Libyan business sector after commercial and contracts activity and the total activities of the business sector constitute only a small percentage of the volume of economic activity in Libya, where the share of the public sector reached 86%, while the share of the business sector reached 14%, from total economic Activity (Shamiya, 2006).

The civil society institutions interested in the Libyan business sector such as, the Libyan Industries Union, the Libyan Contractors Association, the Libyan Trade Union and the Libyan Businessmen Council, show that the share of working capital in investment activity out of the total working capital in business sector in Libya does not exceed 23%³. So it can be concluded that the volume of total demand for goods and services in the local market for investment does not exceed 3% of the aggregate demand in Libya.

$$I_t \text{ proxy GFCF \& L} \quad \& \quad (I_t \approx 0)$$

³ Workshop organized by the Libyan Industries Union, entitled "Legislative proposals to support the private sector for the public sector to achieve development" Tripoli, Libya, December, 2017.

(GFCF) gross fixed capital formation, (L) banking loans for business sector.

3-2-3. The government expenditure of the public sector:

a) Government consumption spending:

Government consumption expenditure can be expressed in the spending values for the 2 & 4 Chapters of the public budget, despite the differences in the purposes of these Chapters; its impact on the aggregate demand is underneath of government consumption spending. Some researcher criticizes this perception by considering the amounts allocated in Chapter 2 are government expenditures while the amounts allocated in Chapter 4 are subsidies to support the price differences of some goods that are consumed by all sectors not only by government sector⁴, however, in reality, those allocations are remained in the government budget and are spent directly on goods and services. Thus these expenditures are considered government consumption spending regardless of the sectors that get benefits from this expenditure.

b) Government investment spending:

Government investment spending can be expressed in the spending values for the Chapter 3 of the public budget, given that the largest proportion of these expenditures are allocated for development projects and other programs owned by the public sector.

$$G_t = \underbrace{G_{2t} + G_{4t}}_{\text{Consumption expenditures}} + \underbrace{G_{3t}}_{\text{Investment expenditures}}$$

(G) total government expenditure, (G2) government operation expenditure Chapter 2, (G4) subsidiaries expenditure Chapter 4, (G3) government development expenditure Chapter 3.

3-2-4. The foreign sector expenditure (foreign trade sector):

a) Expenditure on exports::

The Libyan foreign trade balance illustrates that more than 97% of exports are crude oil and natural gas and all these products are directed to foreign markets and its factors of production are linked to the foreign markets not to domestic markets, nor evaluated to its prevailing market prices. Therefore, expenditure on exports is not a component of the Libyan demand market, but rather it is the components of the global demand for oil and gas in the global markets.

b) Expenditure on imports::

Expenditures on imports are subtracted from the total demand for goods and services in the products market and in the Keynesian macro model of, the volume of expenditures on imports is subtracted directly from the volume of exports to obtain the net of foreign trade

⁴ Fuel, electricity, medicine, cleaning services, water and sanitation services, and some basic commodities

balance, but the application of this part of the model does not reflect the reality of Libyan situation due to the following considerations:

- Expenditures on exports are not among the components of goods and services in the Libyan domestic markets as mentioned in the previous section.
- The concept of taking the variable of imports minus value in the side of the aggregate demand is that deducting the demand for imported goods and services from the aggregate demand as considering this part of the demand is directed to the foreign market not to the domestic market. However, this concept makes sense in the case of societies whose domestic production is very large compared to their imports of goods and services.
- The aggregate supply of production in domestic market are based on foreign market in Libya and as previously explained that the proportion of local production of the total goods and services offered in the domestic markets is very small, so in the Libyan case it is logical to represent the quantity of supplied goods and services in domestic markets by the quantity of imported goods and services multiplied by their market prices.

$$\text{Imp}_t \text{ proxy } Q_{st} \quad (Y_t \approx 0)$$

(Imp_t) the total value of imported goods and services at the market prices through the period (t), (Q_{st}) the quantity of goods and services supplied in the domestic markets.

4. The aggregate supply and demand in the Libyan domestic market:

Since the relationships of the macroeconomic variables proxy the aggregate supply and demand in the Libyan case are completely different from the ones mentioned in the Keynesian model, therefore the determinants of the supply and demand of the Libyan economy are different and as follows:

4-1. Determinants of aggregate supply:

The volume of imports may be an exogenous variable that is determined by the commercial authority, but the determinants of this variable as an aggregate goods and services supply in domestic market are dependent on the ability of the Libyan economy to import goods and services from abroad.

- 4-1-1. The main determinant of the Libyan economy's ability to import during the period (t) is the inflows of foreign exchange into the national economy, which is represented by the volume of oil exports for the same period (Exp_t).
- 4-1-2. Another determinant is the ability of the Central Bank of Libya (CBL) to cover the deficit with foreign exchange, which depends on the volume of its foreign exchange reserves and can be expressed by foreign exchange flows from oil exports during previous years (Exp_{t-n}).

4-1-3. The value of the Libyan Dinar against foreign currencies, which is measured at the real exchange rate (ER_t), is considered the direct determinant of the quantities of goods and services imported from abroad, as the cost of imports⁵.

$$QS_t = f(ER_t) \rightarrow ER_t = f(Exp_t, \dots, Exp_t)$$

(QS_t) the quantity of goods and services supply, (Exp_t) the volume of oil exports for the year (t) and (n) for previous years and (ER_t) the real exchange rate of the Libyan dinar.

4-2. Deriving the aggregate supply curve:

Since most of supply in the Libyan market are goods and services imported from abroad, thus the aggregate supply (AS) does not depend on the labour component⁶ and any other local factors of production but rather depends on Libyan dinar exchange rates in foreign exchange market, as the main determinant of import costs. In other words, the real exchange rate of the dinar determines the volume of goods and services imports as the former proxies for import costs, and thus the relationship between the exchange rate and the quantity supply (qs) in local markets is a positive and direct relationship. So it can be derived the aggregate supply curve in the Libyan economy, which is expressing on the direct relationship between the real exchange rate of the Libyan dinar (ER) and the volume of imports of goods and services (imp):

$$imp = f(ER)$$

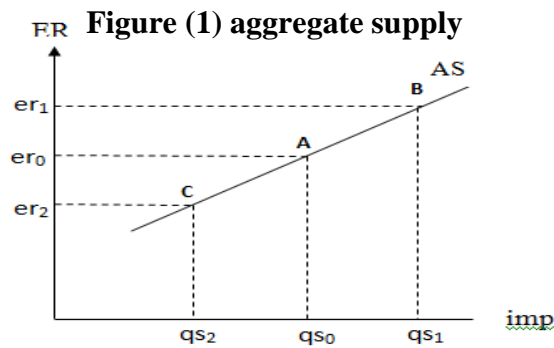
(ER) proxy for the real dinar exchange rate, which is determined by the demand and supply of foreign currency in the foreign exchange market. The aggregate supply curve depicts the quantity of real goods and services that is supplied by the economy at different exchange rates of Libyan dinar. To derive the aggregate supply curve, it can be assumed the following:

- 4-2-1 The aggregate supply curve for the Libyan goods and services is drawn under the assumption that import costs depend on real exchange rate for Libyan dinar. As the cost of imported goods reduce, and so sellers are willing to supply more of goods and services hence, the upward slope of the aggregate supply curve for goods and services.
- 4-2-2 Under the assumption that the economic situation is at the level of a balanced exchange rate in the foreign currency market (er_0) in which the volume of imports of goods and services is at the level of (qs_0) this will give one point (A) on the aggregate supply curve AS.
- 4-2-3 In order to obtain other points, suppose, the Libyan dinar exchange rate has changed to the level of (er_1) which is greater than (er_0) and at the new level of the exchange rate the cost of imported goods will be reduced and thus a new volume of imports is specified (qs_1) which is higher than (qs_0) because the positive relationship between the volume of imports and the exchange rate, an increase in the exchange rate of the

⁵ A general level of prices for goods and services imported from abroad is also a determinant of the supply as it affects import costs, (this variable is determined in the foreign markets of the exporting countries)

⁶ The role of the labour market is absent in the Libyan economy, due to the ineffectiveness of the productivity and wage in controlling the market.

- Libyan dinar will eventually lead to decrease in the costs of imported goods and services, which, *ceteris paribus*, will cause importers to increase the ability to supply more goods and services, and the second point is determined on Libyan economy's aggregate supply curve (B).
- 4-2-4 Conversely, if the exchange rate changes to the level (er_2) which is less than (er_0), then we get point (C) on the aggregate supply curve of goods and services in the Libyan economy (AS), and as shown in Figure (1), the (AS) curve represents a direct relationship between the exchange rate of the real Libyan dinar and the volume of imports of goods and services at the import price cost. This means that any increase in the value of the Libyan dinar against other foreign currencies will reduce the import costs which is evaluated at the local market prices by Libyan dinar, and with the assumption of aggregate demand constant, this will lead to reduce prices and an increase in the quantities imported from goods and services, which represent the aggregate supply in the local market, and vice versa.



4-3. Determinants of aggregate demand:

The estimates of public expenditure may be an exogenous variable as it is determined by the government and approved by the legislature, however, practically the public expenditure depend on estimates of other economic variables such as the estimates of public revenues, the general level of prices and growth in economic activity and expectations of increasing numbers of public sector employees as well as other determinants to take into account when determining public expenditure estimates. So the largest determinant of aggregate demand in the Libyan economy is represented in the volume of public revenues, which depend heavily on oil revenues and the 'latter' depends on the quantities exported from crude oil and its prices. The oil revenues represent the incomes of the Libyan state and these incomes are directed to public expenditures.

$$QD_t = f(G_t) \quad G_t = Rev_t \quad \rightarrow \quad Rev_t = f(Exp_t)$$

(QD_t) the quantity of goods and services demand, (Rev_t) the public budget revenues for the period (t).

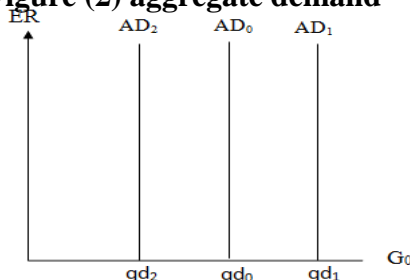
4-4. Deriving the aggregate demand curve:

The aggregate demand curve is derived from the IS / LM curves in according to an extension Keynesian macro model (Edgmand, 1983). Since the economic tools operating in the money

market are ineffective in the Libyan economy, there are no real effectiveness between the aggregate demand of goods and services and the money market represented by investment and the interest rate, but rather the aggregate demand is determined by the volume of public expenditure in the Libyan economy, as the latter is the main source of income spent on buying goods and services in local markets, and since the main determinant of spending is the volume of the public revenues, the variable of public spending is an exogenous variable determined by the government and approved by the legislature (G_0), and this constant relationship will be illustrated extensionally in the next sections of this study.

So it can be derived the aggregate demand in the form a vertical straight line curve that that reflects the volume of total consumer and investment expenditure ($G1 + G2 + G3 + G4$), and the change in the volume of public revenues leads to a change in the amount of spending in the public budget, which leads to a change in the quantities demand of goods and services from (qd_0) to (qd_1) with the shift of the aggregate demand curve to the right with an increase (AD1) and from (qd_0) to (qd_2) as the aggregate demand curve shifts to the left with a decrease (AD2).

Figure (2) aggregate demand



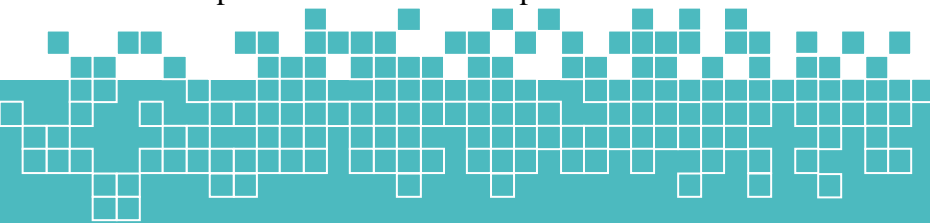
5. The aggregate macro - model explaining Libyan economy:

After drawing and describing the explanations of the relationships of macroeconomic variables in Libya, it is obvious that the variables of the Keynesian macro equilibrium model do not fully reflect the reality of the equilibrium in the Libyan economy, because it is unable to interpret the phenomena and events that occur in the Libyan economy. The models are judged on their ability to explain economic phenomena and events. This means that if the model helps to understand the reality of economic situation, it is reliable model, inversely, if the model leads to misunderstanding, it is a helpless model and then alternative model must be sought, (Edgmand,1983). Therefore, the model that expresses the Libyan macro-aquarium and helps to understand reality can be expressed mathematically as follows:

$$\text{Imp}_t = \underbrace{G1_t + G2_t + G4_t + G3_t}_{AD}$$

AS

The above equation shows, the volume of imports of goods and services at market prices during the period (t) represents the aggregate supply of goods and services (not income) in the Libyan economy and the total expenditures in the public budget for the same period represent the aggregate demand for goods and services for all economic sectors in Libya, assuming that the consumption spending of the households sector is expressed in the total expenditures of the



Chapter 1 of the public budget, consumption spending of the government sector is expressed in the Chapter 2 and 4 of the public budget and investment spending of the government sector is expressed in the Chapter 3, and assuming also that the business sector is an ineffective sector in the Libyan economy and the demanded products for export are not supplied in the domestic markets, but supplied in the global oil markets.

In fact, this equation provides a logical explanation model of the equilibrium of the aggregate demand and the aggregate supply in the market of goods and services in Libya, and it does not conflict mathematically with the Keynesian simple linear equation, as:

$$Y_t = C_t + I_t + G_t + (Exp_t - Imp_t) \quad \longrightarrow \quad Imp_t = G1_t + G2_t + G4_t + G3_t$$

$$(Y_t \approx 0 \ \& \ I_t \approx 0 \ \& \ C_t = G1_t \ \& \ Exp_t \notin AD)$$

5-1. The assumptions of the model:

In order to determine the equilibrium combination of aggregate demand and aggregate supply, next step is to put the supply curve and the demand curve together. We have done this in Figure (3). The vertical axis shows the real exchange (er). This is the exchange rate that the importers evaluate for a given quantity supplied and evaluate the general prices that the sectors will pay for a given quantity demanded. The horizontal axis shows the total quantity demanded and supplied (q) evaluated in Libyan dinar. The model mechanism based on the following assumptions:

- 5-1-1. Oil exports (X) are considered the main engine of the Libyan economy and are the only independent economic variable in the macroeconomic system and all other economic variables are directly or indirectly responding to this variable.
- 5-1-2. Any shocks that occur to the oil export sector reflects on all macroeconomic sectors and then on the macro equilibrium.
- 5-1-3. (QFS) represents the foreign exchange provisions for commercial and personal purposes and heads of households. Marginal propensity to foreign exchange provisions (n) is defined as the share of additional foreign exchange income that a CBL allocates to those purposes. It can be calculated as the change in allocations (Δqfs) divided by the change in oil export (Δx). Thus, the value of (n) will always range from 0 to 1.
- 5-1-4. The relationship between (QFS) and (X) can be represented by a linear equation on the assumption that the (n) is constant and this assumption is logical in practice, that there will be no significant change in monetary policy in the short term (in stability situation in medium term).
- 5-1-5. Foreign exchange provisions are not equal to zero when there are no oil exports, but rather a positive value that depends on the volume of non-oil exports and foreign exchange reserves at the Central Bank (Res).

$$QFS_t = Res + nX_t \quad \longrightarrow \quad n = \Delta qfs_t / \Delta X_t \quad (1 > n > 0)$$

- 5-1-6. (Rev) represents the public revenue and there is positive relationship between public revenue and oil exports, that means, the more oil exports increase the more oil revenues for the public budget.

- 5-1-7. The sovereign revenue (a) is a positive value independent of oil revenue and fixed in the medium term.
- 5-1-8. The marginal propensity for public revenue (b) is defined as the share of additional public revenue that the legislature allocated from oil export income⁷. It can be calculated as the change in allocations (Δrev) divided by the change in oil export (Δx). Thus, the value of (b) will always range from 0 to 1.
- 5-1-9. It can be expressed the relationship between (Rev) and (X) in linear equation that because (b) is assumed to be constant for a linear equation line (Rev) curve because the former is an exogenous variable determined by the monetary authority and used for influence the real exchange rate of Libyan dinar.
- 5-1-10. The relationship between (Rev) and (X) can be represented by a linear equation on the assumption that the (b) is constant and this assumption is logical in the case of stable world oil prices, there will be no significant change in fiscal policy in the medium term. However, in instability in world oil prices, (b) is not constant⁸, but decreases with an increase in the amount of oil exports as a result of fiscal policy pressures to prevent the adverse effects of Dutch disease, (Corden, M. 1984).

$$Rev_t = a + bX_t \longrightarrow b = \Delta rev_t / \Delta X_t \quad (1 > b > 0)$$

- 5-1-11. The relationship between public revenue and public expenditure is a simple relationship represented by the 45 ° income line (Y) which represents the direct relationship between income and expenditure; however, in the Libyan case the public expenditure also is considering the main determinant of the aggregate demand of goods and services (qd) and then is the main determinant of foreign exchange demand (qfd).

$$QRev_t = QG_t \longrightarrow QG \text{ proxy } QD \ \& \ QFD$$

- 5-1-12. (FS) represents the total supply of foreign exchange in the foreign exchange market and expresses the positive relationship between the amount of foreign exchange provided by the CBL (qfs) in official exchange rate (e), and real exchange rate of LYD (er).

$$ER_t = f(eqfs_t)$$

- 5-1-13. (FD) represents the total demand for foreign exchange in the foreign exchange market and expresses the negative relationship between the amount of foreign exchange demanded by economic sectors (qfd) and real exchange rate of LYD (er), the amount of foreign exchange demand is represented by public expenditure that any increase in total demand for goods and services in domestic markets will lead to an increase in demand for foreign currency from the import order—*ceteris paribus*—the

⁷ Oil exports are the state income, this income is distributed between public expenditures, amortization of public debt and savings (reserves held by the central bank).

⁸The public revenues get steeper as the amount of Oil exports increases, resulting in a shape that is curved upward sloping from left to right and concave with respect to the origin.

real exchange rate of LYD will be decreased against other foreign currencies, and vice versa.

$$ER = f(G) \quad (G \text{ Proxy } QFD)$$

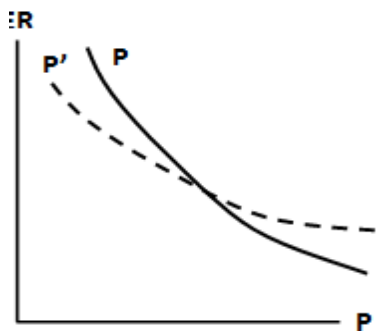
5-1-14. The general prices (P) is correlated directly with the exchange rate (ER) not to money market and products market, thus the Keynes effect⁹ is not existed in Libyan macroeconomic model. The importers tendency to changing prices as result to changing exchange rate is smaller when latter is increase than the decrease, because the importers usually have a tendency to change prices less if the dinar exchange rate rises than decreases in the foreign exchange market.

$$(p < p')$$

(p) The importers tendency to changing prices when (er) increase and (p') when (er) decrease.

5-1-15. The shape of the price curve is downward sloping from left to right and convex with respect to the origin. In other words, it is steeper on the left and flatter on the right. The downward slope of the price curve means the demand for the LYD currency will decrease as measures the value of goods and services in low levels of (ER) and in lower levels the LYD currency will collapse and loses its function as an intermediary for exchange in domestic market.

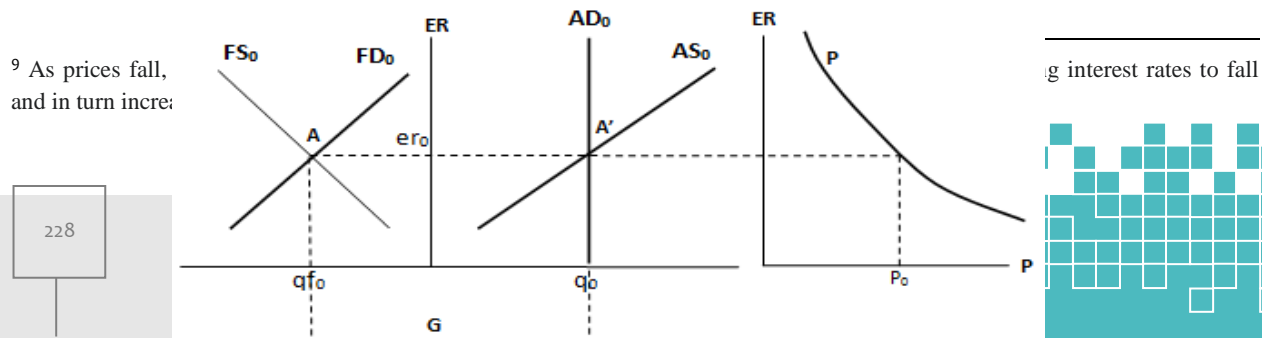
Figure (3) the LYD exchange rate and the general price level



5-2. The equilibrium of aggregate supply - aggregate demand Libyan model:

Figure (4) shows that the equilibrium of aggregate supply and aggregate demand in Libyan economy is happened at the level of oil exports (x_0), where the balance in the foreign exchange market is achieved at the level (qs_0 & er_0) and the balance market in goods and services market at the level (q_0 & er_0) and the general price at (p_0) level.

Figure (4) the equilibrium of aggregate supply and aggregate demand Libyan model



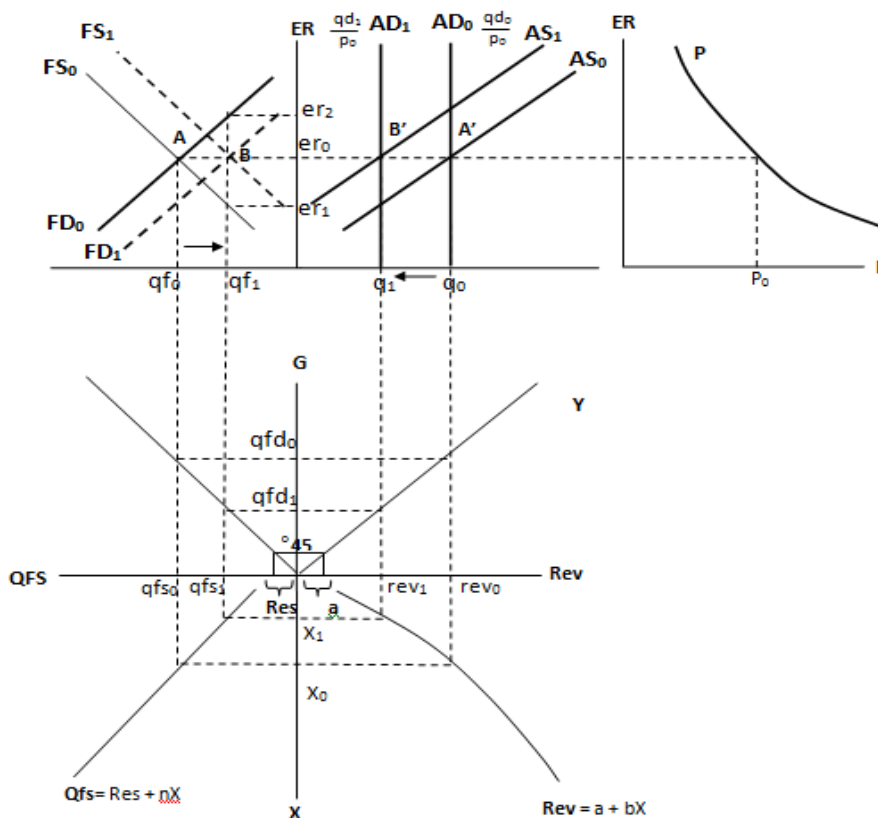
⁹ As prices fall, and in turn incre;

6. Applications of the aggregate supply – aggregate demand model:

6-1. The effects of oil exports on the model

Any change in the volume of oil exports, assume that economic policies are constant, will transfer the economy to another equilibrium point, because the oil exports are the primary determinant of foreign exchange supply and hence determine the volume of imports of goods and services (qs), simultaneously the oil exports are main determinant of the amount of public revenue and hence determine the amount of public expenditure which is considering the demand of goods and services in the domestic market (qd).

Figure (5) the effect of the change in oil exports on the model



If the oil exports decreased from (x_0) to (x_1), then the volume of foreign exchange provisions allocated by CBL decrease, assume that monetary policies are constant, this will lead to a decrease in the quantity supplied of foreign exchange in the foreign currency market (qf_1) at a real exchange rate of LYD (er_1), this combination is obtained in a graph by moving to another point on the curve (FS_0).

The impact of the oil export decline does not stop at that effect in the Libyan economy, but extends to a decrease in the amount of public revenues, considering the oil revenues are the

largest value of the total public revenues, and holding fiscal policies constant this will lead to a decrease in the amount of public expenditures, which leads to a decrease in demand total foreign exchange to (qf_1) at the real exchange rate of LYD (er_2), this combination is obtained in a graph by moving to another point on the curve (FD_0).

$$er_2 > er_1$$

The difference in the quantity supplied and quantity demanded of foreign exchange will push the market mechanisms to move towards setting a new equilibrium level of a exchange rate and holding economic policies constant the demand and supply law will lead to a shift in the aggregate supply and aggregate demand to balance each other and determine a new interaction point (B). In this point the exchange rate of the LYD is likely to stabilize to its first equilibrium level to become the new combination of quantity and exchange rate (er_0 & qf_1), this combination is obtained in a graph by a rightward shift in the foreign exchange demand and supply curves (FS_1 & FD_1).

The new balance combination in the foreign exchange market will lead to a decrease in the imported quantity of goods and services to the level (q_1) as a result of the decrease in the total level of foreign exchange supply from (FS_0) to (FS_1) and this will lead to the aggregate supply of goods and services curve moves upward to the left (AS_1).

Simultaneously, the new oil export level (x_1) will cause a reduction in public expenditures from (qd_0) to (qd_1) as a result of a decrease in public revenues and thus the whole AD_0 curve moves leftward to (AD_1) and become a new equilibrium combination in goods and services market at the new interaction point (B') which is (p_0 & q_1).

$$(qd_1 = qs_1 = q_1) \ \& \ (q_1 < q_0) \ \longrightarrow \ (qs_1 < qs_0 \ \& \ qd_1 < qd_0)$$

Conversely, the effect of the increase in oil export on the model will move the macroeconomics to a new equilibrium level greater than the previous equilibrium level and lead to an increase in the equilibrium quantity of supply and demand for goods and services in the product market with stability in the general level of prices.

Reaching to a new macroeconomic equilibrium is not easy when oil exports decline in the Libyan economy, because public expenditure does not respond to the decrease that occurs in oil revenues, given that the largest proportion of public spending is expenditures on Chapter 1 and 2, which are wages, salaries, and other recurrent expenses that are characterized by inflexibility. In addition, the government's inability to adopt trustful program success in replacing or lifting fuel subsidies, which leads to the lack of flexibility in Chapter 4 of the budget as well. Consequently, the government may resort to adopting some economic policies that aim to finance the budget deficit rather than reducing public expenditure in the case of a decline in oil exports.

6-2. The effect of money financing of budget deficit on the model:

There are three common sources to finance the government's budget deficit: taxing, borrowing or printing money. However, in Libya, when the government expenditures exceed the revenue and the Government budget deficit occurs, they cannot finance the deficit by borrowing by issuing bonds since the Libyan economy does not have effective markets stocks and bonds and the government must resort to printing money. The only way available to the government is to

borrow from the central bank through the national currency held in its banking operations or by printing paper money and the two methods lead to an increase in the money supply, (Harib et al., 2018).

Completing the previous model, we assume that the government was unable to reduce the amount of public expenditure as a result of the decrease in oil revenues, and it borrowed from the central bank to cover the deficit, which carried out the lending process by printing new paper money.

If the economy is equilibrium in combination (x_0 & er_0 & q_0 & p_0), and oil exports decreased to (x_1) and instead of reducing the amount of public expenditure, the government borrowed from the central bank to finance the public budget deficit by printing paper money, this will lead to move the whole public revenue curve to the rightward by the value of deficit financing, given that the new revenue obtained by the government in the form of loans granted by the central bank is added to the sovereign revenue in the public budget because the loans is considered as a non-oil revenue.

$$a_1 = a_0 + cbl \quad (a_1 > a_0)$$

(cbl) Loans granted by the central bank to finance the budget deficit.

The loan revenue will enable the government to maintain the level of public expenditure (qd_0), and consequently, the total demand for foreign currency will stabilize at the level (er_0 & qfd_0) while the total supply of foreign exchange falls to the level of (er_1 & qfs_1) due to the decrease in exports oil from (x_0) to (x_1).

$$FD: (er_1 \text{ \& } qfs_1) > FS: (er_0 \text{ \& } qfs_0)$$

The reduction of the LYD exchange rate at the level of (er_1) encourages speculators to sell more foreign currencies and also encourages the flow of more foreign exchange to the market from people residing outside the country, thus, more sellers result in more supply, shifting the supply curve to the right from (FS_0) to (FS_1).

Conversely, the high LYD exchange rate for the demanded amount of foreign exchange at the level of (er_0) discourages speculators to buy more foreign currencies and also discourages the flow of more foreign exchange to the market from people residing outside the country, thus, less buyers result in less demand, shifting the demand curve to the right from (FD_0) to (FD_1).

The difference between quantity and rate of both aggregate demand and aggregate supply in the foreign exchange market will push the market mechanisms to move in the direction of determining a new equilibrium combination of (q & er). Assuming the economic policies are constant the demand and supply law will shift the aggregate supply and aggregate demand to balance each other and determine a new interaction point (C). In point (C) a new combination of quantity and exchange rate (er_2 & qf_2) is determined, this combination is obtained in a graph by a rightward shift in the foreign exchange demand and supply curves (FS_1 & FD_1).

$$(er_0 < er_2 < er_1) \quad \& \quad (qfd_0 < qf_2 < qfs_1)$$

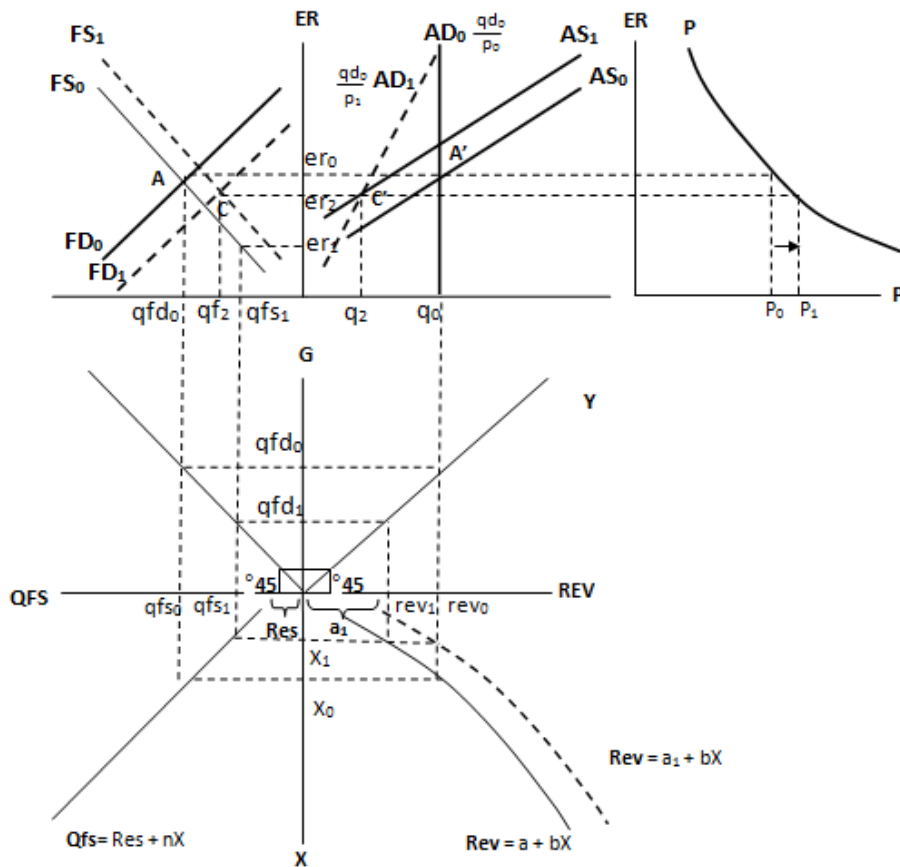
The new balance combination (er_2 & qf_2) will lead to higher import costs which leads to a decrease in the import capacity by moving to level (q_2) and this will lead to the aggregate supply

of goods and services curve moves upward to the left (AS_1). Simultaneously the new balance exchange rate (er_2) will lead to an increase in the general price level from (p_0) to (p_1), at this level of prices, the real value of the aggregate demand for goods and services will be reduced, which will lead to a shift in the entire aggregate demand curve to (AD_1) and become a new equilibrium combination in goods and services market at the new interaction point (C') which is (er_2 & q_2 & p_1), this combination is obtained in a graph by a rightward shift in the goods and services aggregate demand and supply curves (AS_1 & AD_1).

$$(er_2 < er_0) \longrightarrow (p_1 > p_0) \longrightarrow (q_2 < q_0)$$

A decrease in the aggregate supply combined with an increase in the general level of prices, explains the phenomenon of Stagflation suffered by the Libyan economy as a result of borrowing the government from the central bank to finance the its budget deficit. The low exchange rate of LYD, as a result of the shocks experienced by the wars and the closure of oil fields and ports, led to a rise in import costs, which led to a decrease in imported good and services (stagnation of commercial activity) and simultaneously led to an increase in the general level of prices (inflation). The reason that get the Stagflation phenomenon worst, is the processes of printing new paper money to cover the public budget deficit without the ability to cause any increase in the aggregate supply and that means “too much money spent chasing too few goods”.

Figure (6) the effect of money financing of budget deficit on the model



6-3. The effect of commercial and personal provisions of foreign exchange on the model:

As a result of the same fee of selling foreign exchange that imposing on both the commercial and personal purposes by CBL, it will measure the effect both of them on foreign exchange supply as one purpose, because the economic model do measure the prices and quantities rather than purposes.

The expansion in the coverage of foreign exchange demand for commercial and personal requests will lead to an increase in the total amount of foreign exchange provisions. This increase will be reflected in the graph by increasing the steep of the (QFS_0) curve from (n_0) to (n_1) , which leads to leftward turn in the foreign exchange provisions curve from (QFS_0) to (QFS_1) .

$$QFS_1 = Res + n_1X \quad (n_1 > n_0 \ \& \ qfs_1 > qfs_0)$$

(n_1) the share of additional foreign exchange provisions allocated by CBL to commercial personal purposes.

The new economic policy to increase the volume of the foreign exchange provisions was accompanied by a decrease in the exchange rate of LYD through the imposition of commercial fees for foreign exchange sale. This policy implicitly led to depreciate LYD exchange rate against the foreign currency from (e_0) to (e_1) . This policy will decrease the steed of the foreign exchange supply curve which leads to leftward turn in the foreign exchange supply curve from (FS_0) to (FS_1) .

$$FS_1 = e_1PX \quad \& \quad e_1 = (1 + pxfee) e_0 \quad \longrightarrow \quad (e_1 < e_0)$$

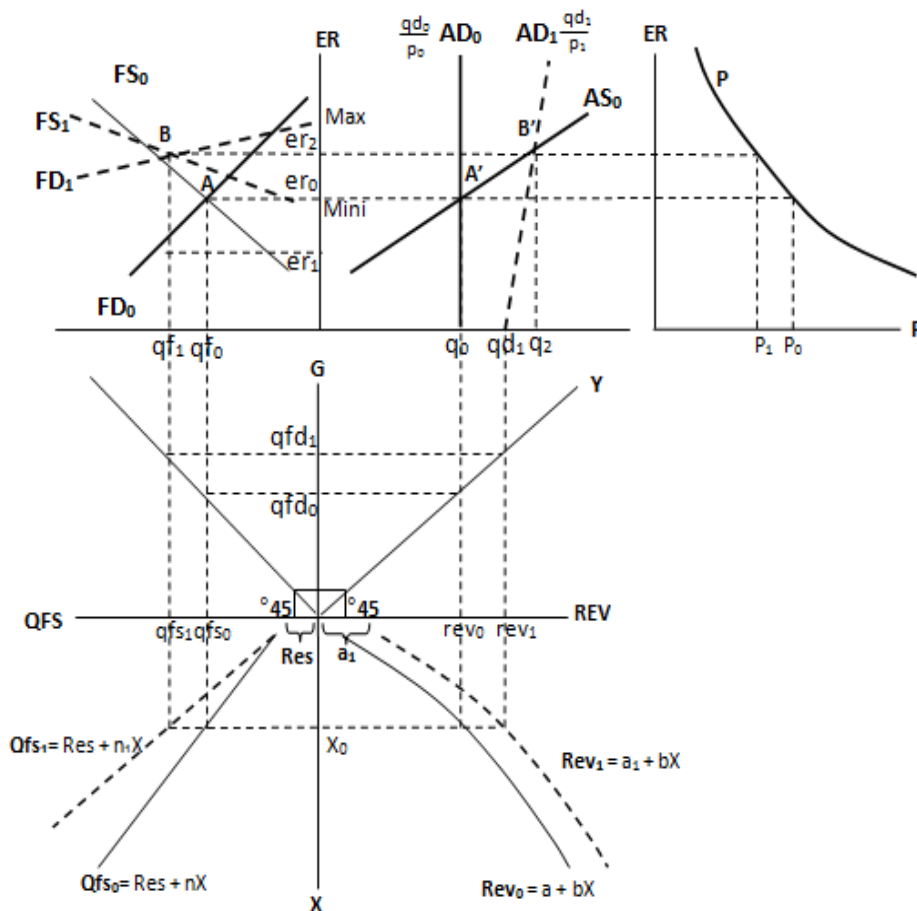
(e_1) the value of the new exchange rate, $(pxfee)$ the percentage of fees charged for selling foreign exchange.

The impact of the new economic policy does not stop at that effect, but extends to a increase in the amount of non-oil revenues from (a_0) to (a_1) , considering the fee revenue imposed on the sale of foreign exchange goes to the government budget that is using for public expenditure financing and amortization of public debt, a new combination is obtained in a graph by shifting public revenue curve to (Rev_1) .

$$Rev_1 = a_1 + bX \quad a_1 = a_0 + \{qfs_1(pxfee) - pd\} \longrightarrow (a_1 > a_0 \ \& \ Rev_1 > Rev_0)$$

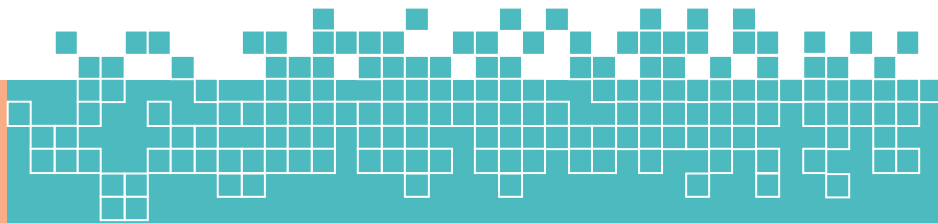
$\{qfs_1(pxfee)\}$ proxy the total fee income, (pd) the value of public debt payment.

Figure (7) the effect of commercial and personal provisions of foreign exchange on the model



If the economy is equilibrium in combination $(x_0 \& p_0 \& q_0 \& er_0 \& px_0)$ as shown in Figure (7), the new trade policy will lead to an increase in public revenue through fee revenue flows on the sale of foreign exchange. These revenues will give the government an opportunity to increase public expenditure and hence an increase in the demand for foreign exchange in the foreign exchange market from (qfd_0) to (qfd_1) . At the new quantity of demand the LYD exchange is determined at the level of (er_1) .

The effect of trade policy does not stop at that effect, but extends to the increase in the proportion of foreign exchange provisions from oil exports at the new exchange rate (e_1) to meet the total demand for foreign exchange. This policy creates a flatter foreign exchange provision curve; (n_1) will be higher than (n_0) . When we graph the flatter curve it becomes apparent another (Qfs_1) curve is more gradual as a result of the increased (n) , and it will lead to a shift in the total foreign exchange supply curve from (FS_0) to (FS_1) due to the high exchange rate of foreign currency to a level higher than (e_0) to (e_1) .



In accordance with new commercial policies, the CBL continues to meet the foreign exchange demand until covers all the new level of total demand (qf_1) and at this level of the foreign exchange supply the LYD exchange rate is determined in level (er_2), this rate is very close to the new official exchange rate (e_1), while the real exchange rate for the LYD is at the same level of foreign currency demand (er_1).

$$(e_1 \approx er_2) \ \& \ (er_1 < er_0 > er_2) \ \& \ (qfd_1 = qfs_1)$$

The LYD exchange rate stabilizes in the foreign exchange market at the level of (er_2 or slightly less) as long as the CBL is able to cover most of the demand of foreign exchange at this level and as a result of a new commercial policies, the foreign exchange supply level is less flexible to change the LYD exchange rate in the foreign exchange market and the response of change of the YLD exchange rate to the change in the demand for foreign exchange will be lowest in the foreign exchange market, as long as the CBL covers all the demand of foreign exchange quantities at (er_2), which will lead to create a flatter foreign exchange demand curve. When we graph the flatter curve it becomes apparent another (FD) curve is more gradual as a result of increase the ability of CBL to cover most of (qfd), and it will lead to a shift in the total foreign exchange demand curve from (FD_0) to (FD_1) and the new balance level of the foreign exchange market is obtained at point (B) and the combination (er_2 & qf_1).

The increase in the volume of public revenues as a result of an inflow of fee income that imposed on the sale of foreign exchange to the public budget will lead to an increase in the amount of expenditure on goods and services, plus the decrease in a general level of prices from the level of (p_0) to (p_1) will also lead to an increase in purchasing power, which leads to a shift in the total demand curve for goods and services from (AD_0) to (AD_1). At the new balanced level of the real exchange rate of the LYD (er_2), the new equilibrium level is obtained at the level of (q_2) which is greater than (q_0) and a new general level of prices is determined (p_1) which is less than (p_0).

The new commercial policy applied by GNA and CBL in covering most of the foreign exchange demand and imposing selling fees on foreign exchange, has surrounded the fluctuation of the change in the exchange rate of the LYD between two levels close to each other (er_0 & er_2) and this will achieve some of macroeconomic stability. It also has had positive effects in reforming the public financial situation, increasing the level of economic activity and a decrease in the general level of prices compared to the previous policy of financing the public budget deficit through government borrowing from the CBL.

$$(q_1 > q_0) \ \& \ (p_1 < p_0) \ \& \ (er_{\max} - er_{\min} \approx 0)$$

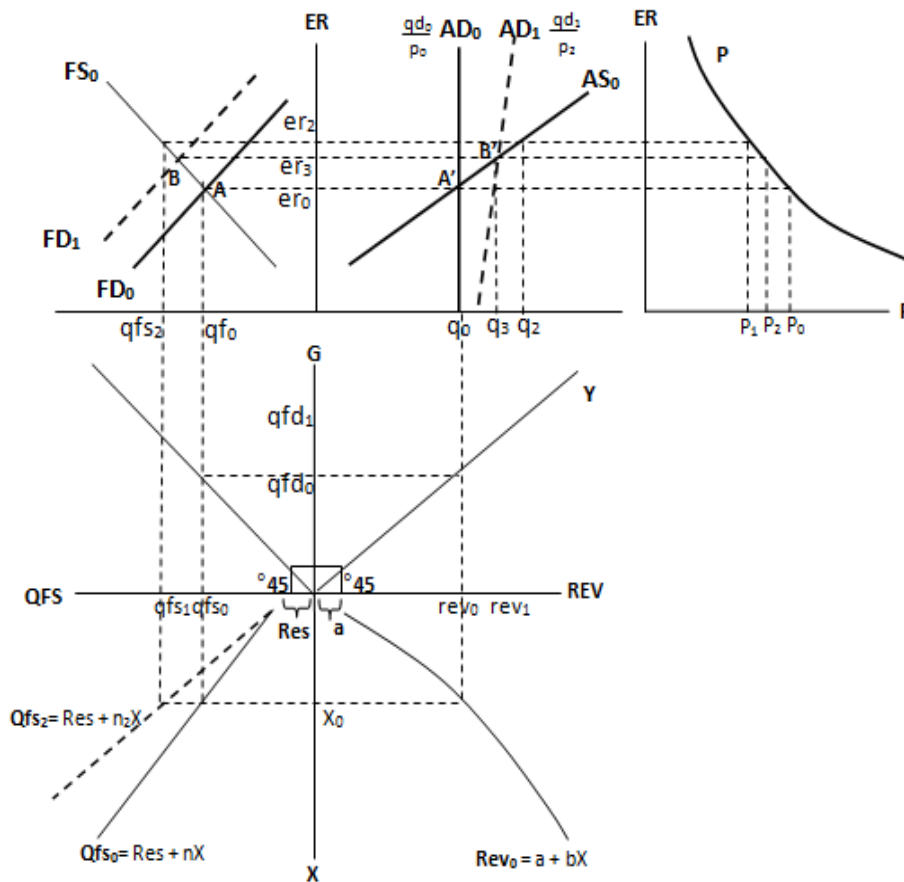
6-4. The effect of household heads provisions of foreign exchange on the model:

The effect of household heads provisions of foreign exchange on the equilibrium is different from commercial and personal provisions, because the allocations of household heads are sold at the official exchange rate (e_0) and do not impose selling fees on them, and thus do not supply revenues to the public budget, and the marginal tendency to allocations for household heads (n_2) is less from the marginal tendency to commercial and personal allocations (n_1).

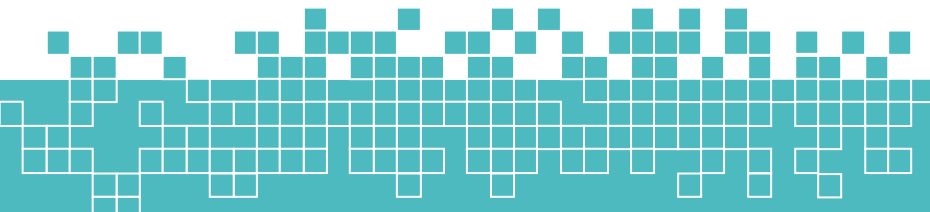
$$(n_1 > n_2) \ \& \ (e_1 > e_0) \ \& \ (a_1 > a_0) \ \& \ (qfs_1 > qfs_2)$$

The “undeclared” goal of selling foreign exchange to the heads of families at the official exchange rate, is to provide them extra cash income in order to improve their standard of living against the continuous rise in the general price level, and to provide cash liquidity at a time that commercial banks were unable to provide the liquidity for paying the salaries of public sector employees. This goal is achieved when heads of households sell their provisions in foreign exchange market and earn additional income that obtained from the difference in the exchange rates between their provisions and the foreign currency in markets.

Figure (8) the effect of household heads provisions of foreign exchange on



If the economy is equilibrium in combination $(x_0 \& p_0 \& q_0 \& er_0 \& px_0)$, as the new monetary policy adopted by CBL to sell a limited amount of foreign exchange to heads of Libyan households on the official exchange rate (e_0) , will be reflected in the graph by increasing the steep of the (QFS) curve, which leads to leftward turn in the foreign exchange provisions curve from (QFS_0) to (QFS_2) , as a result of an increase in the ratio of allocations of foreign exchange to heads of households from (n_0) to (n_2) , without this leading to a shift in the foreign exchange supply curve (FS_0) as happened in Commercial and Personal Provisions, as a result of the



stability of the LYD exchange rate at the level (e_0), and become the new combination of quantity and exchange rate (er_2 & qfs_2).

The effect of this policy on the model does not stop at that level, but extends to increase the demand of goods and services as a result of additional incomes spent by household heads in local market. These quantities of demand are not constant but have negative relationship with the exchange rate of the LYD in the foreign exchange market and will lead to leftward turn in the aggregate demand curve from (AD_0) to (AD_1).

The increase in the total demand for foreign exchange due to the increase in the demand for purchasing more goods and services will lead to a shift in the curve from (FD_0) to (FD_1), given that the increase in demand for goods and services did not come through an increase in public revenues but rather through additional incomes that have been obtained by selling heads of households for their provisions in the foreign exchange market, and the exchange rate for the LYD is determined at the level of (er_3) and then a general level of prices (p_2) is set which is less than (p_0) and the new equilibrium will be achieved at the level of (q_3) which is greater than (q_0).

It can be said that:

- The effect of the household heads provisions policy (HHP) on the Libyan economy was positive, but its effectiveness was less than the commercial and personal provisions policy (CPP), given the equilibrium combination provided by CPP (er_2 & q_2 & p_1) was at a better level than the equilibrium combination provided by the HHP (er_3 & q_3 & p_2).
- The efficiency of CPP and HHP policies depends on the ability of the CBL to cover the total demand of foreign exchange and this ability is constrained by the volume of oil exports, and therefore the monetary and fiscal authorities may have to raise the value of fees imposed on the sale of foreign exchange at low levels of oil exports, however, this policies may lose its efficiency at the lowest levels of oil exports and replaced by the importing provisions policy (IP).
- The CPP policy may play the role of an alternative to the policy of financing the deficit by borrowing from the CBL, while the HHP policy does not provide revenue for the public treasury, however the latter provides direct support to the families' budget (society) and cash (liquidity) for them while the CPP policy provides direct support to the government's budget that will spend it on the society but this support is dependent on the government integrity in managing public money.

6-5. The effect of customs duties as commercial policy tool on the model:

The customs duties are considering as one of the commercial policy tools that aim primarily to influence the commercial activity in order to achieve the macroeconomic goals. Simultaneously, the duties' revenue can provide the public budget with financial resources that are used to achieve the fiscal policy objectives.

If the economy is equilibrium in combination (x_0 & p_0 & q_0 & er_0 & p_0), imposing customs duties on goods and services imports will increase the cost of imports, which will lead to move the whole goods and services supply curve to the leftward (AS_0) to (AS_1), and the financial revenues obtained from customs duties will increase the volume of non-oil revenues (a_1), which will lead to the transfer of the public revenue grants from (Rev_0) to a greater level (Rev_1), and a

new demand is determined on foreign exchange in the foreign exchange market (qfd_1) which is greater than balanced demand (qf_0), at the same time the demand for goods and services increases and moves to the level (AD_1) which is greater than (AD_0).

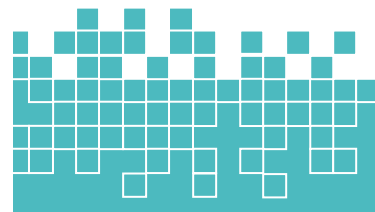
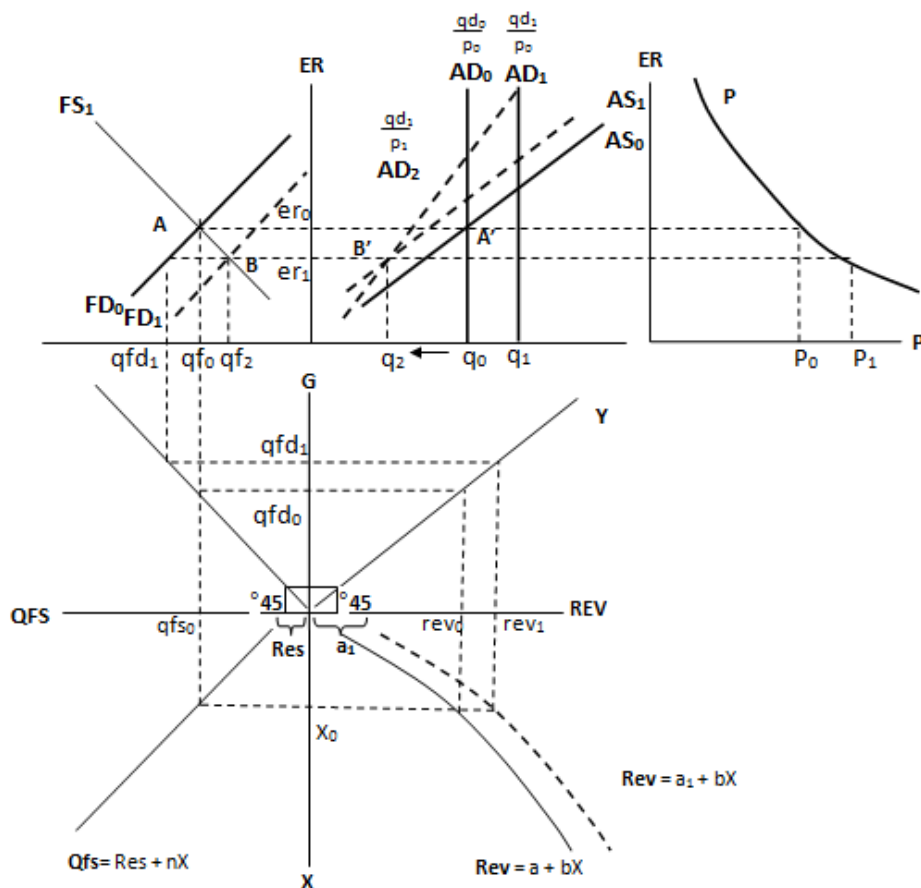
At the level of demand (qfd_1), the exchange rate of the LYD decreases from (er_0) to (er_1) in the foreign exchange market, which leads to a greater increase in the cost of import, so the quantity of goods and services supply will be decreased in a graph by moving to another point (B') on the curve (AS_1). At the new level the real aggregate demand for goods and services will be decreased from (AD_1) to (AD_2), and the real quantity demanded will be failing to (qd_2).

The difference in the quantity supplied and quantity demanded of foreign exchange will push the market mechanisms to move towards setting a new balance level of foreign exchange demand and holding economic policies constant the market law will lead to a shift in the foreign exchange demand (FD_1) to balance each other and determine a new interaction point (B). In this point the new combination of quantity and exchange rate (er_1 & qf_2) is obtained in a graph by a rightward shift in the foreign exchange demand and supply curves (FS_0 & FD_1). At the new balanced level of the real exchange rate of the LYD (er_1), the new equilibrium level is obtained at the level of (q_2) which is less than (q_0) and a new general level of prices is determined (p_1) which is greater than (p_0).

$$(er_0 > er_1 \quad \& \quad q_0 > q_2 \quad \& \quad p_0 < p_1)$$

It can be said that, the effect of the imposing customs a new duties on imports or raising their value on the Libyan economy was negative, given the equilibrium combination before customs duties (er_0 & q_0 & p_0) was at a better level than the equilibrium combination after customs duties (er_1 & q_2 & p_1).

Figure (9) the effect of customs duties as commercial policy tool on the model



7. Conclusion and recommendations:

The economic model shows fragile structure of the Libyan economy, due to large overdependence on oil incomes, and there is no opportunity to raise the economic level except by increasing oil exports, which are dependent on world oil markets, and this link works to further deepen the weakness of the Libyan economy, and to delink with oil export, the economic diversification has become an important development goal of Libyan State,

The goal of economic diversification is only one of the strategic goals pursued by all Libyan successive governments, because of its positive effects on the economy; by protecting the economy from adverse shocks in global oil markets, as was interpreted by study's model. However, diversification of the economy depends on the economic policies adopted by the State for a long term, considering the economic diversification needs a structural change in the whole Libyan economy, and among those policies is encouraging the private sector and developing its participation in economic activity by supporting its investment in economic activities that depend on domestic production, and driving public investments to strategic economic projects such as infrastructure projects, which are characterized by a large capital and indirect economic return.

The diversification path of the Libyan economy is long and contains many internal and external challenges. There are traditional internal challenges represented in restructuring the Libyan economy and seeking for the comparative advantages in order to benefit from them in diversifying the economy, while the untraditional internal challenge and the real diversifications is establishing the meaning of work in Libyan society and making the productivity factor the primary driver of the macroeconomic model instead of oil exports which is independent on the productivity of the Libyan society.

As for the external challenges that many economists did not address when drawing plans for Libyan economic diversification and reform is how to change the Libyan economic shape in the global economic system, in other words how to change the economic function in the global economic chain, from a mono economy to a diversified economy. This diversity will confuse the countries associated with the economic chain with the Libyan economy, especially the regional countries. These countries are working to prevent any diversity even in the long term, by supporting the chaos and authoritarian regimes that destroy any hope in achieving human development and economic diversification, and this is the real challenge facing the diversification of the Libyan economy.

All of those challenges facing the structural change of the Libyan economy make the economic model presented by this study an appropriate model capable of explaining economic manner and assisting to understand the Libyan macroeconomic interaction over the next few years, and thus it is recommended to conduct applied studies that estimate model equations (is called **Hasen's model**) and produce a macroeconomic formula that used by policy makers when developing economic policies.

References:

- Abuazoum, A. (2016), "Oil price fluctuations and their impact on economic growth in Libya: Econometrics Study (1990 -2010)", Academic Research Journal, No (5), pp 75 - 106.
- Ali, S. (2014), "Determinants of private investment in Libya", Sabha University Journal, No (3), pp 106 – 121.
- Almamrook, R. (2017), "Estimating the demand functions for the foreign trade components in the Libyan economy ", Study submitted to obtain the MSc degree, Sabha University, Sabha – Libya, 2017.
- Edgmand, M. R. "Macroeconomics: theory and policy", Englewood Cliffs, N.J: Prentice-Hall, (2nd Ed), 1983.
- Elbeydi. K. (2014), "An Empirical Analysis of the Impact of Selected Macroeconomic Variables on Capital Formation in Libya (1970–2010)", World Academy of Science, Engineering and Technology, No (86) PP 530 – 533.
- Hraib, S. & Taghogh, F. & Hawili, M. (2018), "The monetary stability in the Libyan economy" The second academic conference for economics and business studies, Musrata University, Dec 2018, Musrata – Libya.
- IMF (2007), "Libya: 2006 Article IV Consultation". IMF Country Report No. 07/149 Washington, D.C: International Monetary Fund.
- Khairy, S. & Alqatous, S. (2018), "An economic analysis of the role of the public budget in achieving sustainable development in Libya", Al-Zawia University, Website: <https://zu.edu.ly/university/journal/5c4386807523b762959e5629/research/5e0b4cc1e669f57f91a52d0b>.
- Libyan Audit Bureau (LAB), Annual report (2017), Annual Report, General National Congress (GNC), Tripoli, Libya.
- Shamiya, A. (2006) "Role of State in Economic Activities", Libyan Organization of Policies and Strategies, Tripoli, Libya. Retrieved from Libyan Organization for Policies and Strategies, Website: <http://loopsresearch.org/projects/view/102/?lang=ara>
- Twari, N. & Amer, S. (2018), "The role of private investment in economic growth in Libya", Science and Technology Journal (Humanities), No (1), pp 38 – 49.
- Yakhlif, Y. (2016), "Estimating the consumer spending function - using the relative income (RI) hypothesis", Journal of Economics and Business Studies, No (1), pp 44 - 54.

- Yakhliif, Y. & Sassi, W. (2016)," The relationship between unemployment and inflation in the Libyan economy", Academic Research Journal, No (6), pp 393 – 408.
- Alhasia, M. "The Role of Money in the Libyan Economy: An Analytical and Applied Study", Al-Thawra: printing house, Benghazi – Libya, 1979.

نموذج جديد للاقتصاد الكلي مع قياس آثار السياسات الاقتصادية – ليبيا

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الملخص

تعد هذه الدراسة محاولة لتطوير نموذج نظري للاقتصاد الكلي يشمل كل القطاعات الاقتصادية الفعالة في النشاط الاقتصادي الليبي، قادر على تفسير بعض الظواهر التي يتميز بها الاقتصاد الوطني وقادر أيضا على قياس الآثار الاقتصادية الناجمة عن بعض السياسات الاقتصادية التي تبتها السلطات الاقتصادية في إطار مفهوم الإصلاح الاقتصادي، ومن أهم النتائج التي أظهرها النموذج في تفسير وقياس تلك السياسات، بأن فاعلية سياسة فرض رسوم على بيع لنقد الأجنبي للأغراض التجارية والشخصية تتوقف على قدرة المصرف المركزي على تغطية الطلب الكلي على النقد الأجنبي، وهذا مقيد بحجم الصادرات النفطية، وبالتالي قد تضطر السلطات الاقتصادية إلى رفع في قيمة الرسوم المفروضة على بيع النقد الأجنبي عند مستويات محدودة من انخفاض الصادرات النفطية. كما أظهر نموذج أيضا بأن سياسة فرض الرسوم على مبيعات النقد الأجنبي للأغراض التجارية والشخصية لها أثر إيجابي على الاقتصاد الوطني، وقد تلعب دور البديل لسياسة تمويل عجز الميزانية العامة بالاقتران من المصرف المركزي، بينما سياسة فرض رسوم جمركية على الواردات أو الرفع من قيمتها سيكون لها آثار سلبية على الوضع الاقتصادي، في حين سياسة بيع كمية محدودة من النقد الأجنبي إلى أرباب الأسر بسعر الصرف الرسمي لا توفر أي إيرادات لصالح الخزينة العامة ولا تلعب دور البديل في تمويل عجز الميزانية العامة، إلا إنها تقدم دعم مباشر لميزانية الأسر وتوفر سيولة نقدية وختمت الدراسة بأن النموذج الاقتصادي يبين ضعف الوضع الاقتصادي، وذلك لإعتماده على الصادرات النفطية وأنه لا مجال للرفع من المستوى الاقتصادي إلا من خلال زيادة الصادرات النفطية المعتمدة على الأسواق العالمية للنفط، وهذا الارتباط يعمق الضعف الذي يتصف به الاقتصاد الليبي، ولذا الارتباط بالصادرات النفطية يجب العمل على تنويع الاقتصاد الليبي.

مفاتيح الكلمات: نموذج، الاقتصاد الكلي، ليبيا

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