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Original Article

Analyzing the Effects of Flexible Exchange Rate Regime on the Malian Economy Using a Dynamic Stochastic General Equilibrium Model

Issaka Hamadi Maiga[1], Nafiu Lukman Abiodun[2] and Thomas Mageto[3]

[1]*Depertement of Mathematics, Pan African University Institute for Basic Sciences, Technology and Innovation/ Jomo Kenyata University of Agriculture and Technology, Kenya*
[2]*Department of Mathematics and Statistics, Kabale University, Uganda*
[3]*Department of Statistics and Actuarial Sciences, Jomo Kenyatta University of Agriculture and Technology, Kenya*

Abstract *- This paper investigates the possibility to analyse the effects of flexible exchange rate regime on the Malian economy using a Dynamic Stochastic General Equilibrium (DSGE) model. The model includes 22 equations estimated by log-likelihood estimation technique using data from the variables consumption, production, consumer price index, exportation, importation, money supply, exchange rate, domestic interest rate, gross domestic products, and world interest rate observed chronologically for the period 1970-2020. The results show that household consumption is more affected negatively under fixed exchange rate regime when there occurs a shock of world interest rate. For instance, one-unit shock to world interest rate reduces household consumption by an estimated 0.52 when the exchange rate regime is set to be fixed and by an estimated 0.01 when it is flexible. Production is more affected positively under fixed exchange rate regime in response to the shocks. For instance, a 1% increase of trade terms, raises the production by 0.02% under fixed exchange rate regime and by only 0.003% under flexible exchange rate regime. In terms of fluctuations, results show that all the variables fluctuate more under flexible exchange rate regime for all types of shocks compared to fixed exchange rate regime.*

Keywords - *DSGE, flexible exchange rate regime, fixed exchange rate regime, fluctuations, shocks*

I. INTRODUCTION

Monetary policy is one of economic policies used by a State in order to either stabilize probable fluctuations in the growth of the economy or to revive the economy. One of the main tools used by this policy is the exchange rate which is based on the exchange rate regime chosen by the State. According to the economics theory, a fixed exchange rate system which consists of determining the value of a currency to a stronger currency, could have many benefits, especially for developing countries looking up to consolidate confidence in their economic policies. Nevertheless, using such system has many drawbacks since countries which opt for that system have to give up their monetary policy as a tool of regulation, namely they can no longer decide to act on the exchange rate to stabilise the economic fluctuations. However, most of the countries in West and Central Africa using franc CFA have opted for a fixed regime which peg the value of their currency to the euro. Mali is one of the countries using that exchange rate system. As there is an ongoing project to end the treaty guaranteeing the fixed parity between euro and franc CFA, this gives rise to a great number of questions among them what could be the effects of that change on the economy's growth and stability of those countries. This study is focused on the specific case of Mali. Indeed, no scientific study has been done yet on the specific case of Mali about the effects of a flexible exchange rate regime on her economy. Dynamic Stochastic General Equilibrium (DSGE) model which is one of the most popular models when it comes to monetary policy analysis, is used in this study in order to evaluate the effects of a flexible exchange rate regime on the Malian economy. The main purpose of this paper is to evaluate the effects of flexible exchange rate and compare them with those of fixed exchange rate regime on main economic variables of Malian economy.

This paper is organized in six sections. Section one introduces the paper, section two is assigned to the literature review, section three to the model specification, empirical results will be presented in section four, results will be discussed in section five and concludes the paper in section six.

II. LITERATURE REVIEW

Dynamic Stochastic General Equilibrium (DSGE) models have been consistently used as the framework of macroeconomic analysis since the 1990s. Empirical researches have been done in the area of monetary policy analysis using Dynamic Stochastic General Equilibrium model vulgarized recently by (Frank & Wouters, 2003) and (Lawrence, Martin, & Charles, 2005). In order to determine the role of the monetary policy in the case of the Philippines, (Federico, 2011) used a Dynamic Stochastic General Equilibrium model and he had found out that the flexible exchange rate regime is favoured when unanticipated shocks driving the business cycle are also part of the picture while fixed exchange rate regime avoids a rapid real appreciation and performs better for recipient households facing an increasing trend for remittances. (Naoyuki & Tamon, 2017) had also used a DSGE model to determine the optimal exchange rate regime transition policy for three East Asian countries, namely the Peoples Republic of China (PRC), Malaysia, and Singapore. (Mutiu, 2017) applied a small open economy Dynamic Stochastic General Equilibrium (DSGE) model to analyse the dynamic effects of the monetary policy in Nigeria. He used the Bayesian technique to estimate the model. His findings indicate that the inflation in Nigeria is driven by the following main economic variables: money supply, productivity, nominal exchange rate and domestic interest rate shocks; while output fluctuations are influenced by external shocks like exchange rate and external debt. Similar DSGE model was used by (Khalafalla, 2020) in his research entitled "Does the DSGE model fit the Sudan Economic data?" and he had shown that the terms of monetary policy in Sudan are effected in the same way by the nominal interest rate and the general price level. He had also found out that the Central Bank of Sudan (CBS) is practicing less radical change in the formulating monetary policy, and is achieving slight progress in combating inflation and fostering economic growth. To study the effects of external shocks on the economy of Republic Democratic of Congo (DRC), (Umba, 2020) estimated a Dynamic Stochastic General Equilibrium model using Bayesian technique just like (Mutiu, 2017) in the case of Nigeria. His results have shown that the world interest rate doesn't influence directly the economic activity of DR. Congo, however external shocks producing a reduction in speed or a decrease in the level of production may affect negatively the global demand and have a significant impact on economic activity.

Dynamic Stochastic General equilibrium model is not only used for economic policy analysis but also used for the purpose of forecasting. Thus, (NOEL, 2019) developed in his thesis a variant of DSGE model on the one hand, and Vector Auto Regressive (VAR) model on the other hand in order to compare the performances of the two models in terms of forecasting using economic data of Canada. He has shown that under certain assumptions, the DSGE model give a better precision, especially when the horizons of forecasting are more and more distant. Similarly, based on the quarterly Australian economic data, (Phuong, 2020) built a small open economy New Keynesian Dynamic Stochastic General Equilibrium model to compare the forecasting performance of the said model with its closed economy-counterpart. He found out that the latter model yield predictions with more accuracy than the former. Most recently, (Hang, Yimeng, & Yunchan, 2021) constructed a New Keynesian Dynamic Stochastic General Equilibrium model to study the impact of COVID-19 pandemic on the sustainability of Chinese economic growth. After analysing the targets of monetary policy, they have concluded that authority of monetary policy should focus more on the target of price stability if the impact of COVID-19 pandemic has led to a recession in aggregate demand; while monetary policy should concentrate on the objective of economic growth if the crisis of COVID-19 has affected both demand for labour and aggregate demand. In the

same way, (Vronique & Agns, 2010) combined a DSGE model with an epidemiological Susceptible-Infected-Recovered (SIR) model in order to evaluate the economic impacts of epidemics and the possibility for underground monetary policy to redress those effects. They came up with the conclusion that there is no such a monetary policy to correct the harmful effects of epidemic crisis. To analyse the risks linked with higher debt, (Burriel, Checherita-Westphal, Jacquinot, & Stahler, 2020) used three large scale DSGE models. Their simulations have shown that high debt economies may lose considerable output during a crisis but less affected by spillover effects. However, they precised that if the monetary policy is focused on the area-wide aggregate like Euro area, countries with high debt are more equipped to resist future asymmetric shocks.

III. MODEL SPECIFICATION

Our model is basically derived from the small open economy dynamic stochastic general equilibrium model developed by (Michael, Philip R., & Juanyi, 2004). Most of the equations are obtained by considering log-linearized form of their equations using the techniques proposed by (Uhlig, 1998). We then extend the equations by taking account the gross domestic products and money supply taken respectively from (Lorenzo, 2017) and (Devereux, 2010).

The model contains the following behavioural equations:

a. Household consumption (c) depends on the consumer price index (p), interest rate (i) and the expected future consumption.
b. Consumer price index (p) is a function of non-traded goods price (pn) and the price of import goods (pm)
c. The price of non-traded goods (pn) depends on the marginal cost (mc) of non-traded goods production (yn) and the expected future value of the non-traded goods price
d. The marginal cost (mc) of production is expressed as a function of production (yn), the labour supply (hn) for the production and the wage (w) to which it is payed
e. The price of import goods (pm) depends on the exchange rate (s), the price abroad of imported goods (psm), the total importation of goods (tm) and the expected future value of the imported goods price
f. The exchange rate (s) is derived from the interest rate parity condition given by a combination of Euler equations in (Michael, Philip R., & Juanyi, 2004) and it depends on the expected future values of itself, interest rate (i) and foreign debt (d)
g. The foreign debt (d) is a function of world interest rate (wi), household consumer (c), consumer price index (p) and the exchange rate (s). It is established from one of the Euler equations in (Michael, Philip R., & Juanyi, 2004)
h. Interest rate (i) is used in this model as tool of regulating the monetary policy. In this case, it depends on the non-traded price (pn), the consumer price index (p), the exchange rate (s), the gross domestic products (g) and a monetary policy shock (u)
i. The gross domestic products (g) is set to be linked negatively to the interest rate (i) and positively to the expected future value of inflation depending on the consumer price index (p) and as well as to its expected future value
j. Domestic production (yn) is set to be simply a function of labour supply (hn) which is paid at wage (w), since the capital factor is not considered in this model
k. The exportation function (yx) also depends only on the labour supply factor (hx) paid at wage (w)
l. The wage (w) depends on the labour supply (h), consumer price index (p) and the household consumption (c)
m. The total importation (tm) depends on the consumer price index (p), the price of import goods (pm) and the household consumption (c)

n. And the labour supply (h) is setting to be a summation of labour supply for domestic production (hn) and labour supply for exportation goods (hx) in clearing the market of labour.

o. The price abroad of exported goods (psx) is a function of the marginal cost (px) of exported goods production (yx) and the exchange rate (s)

p. The marginal cost (px) of exported goods production (yx) depends on the exported goods production (yx), the labour supply (hx) for exported goods production and the wage (w)

q. The price abroad of imported goods depends on the price abroad of exported goods and the terms of trade (tt). The terms of trade (tt) is defined to be the relative variation between the price abroad of exported goods (psx) and the price abroad of imported goods (psm). It is grafted to this model as an external shock as well as world interest rate (wi).

r. The money supply (m) is a function of interest rate (i), household consumption (c) and the consumer price index (p)

s. The terms of trade shock (tt) is assumed to follow an autoregressive process

t. The world interest rate shock (wi) is assumed to follow an autoregressive process

u. The monetary policy shock (u) is assumed to follow an autoregressive process

$$c_t = c_{t+1} + \frac{1}{\sigma} * (p_{t+1} - p_t) - \frac{1}{2\sigma} * i_{t+1}$$

$$p_t = a * pn_t + (1 - a) * pm_t$$

$$pn_t = \frac{\lambda}{1-\lambda} * mc_t + \frac{\psi_{pn}}{1-\lambda} * (pn_{t+1} - pn_t)$$

$$mc_t = w_t - yn_t + hn_t$$

$$pm_t = \frac{\lambda}{1-\lambda} * (psm_t + s_t) + \frac{\psi_{pm}}{1-\lambda} * (pm_{t+1} - pm_t)$$

$$s_t = s_{t+1} - i_{t+1} + \psi_d * d_{t+1}$$

$$d_t = \psi_d * i_{t+1} + \sigma\beta * (c_{t+1} - c_t) + \beta * (p_{t+1} - p_t) - \psi_d * s_{t+1}$$

$$i_t = \mu_{\pi n} * (pn_{t+1} - pn_t) + \mu_\pi * (p_{t+1} - p_t) + \mu_s * s_t + \mu_g * g_t + u_t$$

$$g_t = g_{t+1} - \frac{1}{\sigma} * (i_t - p_{t+1} + p_t)$$

$$yn_t = (1 - \alpha) * hn_t$$

$$yx_t = (1 - \gamma) * hx_t$$

$$w_t = \psi * h_t + p_t + \sigma * c_t$$

$$tm_t = (1 - a)\rho * p_t + (a - 1)\rho * pm_t + (1 - a)c_t$$

$$h_t = hn_t + hx_t$$

$$psx_t = px_t - s_t$$

$$px_t = w_t - yx_t + hx_t$$

$$psm_t = psx_t - tt_t$$

$$m_t = \frac{\sigma}{\nu} * c_{t+1} + \frac{\beta(1+\delta)}{\delta\nu} * (p_{t+1} + i_{t+1}) - \frac{1}{\beta\delta\nu} * p_t$$

$$tt_{t+1} = \rho_{tt} * tt_t$$

$$wi_{t+1} = \rho_{wi} * wi_t$$

$$u_{t+1} = \rho_u * u_t$$

Data

The data used in this study are from Central Bank of States of West Africa and Malian National Institute of Statistics. The observed variables are household consumption (c), production (yn), consumer price index (p), exportation (yx), importation (tm), money supply (m), exchange rate (s), domestic interest rate (i), gross domestic products (g), and world interest rate[1] (wi). The other variables are unobserved. The sample covers 1970-2020.

IV. EMPIRICAL RESULTS

Calibration

The calibration of the model consists to select a combination of values for parameters with respect to the long terms characteristic of economic environment. Some parameters of the model are then chosen from previous studies, some are chosen with respect to the monetary policy rule and the remaining are estimated using log-likelihood estimation technique of DSGE model on Stata software.

Thus, the proportion $\boldsymbol{a}$ of non-traded goods in the consumption, the household risk aversion $\boldsymbol{\sigma}$, the elasticity of substitution between non-traded goods and traded goods in the consumption $\boldsymbol{\rho}$ and the household discount factor $\boldsymbol{\beta}$ are fixed respectively to 0.6, 2.61, 1 and 0.92 as have been estimated by (Diop, 2011); the coefficient of foreign debt adjustment cost $\boldsymbol{\psi\_D}$ is fixed to 0.007, following (Stephanie & Uribe, 2004); the inverse of the elasticity of Frisch labor supply $\boldsymbol{\psi}$ is considered to be 3 as estimated by (Sisay, 2011); the inverse of the elasticity of money holding with respect to the interest rate $\boldsymbol{v}$ and the scale parameter of money supply $\boldsymbol{\delta}$ are fixed respectively to 2 and 1, following (Devereux, 2010). The elasticity of labor for non-traded goods $\boldsymbol{\alpha}$ and the elasticity of labor for traded goods $\boldsymbol{\gamma}$ are chosen both to be 0.66 from the study conducted by (Diop, 2011) as well as the value of the parameter $\boldsymbol{\lambda}$ fixing at 11, it presents the elasticity of substitution between different goods. The parameters $\boldsymbol{\psi\_PN}$ and $\boldsymbol{\psi\_PM}$ controlling respectively the transmission of non-traded goods price and the exchange rate are both fixed at 120 following the study of (Michael, Philip R., & Juanyi, 2004).

The parameters $\boldsymbol{\mu_{\pi n}}$ using by the authority of monetary policy to control the inflation of non-traded goods, $\boldsymbol{\mu_{\pi}}$ controlling the level of consumer price index, $\boldsymbol{\mu_s}$ controlling the exchange rate and $\boldsymbol{\mu_g}$ controlling the level of gross domestic products are chosen according to the exchange rate regime system. We then estimated two models according to the two monetary policy rules (flexible and fixed exchange rate regimes).

For the flexible exchange rate regime, $\boldsymbol{\mu_{\pi}}$ and $\boldsymbol{\mu_g}$ are fixed respectively to 1.5 and 0.5 while the parameters $\boldsymbol{\mu_s}$ and $\boldsymbol{\mu_{\pi n}}$ tend to zero. The estimation results for the other parameters are indicated in the following **Table *1***.

Table 1: **Estimation results under flexible exchange rate regime**

	Coefficient	Std. err.	z	P>|z|	[95% conf.	interval]
/structural						
ρ_{tt}	0.7667	0.0267	28.6800	0.0000	0.7143	0.8191
ρ_{u}	0.6126	0.0123	49.7500	0.0000	0.5885	0.6368
ρ_{wi}	0.9997	0.0003	2610.0900	0.0000	0.9989	1.0004
sd(e.tt)	89.5924	8.3951			73.1383	106.0466
sd(e.u)	94.7929	4.7523			85.4785	104.1073
sd(e.wi)	13.3519	0.6838			12.0115	14.6922

For the fixed exchange rate regime, $\boldsymbol{\mu_s}$ tends to infinity while $\boldsymbol{\mu_{\pi}}$, $\boldsymbol{\mu_g}$ and $\boldsymbol{\mu_{\pi n}}$ tend to zero. The estimation results for the other parameters are indicated in the following **Table 2**.

[1] World interest rate variable is from the economic data base of Organization for Economic Co-operation and Development and represent the average interest rate of member States.

Table 2: Estimation results under fixed exchange rate regime

	Coefficient	Std. err.	z	P>|z|	[95% conf.	interval]
/structural						
ρ_{tt}	0.9864	0.0001	7418.0500	0.0000	0.9861	0.9867
ρ_{u}	0.0919	0.0002	384.4400	0.0000	0.0914	0.0923
ρ_{wi}	0.9317	0.0000	130000.0000	0.0000	0.9317	0.9317
sd(e.tt)	1.0434	0.0275			0.9894	1.0974
sd(e.u)	2.5078	0.0000			2.5078	2.5078
sd(e.wi)	0.2395	0.0009			0.2376	0.2413

We used these two monetary policy rules to deal with flexible and exchange rate regimes system following (Devereux, 2010).

Impulse response functions under flexible exchange rate regime

The graphic representation of a variable evolution in response to a shock of state variable is known as an Impulse Response Function (IRF). Since we have three shocks in this model, we have analyzed the responses of some variables of interest following each of the shocks. For reminder, the three shocks are: world interest rate shock, terms of trade shock and monetary policy shock. The variables of interest are: household consumption, gross domestic products (GDP), domestic interest rate, money supply, consumer price index (CPI), exchange rate, production, importation and exportation.

The ***Figure 1*** shows the response of these variables to a shock of world interest rate under flexible exchange rate. Thus, a shock to world interest rate shows out a temporary decrease in the household consumption, production, importation and exportation at the same time, while in the exchange rate and the consumer price index, it causes an increase. The other variables, namely, domestic interest rate, gross domestic products and money supply are fluctuating around their steady state level due to a shock of world interest rate. In fact, an increase in the consumer price index may affect negatively the purchase power of households and accordingly a decrease in their consumptions.

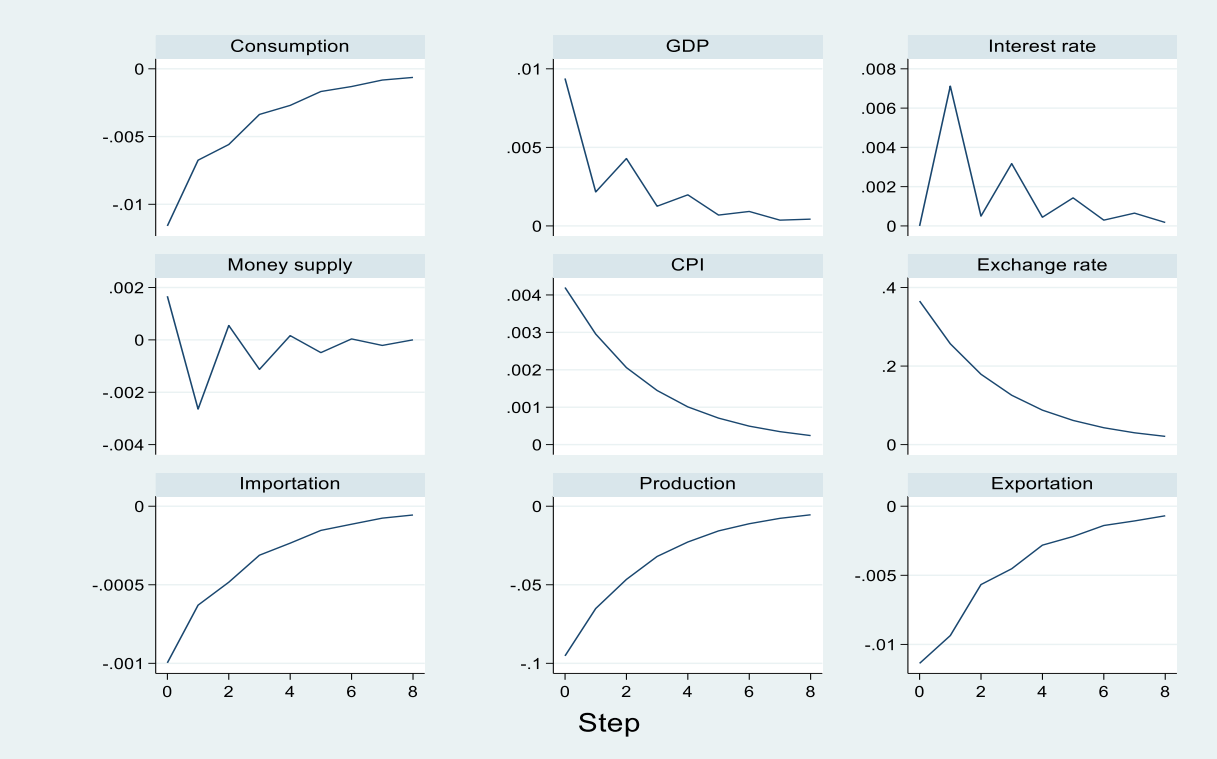

Figure 1: Response of variables to a shock of world interest rate under flexible exchange rate regime

A shock to terms of trade is manifesting by a negative effect on the consumption, the exchange rate and the importation which are decreasing. As to gross domestic products, production and exportation, they are fluctuating with a light increase. Counter to other variables, the consumer price index is increasing in response to the terms of trade shock. The domestic interest rate and money supply are fluctuating strongly around their steady state level.

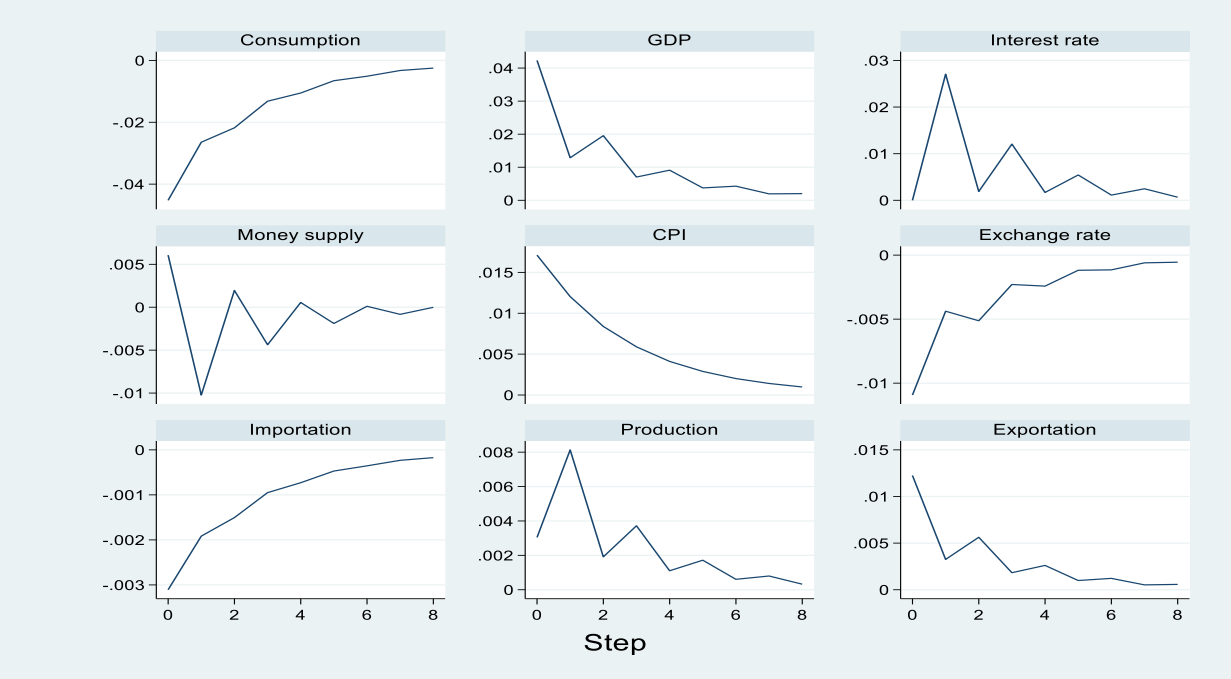

Figure 2: Response of variable to a shock of trade terms under flexible exchange rate regime

All the variables are fluctuating due to a shock to monetary policy. However, some like money supply and domestic interest rate fluctuate highly than others. One can note surprisingly an increase in the exportation while the variables consumption, production, importation and gross domestic products as well as the exchange rate record a temporary decrease.

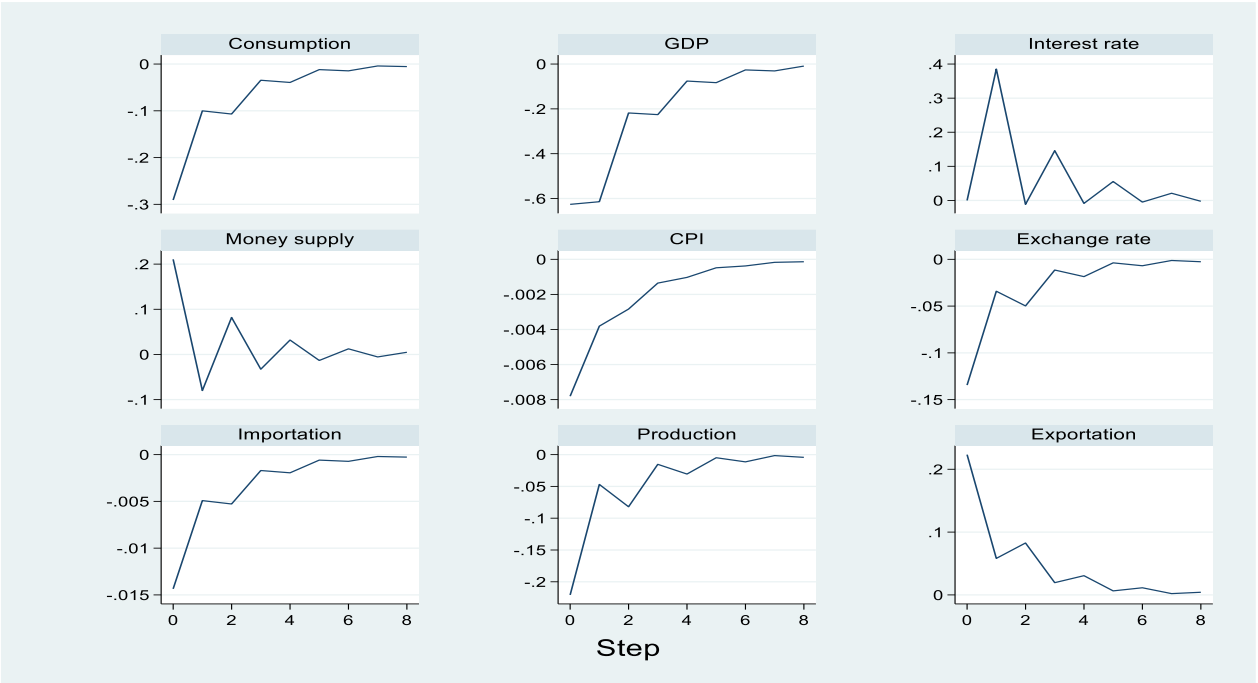

Figure 3: Response of variables to a shock of monetary policy under flexible exchange rate

Impulse response functions under fixed exchange rate regime

A shock to world interest rate is manifesting by a decrease in the household consumption, importation and gross domestic products. In fact, the trade balance of Malian economy being always negative, so a decrease in the importation can affect negatively the household consumption and accordingly the gross domestic products. The interest rate responses to the shock by a sudden increase before decreasing and going back to its steady state level. Money supply records a decrease following to the world interest rate shock which can be somehow explained by the negative relationship between domestic interest rate and money supply according to the economic theory. Both production and exportation increase following a shock to world interest rate.

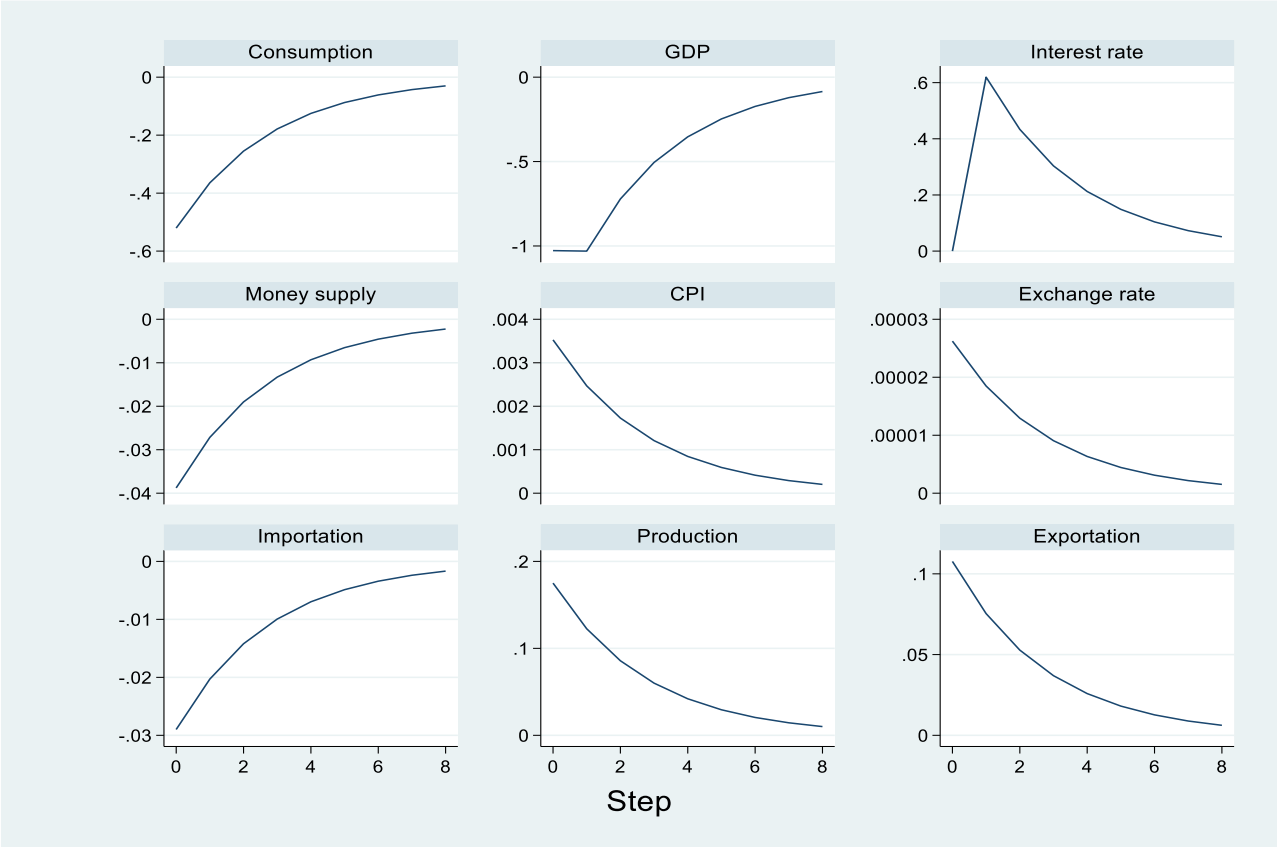

Figure 4: Response of variables to a shock of world interest rate under fixed exchange rate regime

A shock to terms of trade shows out almost the same effects observed in the case of world interest rate shock for the variables consumption, money supply, importation, consumer price index and domestic interest rate. However, the exchange rate records an increase in response to the terms of trade shock while it was decreasing in the case of world interest rate shock previously. And also, the gross domestic products that increase in response to terms of trade shock while was decreasing previously in the case of world interest rate shock. The increase in the gross domestic products can be explained by the increase in the production and exportation. In fact, consumption, production, exportation and importation are components of gross domestic products, so the increase or the decrease of the latter depends strongly on the level of the decrease or the increase in the formers.

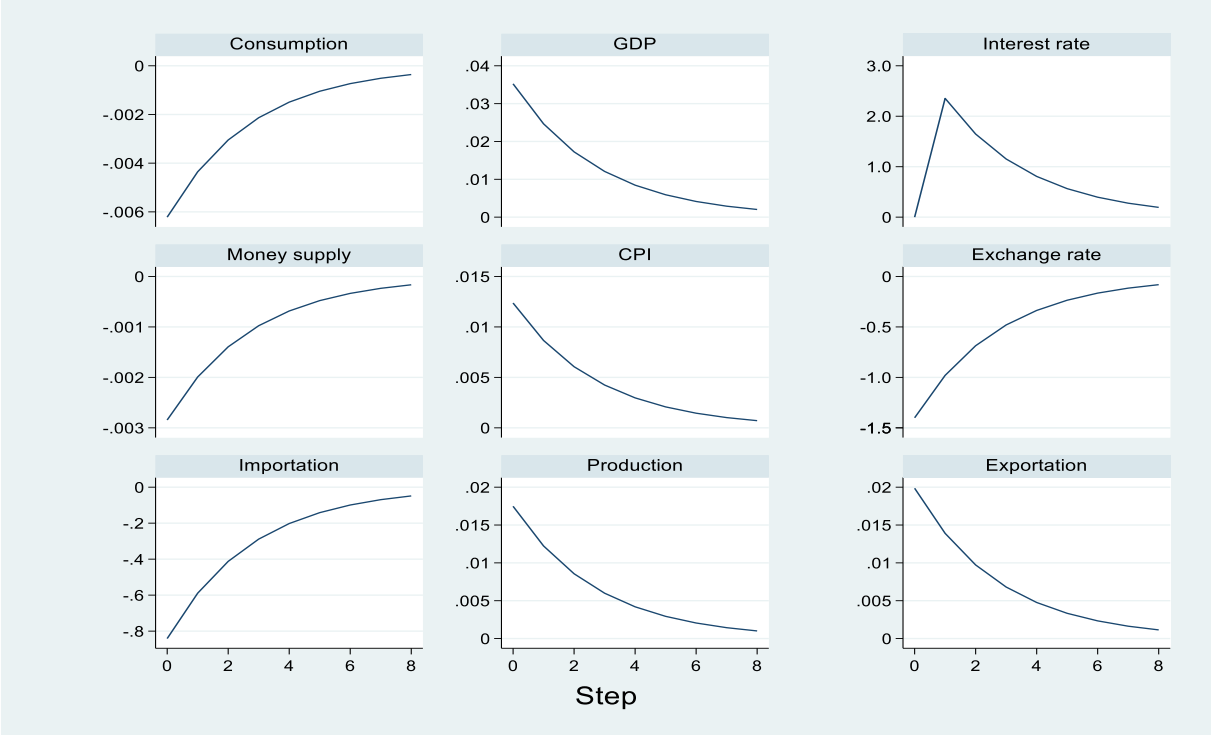

Figure 5: Response of variables to a shock of trade terms under fixed exchange rate regime

A shock to monetary policy under fixed exchange rate regime causes an increase in the production, exportation and the gross domestic products. Conversely, household consumption, importation and consumer price index decrease in response to the same shock. The interest rate also records a sudden increase before decreasing and returning to its steady level.

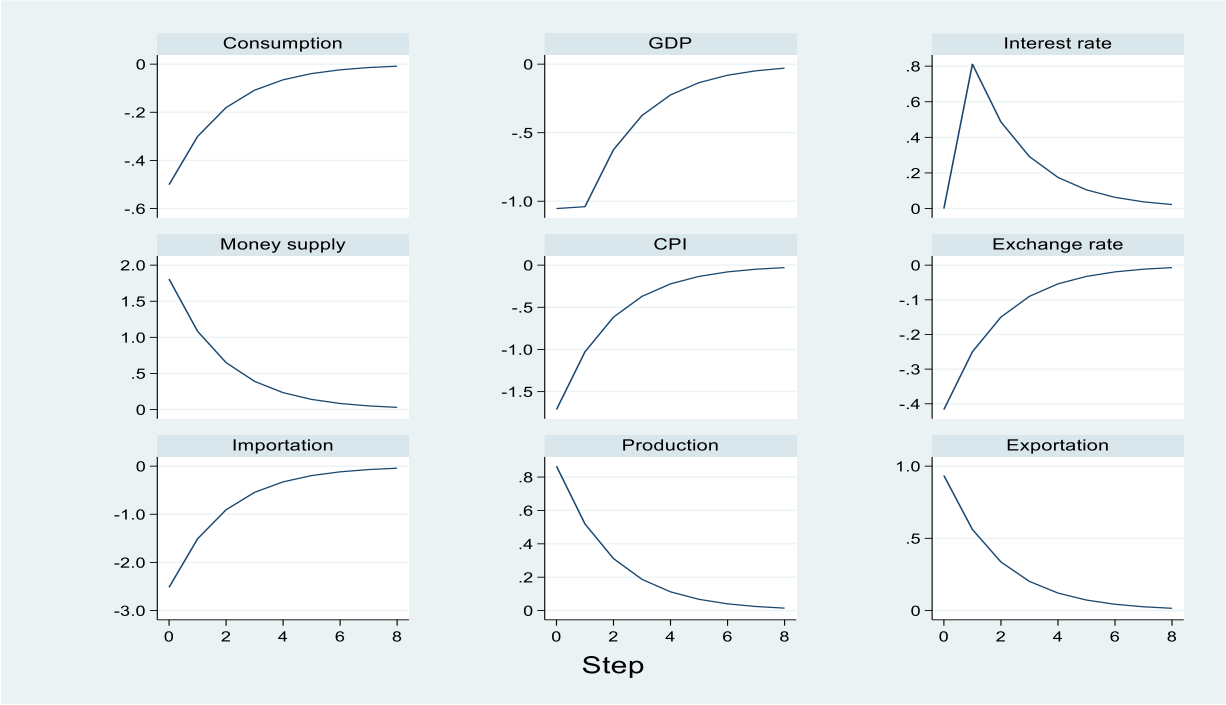

Figure 6: Response of variables to a shock of monetary policy under fixed exchange rate regime

Policy matrix under fixed and flexible exchange rate regime

Policy matrix of parameters specifies how the state variables affect the control variables. It displays the effect of one-unit shock of state variable on a control variable. In the other word, it evaluates how much a variable is going to increase or decrease following to one-unit shock.

The following ***Table 3*** displays the policy matrix for both flexible and fixed exchange rate regime in order to compare the two monetary policy rules in terms of effects on the variables in response to the shocks. Clearly, one-unit shock to monetary policy has more significant effects on some of the variables under flexible exchange rate regime than under fixed exchange rate regime. For instance, one-unit shock to monetary policy reduces the household consumption by an estimated 0.29 under flexible exchange rate regime while the same shock reduces it only by an estimated 0.00005 under fixed exchange rate regime. As for one-unit shock to world interest rate, household consumption decreases by an estimated 0.52 under fixed exchange rate regime and by an estimated 0.01 under flexible exchange rate regime. Production and exportation are more affected under fixed exchange rate regime in response to the shocks than under flexible exchange rate regime. Indeed, a 1% increase of trade terms, raises the production by 0.02% under fixed exchange rate regime while it raises it by only 0.003% under flexible exchange rate regime. The effects of the shocks are not too different under fixed and flexible exchange rate regime on the consumer price index. As for domestic interest rate, a 1% increase in the world interest rate, raises it by 0.62% under fixed exchange rate regime while it raises by only 0.007% under flexible exchange rate regime. As one can expect it, the exchange rate is more stable under fixed exchange rate regime than flexible exchange rate regime. In fact, the different shocks have no significant effects on it when the monetary policy is set to be fixed exchange rate regime while it is affected when the rule is flexible exchange rate regime. For instance, a 1% increase in the world interest rate, raises the exchange rate by 0.37% under flexible exchange rate regime while it raises it only by 0.00002% under fixed exchange rate regime, which is not significant compared to 0.37% when the monetary policy rule is set to be flexible exchange rate regime.

Table 3: Policy matrix under flexible and fixed exchange rate regime

	Flexible exchange rate regime			Fixed exchange rate regime		
	TTS[2]	MPS[3]	WIS[4]	TTS	MPS	WIS
CPI	0.0171109	-0.007803	0.0041985	0.0123722	-1.71E-06	0.0035271
Consumption	-0.0452257	-0.2907142	-0.0115964	-0.0062172	-0.0000501	-0.5205537
Exchange rate	-0.0109268	-0.134459	0.3655447	-1.40E-08	-0.0000417	0.0000262
GDP	0.0423109	-0.6260123	0.0093874	0.0352308	-0.0001053	-1.027519
Production	0.0030448	-0.2206503	-0.0952647	0.0174803	0.0000865	0.1750413
Exportation	0.0122524	0.2233255	-0.011369	0.019859	0.0000936	0.1076938
Interest rate	0.0270512	0.3854368	0.007121	2.35E-08	0.0000811	0.6194253
Money supply	0.0060703	0.2106225	0.0016683	-0.0028442	0.0000181	-0.0387828
Importation	-0.0031074	-0.014352	-0.0009969	-0.0008413	-2.52E-06	-0.0289921

Comparison of exchange rate regimes on the fluctuations of variables

The purpose of most of economic policies is to ensure the stability of the economy in case of external or internal shock. From the ***Figure 1***, ***Figure 2*** and ***Figure 3***, one can readily observe that the variables fluctuate significantly when

[2] Terms of Trade Shock
[3] Monetary Policy Shock
[4] World Interest rate Shock

the monetary policy rule is set to be flexible exchange rate regime. As under fixed exchange rate regime, the responses of variables to the different shocks are more persistent and fluctuate less than the case of flexible exchange rate regime, this fact can be observed through the ***Figure 4***, ***Figure 5*** and ***Figure 6***.

V. DISCUSSION

The main results which have been shown out in evidence in this research are the differences between variables fluctuations under the two systems of exchange regimes. Indeed, the variables are susceptible to fluctuate more significantly under flexible exchange rate regime system compared to the fixed exchange regime system. This result is similar to the one that found by (Oyono, 2006) in his study on "*the real effects of exchange rate regimes on developing countries*". He had particularly shown that the production fluctuates significantly when the exchange rate regime is flexible compared to when it is fixed.

The responses of variables seem to be similar in magnitude to the different shocks. However, variables like household consumption, importation, money supply and gross domestic products are more affected under fixed exchange rate regime when there occurs a shock of world interest rate. Also, domestic interest rate raises more significantly under flexible exchange rate regime in response to world interest rate shock. Conversely, in presence of terms of trade shock, consumption is more affected negatively under flexible exchange rate regime compared to fixed exchange rate regime. Nevertheless, Production and exportation are affected positively under fixed exchange rate in presence of world interest rate shock.

VI. CONCLUSION

This research is an attempt to build a Dynamic Stochastic General Equilibrium (DSGE) model to analyse the effects of flexible exchange rate regime on the Malian economy compared to fixed exchange rate regime. It's different from other studies by focusing in the specific case of Mali and applying the model on real economic data to find out the effects of different exchange rare regime systems on the economy. Log-likelihood estimation technique of DSGE model under Stata software has been used to estimate the values of parameters that have not been constrained and calibrated from previous studies. Time series data from 1970 to 2020 are available for the household consumption, production, consumer price index, exportation, importation, money supply, exchange rate, domestic interest rate, gross domestic products, and world interest rate. Data are obtained from the Central Bank of States of West Africa and Malian National Institute of Statistics. The findings show out approximatively similar effects between fixed and flexible exchange rate regime on the Malian economy. However, in case of the shocks due to either terms of trade or world interest rate or monetary policy, the variables seem to fluctuate more under flexible exchange rate regime compared to when the monetary policy rule is set to be fixed exchange rate regime. This study may be improved by combining for instance, Vector Autoregressive model with DSGE model.

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