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The viability of an economic and monetary union in Africa with a unified currency: evidence from the African economies' reactions to the international income, price and monetary shocks

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Abstract

The purpose of this paper is to provide a framework to analyze the feasibility of an economic and monetary union in Africa with a common currency. In this context, the present study has two objectives. The first one is to analyze the impacts of the international income, price and monetary shocks on real GDP, household consumption and consumer prices index in 17 African countries using a SVAR model for the period 1970-2007. The research methodology adopted in this study suggests that 16 countries are exposed to the international income shock, nine to the international price shock and 10 to the international monetary shock. A decrease in real OECD GDP has a negative impact on real GDP, household consumption and consumer prices index, and inversely in the case of an increase. A decrease in current Federal funds effective rate has a positive effect on those variables, and inversely. World price of oil impacts essentially African oil producers, with a decrease affecting negatively their economies and an increase positively. The second one is to compare African economies' orthogonal impulse response functions to those international shocks. It can be observed that the functions tend to be similar in the cases of the real GDP and household consumption's reactions, and more or less similar in the case of the consumer prices index responses. This analysis emphasizes that the possibility of creating an economic union in Africa with a common currency does exist.

Keywords: African economies, international income, price and monetary shocks, SVAR model

JEL Classification : C22, E32, F43, 011

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1. Introduction

The continental political organization, African Union, plans to create an economic and monetary union with a unified currency for the African Countries by 2023. This paper studies the feasibility of this project by analyzing the effects of the international income, price and monetary shocks on African economies and by comparing the reactions of these economies to those international shocks.

In fact, African countries produce and export essentially raw materials towards advanced and emerging economies (Madeley, 2003). In this context, they can be exposed to the international economic condition. For example, a decrease in international demand of raw materials subsequent to an international industrial crisis would have a negative impact on their economies (Berman and Matin, 2012). Several recent studies argue that Africa is exposed to the international economic and financial crisis through the export and import channels (Assoumou Ella and Bastidon Gilles, 2013), the tourism channel (Naudé and Saayman, 2005), the migrant transfer's channel (Singh et al. 2009), the FDI, external debt and others financial flows channels. Thereby, the aim of this study is firstly to analyze the impacts of the international shocks on real GDP, household consumption and consumer prices index in Africa; secondly, to compare the orthogonal impulse response functions of those variables after the different shocks during 10 years. The similarity in the reactions is a good starting point to conclude at the viability of the African Union's project.

The paper is organized as followed: Introduction, sections 2, 3 and 4 that present the literature review, the methodology and the results.

2. A brief literature review

The impact of international economic shocks in Africa has been subject of several recent studies. Ayhan Kose and Riezman (2001) presented the impact of international trade shocks in African economies through analysis of the relationship between the fluctuations in the prices of exported primary commodities, imported capital goods, intermediate inputs, the world real interest rate and macroeconomic fluctuations in Africa. Their results suggest that “while trade shocks account for roughly 45 percent of economic fluctuations in aggregate output, financial shocks play only a minor role. Adverse trade shocks induced also prolonged recessions.” Nkomo (2006) studied the relationship between world oil price movements, energy and development in Southern African countries. His results suggested that “oil price shocks increase the total import bill for a country. Low-income countries and poorer households tend to suffer the largest impact from oil price rise”. Berman and Matin (2012) argued that an international industrial crisis would have a big impact on African economies because the growth and development of these economies depend on the export of raw materials. In this context, Assoumou Ella (2012) says that there is re-coupling between international economic shocks and African economic conditions.

Few papers analyze the viability of an economic and monetary union in Africa with a unified currency. The existing ones, most often, analyze the optimality of different areas within the continent. In the case of the feasibility of the monetary union in the East Africa Community, Buigut (2004) used a model of government finance and Kishor et al. (2009) analyzed the correlations of business cycles among countries that compose this community. Concerning the monetary union in West Africa, Coulibaly and Gnimassoun (2012) studied its viability using a model based on the convergence and co-movements of exchange rate misalignments. Contrary to those studies, Lucas et al. (2011) take into account the external shocks in their analysis. They aim to show whether a monetary union between economies of the Common Market for Eastern and Southern Africa (COMESA) is viable using the responses of the countries that belong to this area to the internal and external shocks, and they conclude that the possibility of creating in that area a monetary union does exist. In a recent paper,

Assoumou Ella (2012) studied the feasibility of the African Union's project by comparing the reactions of the African's real GDP per capita to the real OECD GDP per capita shock, the Federal funds effective rate shock and the World price of oil shock, and concluded with optimism. The present study is the continuation of that research by extending the impacts of those international shocks on real GDP, household consumption and consumer prices index in Africa and by comparing the orthogonal impulse response functions.

3. Impact of international income, price and monetary shocks in Africa: a SVAR Model

3.1. The variables

Any national economy is composed by three VAR models that represent the effects of international shocks on domestic real GDP, household consumption and consumer prices index. The External variables represent three types of crises that have affected advanced economies in recent years:

- International monetary shocks: world interest rate is approximated by the Federal funds effective rate (Gossé and Guillaumin, 2010; Assoumou Ella, 2012);
- International price shocks: world price of oil is used to characterize this type of shock (Allegret and Sand-Zantman, 2010, Assoumou Ella, 2012; Assoumou Ella and Bastidon Gilles, 2013), because African countries produce essentially raw materials (Madeley, 2003);
- International income shocks: real OECD GDP characterizes this type of shock.

This paper uses the usual determinants of economic growth in a country to characterize the control variables: education (adult literacy rate), investment, life expectancy, public spending and domestic consumer prices index (or not, in the case that this index is the endogenous variable).

3.2. Model specification

The formalization uses a SVAR model to study the impact of external shocks in domestic economy, (Gossé and Guillaumin, 2010; Assoumou Ella, 2012).

First, it is assumed that any African economy is described by three VAR models that have this reduced-form:

$$A(L)X_t = u_t \quad (1)$$

Where $A(L)$ is a matrix polynomial in lag operator L , $E(u_t) = 0$, $\text{Var}(u_t) = \sigma^2$ and $X_t = (\Delta \text{gdpcde}, \Delta r, \Delta \text{baril}, \Delta \text{gdp}, \Delta p, \Delta \text{hc}, \Delta \text{alph}, \Delta \text{inv}, \Delta \text{life}, \Delta g)$ in the case of the impact of the external shocks on domestic real GDP, $X_t = (\Delta \text{gdpcde}, \Delta r, \Delta \text{baril}, \Delta p, \Delta \text{hc}, \Delta \text{alph}, \Delta \text{inv}, \Delta \text{life}, \Delta g)$ concerning the impact of the external shocks on domestic household consumption, and $X_t = (\Delta \text{gdpcde}, \Delta r, \Delta \text{baril}, \Delta p, \Delta \text{alph}, \Delta \text{inv}, \Delta \text{life}, \Delta g)$ in the case of the impact of the external shocks on domestic consumer prices index, with Δ , the first derivative, and gdpcde , r , baril , gdp , p , hc , alph , inv , life and g represent respectively, real OECD GDP, Federal funds effective rate, world price of oil, domestic real GDP, domestic consumer prices index, domestic household consumption, adult literacy rate, investment, life expectancy and public spending.

The equation (1) can be rewritten in VMA form:

$$X_t = B(L)u_t \quad (2)$$

With $u_t = S\varepsilon_t$, where $\varepsilon_t = (\varepsilon_t^{\text{ext}}, \varepsilon_t^{\text{gdp}}, \varepsilon_t^p, \varepsilon_t^{\text{hc}}, \varepsilon_t^{\text{alph}}, \varepsilon_t^{\text{inv}}, \varepsilon_t^{\text{life}}, \varepsilon_t^g)$ in the case of the impact of the external shocks on domestic real GDP, $\varepsilon_t = (\varepsilon_t^{\text{ext}}, \varepsilon_t^p, \varepsilon_t^{\text{hc}}, \varepsilon_t^{\text{alph}}, \varepsilon_t^{\text{inv}}, \varepsilon_t^{\text{life}}, \varepsilon_t^g)$ concerning the impact of the external shocks on domestic household consumption, and $\varepsilon_t =$

$(\varepsilon_t^{\text{ext}}, \varepsilon_t^{\text{p}}, \varepsilon_t^{\text{alph}}, \varepsilon_t^{\text{inv}}, \varepsilon_t^{\text{life}}, \varepsilon_t^{\text{g}})'$ in the case of the impact of the external shocks on domestic consumer prices index. The three ε_t are the orthogonal normalized innovation vectors that represent the structural shocks. $\varepsilon_t^{\text{ext}}, \varepsilon_t^{\text{gdp}}, \varepsilon_t^{\text{p}}, \varepsilon_t^{\text{hc}}, \varepsilon_t^{\text{alph}}, \varepsilon_t^{\text{inv}}, \varepsilon_t^{\text{life}}, \varepsilon_t^{\text{g}}$ represent respectively the external shocks, the domestic real GDP shock, the domestic consumer prices index shock, the domestic household consumption shock, the education shock, the investment shock, the sanitary shock, the public spending shock, satisfying $u_t = S\varepsilon_t$ and $E(\varepsilon\varepsilon') = I$, with I the identity matrix.

The consequence is that $SS' = \Sigma$. Using the orthogonal matrix S , the VMA model can be written with structural shocks:

$$X_t = C(L)\varepsilon_t \quad (3)$$

Where $C(L) = B(L)S$.

The existing literature concludes that the identification of the VAR structural form conduces to impose $\frac{n(n-1)}{2}$ constraints.

The formalization assumes that the external variables are exogenous, relatively to domestic variables (Allégret and Sand-Zantman, 2007; Gimet, 2007; Sato et al. 2009; Assoumou Ella, 2012).

Thus, the contribution of international shocks to the variance of the endogenous variables is studied using the SVAR models with an exogenous hypothesis (Mackowiak, 2007). This specification improves the quality of the estimations (Sosa, 2008). In this context, the SVAR models can be rewritten in this form:

$$\sum_{s=0}^p \begin{bmatrix} A_{11}(S) & A_{12}(S) \\ A_{21}(S) & A_{22}(S) \end{bmatrix} \begin{bmatrix} y_{1(t-s)} \\ y_{2(t-s)} \end{bmatrix} = \begin{bmatrix} \varepsilon_1(t) \\ \varepsilon_2(t) \end{bmatrix}$$

Where $A_{12} = 0$ for any $S = 0, 1, \dots, \infty$, with $E[\varepsilon(t)/y_{t-s}, s > 0] = 0$ and $E[\varepsilon(t)\varepsilon(t)'/y_{t-s}, s > 0] = I$, with I the identity matrix. $y_{1(t-s)}, y_{2(t-s)}, \varepsilon_1(t)$ and $\varepsilon_2(t)$ represent respectively, the vector of external variables, the vector of domestic variables, the vector of structural external shocks and the vector of structural domestic shocks. It is assumed in conformity with Gossé and Guillaumin (2010) that $A_{12}(S) = 0$ for any $S = 0, 1, \dots, \infty$. That is to say that the domestic structural shocks do not affect $y_{1(t-s)}$ in t or in $t - s$. It is also supposed that a short-term shock of any external variable do not affects any others external variables (Sato *et al.* 2009).

3.3. Data characteristics

The data used in this study comes from the websites of the World Bank (World Development Indicators) and the United States Federal Reserve. ADF and Phillips-Perron tests are used to study the stationarity of the series, before using the short-run SVAR (there is no long-term relationship between the variables). In applying the models, the Akaike Information Criterion (AIC) is used to determine the optimal lag length. After the estimations, the residual autocorrelation test (LM test) and the collinearity test (Wald test) are performed, and the stability of the models is also checked. The models are estimated using Stata 12 during 1970-2007. They are firstly estimated using the specification described in the section 3 to study the contribution of a decrease in the exogenous variables to the endogenous variable, and the Cholesky matrix is secondly programmed and estimated to analyze the effect of an increase on exogenous variables to the endogenous variable. Finally, the orthogonal impulse response functions give us the reaction of each African economy to the international shocks if the economy is exposed.

4. Results

4.1. International income shocks

International income shocks affect 16 African countries. The fluctuations of real OECD GDP impact real GDP in 12 countries: Benin, Botswana, Cameroon, Central African Republic, Chad, Kenya, Mali, Niger, Senegal, South Africa, Togo and Tunisia. A 1% decrease in real OECD GDP affects negatively real GDP in those countries from -0,154 to -0,014%, and a 1% increase impacts positively this variable from 0,002 to 0,015%. Thus, it can be deduce that international income shocks have a significant impact on real GDP in Africa.

Household consumption is also impacted by the fluctuations of real GDP in 12 African countries: Algeria, Botswana, Central African Republic, Kenya, Malawi, Mali, Niger, Senegal, South Africa, Togo, Tunisia and Zambia. A 1% decrease in real OECD GDP affects household consumption from -0,189 to -0,002%, and a 1% increase impacts this variable from 0,006 to 0,102%. As in the case of real GDP, international income shocks have a significant impact on household consumption in Africa; a negative shock impacting negatively this variable, and inversely concerning a positive shock.

Only four countries are impacted in the case of the consumer prices index: Cameroon, Congo, Kenya and Tunisia; a 1% decrease in real OECD GDP impacting this variable from -0,018 to -0,001%, and a 1% increase affecting the same variable from 0,004 to 0,007%.

Concerning the orthogonal impulse response functions, the reactions of the African's real GDP and household consumption to the positive real OECD GDP shocks are similar. In general, the effect is positive in the first year, becomes negative in the second year and disappears after three or four years in the case of the real GDP, five or six years in the case of the household consumption. Concerning the consumer prices index, the reactions of Congo and Nigeria are similar. South Africa has approximately the same response that the preceding countries, excepting the fact that the effect disappears after three years in Congo and Nigeria, after five years in South Africa. The case of the Nigeria is ambiguous. Basing on the result of the model estimation, a 1% decrease in current real OECD GDP has a negative effect on current consumer prices index in this country, but according the orthogonal impulse response function, a positive shock in international income has initially a negative impact on this variable. It becomes positive in the second year and disappears after three years.

4.2. International monetary shocks

International monetary shocks impact 10 African countries. The variations in Federal funds effective rate affect real GDP in six countries: Cameroon, Central African Republic, Mali, Senegal, South Africa and Zambia; a 1% decrease impacting this variable from 0,97 to 7,222%, and a 1% increase affecting the same variable from -0,651 to -0,074%.

Six countries are also impacted in the case of the household consumption: Central African Republic, Chad, Mali, Senegal, South Africa and Zambia. A 1% decrease in Federal funds effective rate affects household consumption from 0,726 to 5,901%, and a 1% increase impacts this variable from -0,691 to -0,102%.

Concerning the effect of the international monetary shock on consumer prices index, only three countries are affected: Algeria, Niger and Tunisia. A decrease in Federal funds effective rate has a positive effect on consumer prices index in Algeria and Niger, and a negative effect in Tunisia.

Thus, it can be note that a restrictive monetary policy (increase in Federal funds effective rate) has a negative impact on income and household consumer in Africa, and inversely.

Figures 3, 6 and 9 present the orthogonal impulse response functions of the African economies to the positive Federal funds effective rate shock. There is initially a negative effect on real GDP. This impact becomes positive in the second year and disappears after five years in Cameroon, Mali and Zambia. The effect is however positive in the first year in Central African Republic, South Africa and Senegal. In the case of the household

consumption, the effect is positive in the first year, becomes negative in the second year and disappears after five years, excepting Chad and South Africa for which the effect is negative in the first year, positive in the second year and disappears after five years. Concerning the consumer prices index, the effect is negative in the first year, becomes positive in the second year and disappears after three or four years, in Algeria and Niger. It is initially positive in the case of Tunisia.

It can be concluded that the impacts of the current Federal funds effective rate in African economies are similar (according to the result estimations), but the reactions of those economies after the shocks are more or less similar.

4.3. International price shocks

International price shocks impact nine African countries. Concerning the effect of world price of oil shocks on real GDP, four countries are impacted: Algeria, Congo, Nigeria and South Africa. Excepting South Africa, all the others countries are oil producers. A decrease in world price of oil shock impacts real GDP in those countries from -1,965 to -0,922%. Inversely, an increase has a positive effect in this variable from 0,067 to 0,132%.

In the case of the effect of world price of oil shocks on household consumption, five countries are exposed: Algeria, Benin, Botswana, Nigeria and Tunisia. These countries are oil producers. A decrease in world price of oil has a negative impact on household consumption from -1,102 to -0,011%, and an increase has a positive effect on this variable from 0,024 to 0,081%, excepting Botswana for which a decrease in international price of oil has a positive effect on household consumption.

Four countries are affected in the case of the consumer prices index: Algeria, Benin, Mali and Congo. Excepting Mali, all the others countries are oil producers. A decrease in world price of oil impacts consumer prices index on those countries from -1,886 to -0,008%, and an increase has a positive effect on this variable from 0,064 to 0,127%.

Figures 2, 4 and 8 present the orthogonal impulse response functions of the African economies to the world price of oil shock. In general, the reactions of the African's real GDP and household consumption are similar: positive in the first year, negative in the second year, and disappears after three or four years. In Botswana, the effect is negative in the first year, positive in the second year, and disappears after six years. In the case of the consumer prices index, the effect is negative in the first year, positive in the second year, negative in the third year and disappears after five years, in Algeria and Benin. In Congo and Mali, it is positive in the first year, negative in the second year and disappears after four years.

5. Conclusion

The goal of this paper was to provide a framework in order to study the feasibility of an economic and monetary union in Africa with a common currency by analyzing the impacts of the international income, price and monetary shocks on real GDP, household consumption and consumer prices index in 17 African economies. The final objective was to compare their reactions at those international shocks (similarity or not). Real GDP and household consumption are exposed to real OECD GDP shock in 12 countries. Only four countries are impacted concerning the effect of this type of shock on consumer prices index. A decrease in real OECD GDP has a negative impact on real GDP, household consumption and consumer prices index in African countries and inversely in the case of an increase. Their orthogonal impulse response functions tend to be in general similar. For example, an increase in real GDP OECD has a positive impact on African's real GDP and household consumption in the first year. It becomes negative in the second year, and disappears after four or five years. Federal Funds effective rate shock impacts real GDP and household consumption in six countries, and consumer prices index in three countries. A decrease in current Federal funds

effective rate has a positive effect on those variables (according to the model estimations). Concerning the orthogonal impulse response functions, in general, an increase has a negative effect on real GDP and a positive effect on household consumption the first year. It becomes negative (positive) in the second year and disappears after three or four years. World price of oil shock impacts essentially African oil producers, except South Africa and Mali. Real GDP and consumer prices index are exposed to this type of shock in four countries, and household consumption in five countries. In general, a decrease in world price of oil has a negative impact on real GDP, household consumption and consumer prices index. The orthogonal impulse response functions are similar in the cases of the real GDP and household consumption and ambiguous in the case of the consumer prices index because they are more or less similar. It is a fact that these countries don't have a common monetary policy. Based on the effects of international income, prices and monetary shocks in African economies and their reactions, it can be concluded that the feasibility of an economic and monetary union in Africa with a common currency does exist.

Table 1- Model estimations: Impact of international shocks on real GDP in African countries

Note: *, ** and ***: significant at 10%, 5% and 1%. The first value represents the effect of 1% decrease in exogenous variable on endogenous variable and the second value, the effect of 1% increase in exogenous variable on endogenous variable (the Cholesky decomposition value). The numbers in parenthesis represent the Student's t-distribution. Cam=Cameroon, Cent. Rep= Central African Republic and South Afri= South Africa.

| | Alegria | Benin | Botswana | Cam. | Cent. Rep. | Chad | Congo | Kenya | Malawi |
|---------|------------------------------|-------------------------------|-------------------------------|-------------------------------|-------------------------------|------------------------------|--------------------------------|-------------------------------|----------------------------|
| oedcgdp | -0,117 0,004 (-1,13) | -0,06* 0,006 (-1,86) | -0,089*** 0,011 (-4,86) | -0,067** 0,006 (-1,89) | -0,06** 0,007 (-2,25) | -0,074*** 0,01 (-2,89) | -0,02 0,003 (-0,83) | -0,119*** 0,015 (-4,87) | -0,015 0,002 (-0,7) |
| baril | -1,886** 0,067 (-2,02) | -0,244 0,013 (-0,79) | -0,42 0,037 (-1,22) | -0,161 0,002 (-0,4) | -0,013 0,007 (-0,05) | 0,196 -0,041 (0,67) | -0,922*** 0,122 (-5,17) | 0,316 -0,004 (0,88) | -0,193 0,031 (-0,93) |
| r | 5,739 -0,243 (0,55) | 0,557 -0,03 (1,01) | 0,053 -0,019 (0,09) | 0,97* -0,074 (1,62) | 4,879* -0,539 (1,86) | 0,333 -0,016 (0,74) | 3,305 -0,67 (1,26) | 0,483 -0,053 (0,88) | 0,563 -0,085 (1,57) |
| life | 0,068* -0,001 (1,86) | 0,022*** -0,003 (2,36) | -0,019 0,003 (-1,31) | -0,032* 0,003 (-1,74) | -0,002 0,002 (-0,15) | -0,028** 0,004 (-2,29) | -0,005 0,001 (-0,52) | -0,03*** 0,004 (-3,25) | 0,014 -0,002 (1,18) |
| alph | -0,086*** 0,002 (-2,1) | 0,014 -0,002 (1,45) | -0,004 0,001 (-0,69) | -0,085** 0,007 (-2,15) | 0,022 -0,001 (1,25) | 0,012* -0,002 (1,61) | 0,000 -0,000 (0,04) | -0,007 0,001 (-1,21) | -0,004 0,000 (-0,55) |
| inv | -0,816 0,015 (-1,4) | -1,334*** 0,147 (-4,23) | -0,709*** 0,091 (-5,57) | -1,124*** 0,118 (-4,26) | -1,141*** 0,113 (-3,56) | -1,025* 0,152 (-1,62) | -0,204 0,003 (-0,71) | -1,141** 0,14 (-2,17) | -0,305 0,074 (-1,44) |
| p | 1,493 0,147 (0,49) | 3,457** -1,831 (2,07) | 0,772** 0,014 (2,08) | 5,698*** -2,872 (4,51) | -3,011 0,334 (-0,24) | 5,688 -0,154 (0,47) | -3,197*** -0,814 (-2,87) | 1,877* -1,047 (1,74) | -0,165 0,014 (-0,29) |
| g | -0,002 0,012 (-0,01) | -0,891*** 0,094 (-5,04) | -0,244 0,072 (-1,29) | -1,539*** 0,124 (-7,69) | -0,37 0,119 (-1,08) | -0,495 0,171 (-0,84) | -0,08 0,01 (-0,4) | -0,258 0,174 (-0,42) | -0,139 0,024 (-0,99) |

| | Mali | Niger | Nigeria | Senegal | South Afri. | Togo | Tunisia | Zambia |
|---------|-------------------------------|-------------------------------|-------------------------------|-------------------------------|-------------------------------|-------------------------------|------------------------------|-------------------------------|
| oedcgdp | -0,061*** 0,008 (-2,64) | -0,116*** 0,014 (-5,6) | -0,035 0,002 (-0,71) | -0,094*** 0,012 (-4,29) | -0,154*** 0,009 (-3,72) | -0,112*** 0,014 (-5,13) | -0,014** 0,006 (-1,92) | -0,035 0,005 (-1,38) |
| baril | -0,207 0,016 (-0,83) | -0,067 0,009 (-0,18) | -1,965*** 0,132 (-6,07) | 0,104 -0,023 (0,34) | -1,614*** 0,069 (-2,45) | -0,315 0,012 (-0,91) | -0,002 0,006 (-0,03) | -0,2 0,036 (-0,85) |
| r | 3,935* -0,447 (1,75) | 2,432 -0,082 (0,77) | 2,527 -0,389 (0,41) | 7,222*** -0,651 (2,75) | 3,043*** -0,148 (3,82) | 1,309 -0,085 (0,4) | 0,311 -0,117 (0,56) | 3,827** -0,548 (2,2) |
| life | -0,02* 0,003 (-1,79) | -0,002 0,000 (-0,12) | -0,022 0,002 (-0,64) | -0,001 0,001 (-0,05) | -0,004 0,001 (-0,1) | -0,006 0,001 (-0,47) | -0,002 0,001 (-0,82) | 0,001 -0,002 (0,78) |
| alph | -0,118** 0,013 (-1,96) | -0,116* 0,01 (-1,73) | -0,046*** 0,002 (-3,16) | -0,017 0,002 (-0,41) | -0,006 0,000 (-1,51) | -0,001 0,001 (-0,2) | 0,001 -0,001 (0,68) | 0,001 -0,000 (0,78) |
| inv | -0,856*** 0,117 (-5,3) | -2,857*** 0,282 (-4,44) | -1,75*** -0,006 (-2,74) | -0,682*** 0,074 (-5,36) | -2,11*** 0,111 (-6,04) | -0,907*** 0,202 (-2,43) | 0,007 -0,001 (0,19) | -0,806*** 0,104 (-4,64) |
| p | 1,867 -0,197 (1,44) | 2,524 -0,4 (0,14) | 1,8 -0,061 (0,64) | 6,213*** -2,423 (4,91) | 2,413* 0,006 (1,71) | -1,345 0,885 (-0,1) | -0,11 0,074 (-0,67) | 3,116 -0,591 (0,87) |
| g | -0,915*** 0,176 (-5,31) | -0,657*** 0,104 (-3,36) | -0,594 0,115 (-0,47) | -0,772*** 0,131 (-4,72) | -0,896*** 0,098 (-2,82) | -0,026 0,079 (-0,12) | -0,009 0,01 (-0,67) | -0,304 0,036 (-1,19) |

Table 2- Model estimations: Impact of international shocks on household consumption in African countries

| | Alegria | Benin | Botswana | Cam. | Chad | Cent. Rep. | Congo | Kenya | Malawi |
|---------|-------------------------------|-------------------------------|-------------------------------|-------------------------------|-------------------------------|-------------------------------|------------------------------|-------------------------------|-----------------------------|
| oedcgdp | -0,059** 0,007 (-2,09) | -0,034 0,004 (-1,07) | -0,115*** 0,102 (-5,54) | -0,022 0,002 (-0,68) | -0,021 0,003 (-0,83) | -0,055*** 0,008 (-2,47) | -0,022 0,004 (-1,02) | -0,05* 0,006 (-1,61) | -0,029* 0,006 (-1,73) |
| baril | -0,688*** 0,051 (-2,57) | -0,104 0,006 (-0,37) | 0,777* -0,047 (1,79) | -0,158 0,011 (-0,45) | 0,07 -0,018 (0,32) | -0,088 0,011 (-0,35) | 0,062 -0,011 (0,31) | -0,254 0,019 (-0,82) | -0,152 0,033 (-0,9) |
| r | 1,922 -0,208 (0,62) | 0,47 -0,036 (0,92) | 1,017 -0,081 (1,28) | 0,418 -0,041 (0,82) | 0,726** -0,102 (2,26) | 5,677*** -0,691 (2,62) | 1,459 -0,28 (0,84) | 0,027 -0,019 (0,06) | 0,416 -0,075 (1,49) |
| life | -0,015 0,001 (-1,31) | -0,02** 0,003 (-2,32) | -0,04** 0,003 (-1,99) | -0,025* 0,003 (-1,68) | -0,001*** 0,004 (-3,25) | -0,002 0,002 (-0,15) | -0,007 0,003 (-0,99) | -0,024* 0,003 (-1,72) | -0,005 0,000 (-0,55) |
| alph | -0,023* 0,002 (-1,74) | -0,000 0,001 (-0,05) | -0,001 0,001 (-0,07) | -0,048 0,007 (-1,41) | -0,007 0,001 (-1,23) | -0,014 0,001 (-0,93) | -0,006** 0,001 (-2,18) | -0,004 0,000 (-0,71) | -0,004 0,001 (-0,79) |
| inv | -0,815*** 0,081 (-7,59) | -0,542* 0,081 (-1,67) | -1,036*** 0,101 (-5,89) | -0,589*** 0,085 (-2,47) | -1,141** 0,14 (-2,17) | -0,64** 0,065 (-2,01) | -0,178 0,033 (-0,85) | -0,501*** 0,074 (-4,37) | -0,26* 0,089 (-1,6) |
| p | 0,664 -0,137 (0,44) | 3,045*** -2,844 (2,07) | 0,064 -0,044 (0,12) | 3,108*** -0,312 (3,06) | 1,877* -0,105 (1,74) | 1,069 -0,521 (1,05) | 6,031 -0,811 (0,58) | 0,415 -0,072 (0,32) | 0,41 -0,089 (0,94) |
| g | -0,89*** 0,098 (-8,15) | -0,655*** 0,891 (-5,04) | -0,63*** 0,087 (-2,59) | -0,746*** 0,109 (-4,46) | -0,258 0,174 (-0,42) | -0,199 0,078 (-0,7) | -0,266 0,029 (-1,98) | -0,632*** 0,103 (-9,82) | -0,107 0,038 (-0,9) |

| | Mali | Niger | Nigeria | Senegal | South Afri. | Togo | Tunisia | Zambia |
|---------|-------------------------------|-------------------------------|-----------------------------|-------------------------------|-------------------------------|-------------------------------|-------------------------------|------------------------------|
| oedcgdp | -0,063*** 0,008 (-2,67) | -0,109*** 0,012 (-4,14) | -0,002 0,000 (-0,07) | -0,092*** 0,011 (-3,62) | -0,05*** 0,006 (-2,61) | -0,047** 0,007 (-2,08) | -0,189*** 0,014 (-5,82) | -0,04*** 0,008 (-2,42) |
| baril | -0,316 0,028 (-1,25) | -0,398 0,031 (-1,12) | -0,52*** 0,081 (-2,9) | 0,355 -0,04 (1,11) | -0,398 0,05 (-1,32) | 0,161 -0,029 (0,7) | -1,102** 0,024 (-1,9) | -0,246 0,056 (-1,44) |
| r | 4,249* -0,441 (1,82) | 2,24 -0,121 (0,74) | 0,471 -0,276 (0,22) | 5,901** -0,552 (2,04) | 1,147*** -0,135 (3,33) | 1,55 -0,227 (0,73) | 1,682 -0,048 (0,3) | 2,495* -0,481 (1,76) |
| life | -0,03*** 0,004 (-2,63) | -0,002 0,001 (-0,07) | -0,004 0,000 (-0,4) | -0,012 0,000 (-0,83) | -0,009 0,000 (-0,65) | -0,016** 0,003 (-1,9) | -0,019 0,001 (-1,04) | -0,002 0,002 (-0,33) |
| alph | -0,157*** 0,015 (-2,58) | -0,162*** 0,015 (-2,54) | -0,001 0,000 (-0,19) | -0,001 0,003 (-0,03) | -0,002 0,000 (-1,02) | -0,002 0,000 (-0,68) | -0,014 0,009 (-1,1) | -0,001 0,000 (0,44) |
| inv | -0,594*** 0,083 (-2,66) | -1,254 0,182 (-1,53) | -0,52*** 0,054 (-2,9) | -0,674*** 0,072 (-4,97) | -1,019*** 0,119 (-8,88) | -0,305 0,1 (-1,03) | -0,349 0,026 (-1,53) | -0,328** 0,054 (-2,29) |
| p | 1,266 -1,128 (1,07) | 6,22 -0,441 (0,4) | 1,088 -0,042 (1,28) | 6,022*** -2,684 (4,81) | 1,238 -0,014 (1,18) | 1,482* -0,122 (1,86) | 3,07*** -0,033 (2,43) | 1,805 -0,562 (0,9) |
| g | -0,791*** 0,166 (-4,74) | -0,516*** 0,077 (-3,12) | -0,003 0,056 (-0,01) | -0,939*** 0,137 (-7,22) | -0,843*** 0,11 (-7,13) | -0,349*** 0,079 (-2,57) | -0,536*** 0,055 (-6,42) | -0,001 0,027 (-0,66) |

Table 3- Model estimations: Impact of international shocks on consumer prices index in African countries

| | Alegria | Benin | Botswana | Cam. | Cent. Rep. | Chad | Congo | Kenya | Malawi |
|---------|-------------------------------|--------------------------------|-----------------------------|------------------------------|----------------------------|------------------------------|------------------------------|------------------------------|------------------------------|
| oedcgdp | -0,006 0,004 (-1,06) | -0,000 0,001 (-0,33) | -0,012 0,002 (-0,74) | -0,001** 0,007 (-2,05) | -0,000 0,000 (-0,04) | -0,000 0,004 (-1,15) | -0,001* 0,006 (-1,62) | -0,011** 0,004 (-2,17) | -0,005 0,003 (-0,76) |
| baril | -0,176*** 0,114 (-4,21) | -0,011** 0,06 (-2,11) | -0,144 0,027 (-0,77) | -0,001 0,018 (-0,13) | -0,000 0,003 (-0,1) | -0,000 0,004 (-0,03) | -0,01*** 0,127 (-5,5) | -0,067 0,069 (-1,37) | -0,026 0,011 (-0,45) |
| r | 1,001* -0,257 (1,64) | -0,009 0,053 (-1,12) | -0,372 0,07 (-1,16) | -0,005 0,037 (-0,58) | 0,05 -0,348 (1,19) | -0,005 0,038 (-1) | -0,035 0,701 (-1,24) | 0,014 -0,039 (0,18) | -0,013 0,013 (-0,13) |
| life | 0,002 -0,001 (1,01) | 0,000 0,000 (0,35) | 0,015* -0,002 (1,79) | 0,001* -0,025 (1,93) | -0,000 0,002 (-1,27) | -0,001** 0,004 (-2,18) | 0,000 -0,001 (0,02) | -0,001 0,001 (-0,48) | -0,005* 0,003 (-1,6) |
| alph | -0,001 0,000 (-0,52) | -0,000 0,000 (-0,45) | -0,002 0,000 (-0,66) | 0,000 -0,001 (0,6) | 0,000 -0,001 (0,39) | -0,000 0,001 (-1,5) | -0,000 0,001 (-1,42) | 0,001 -0,000 (1,53) | 0,004*** -0,003 (2,65) |
| inv | -0,025 0,027 (-0,74) | -0,005 0,028 (-0,85) | -0,174* 0,031 (-1,83) | 0,004 -0,025 (0,86) | 0,001 0,004 (0,08) | -0,009 0,054 (-1,04) | -0,006* 0,031 (-1,84) | 0,023 -0,045 (0,99) | 0,035 -0,009 (0,51) |
| g | 0,008 0,02 (0,34) | 0,008*** (-0,028) (3,31) | -0,107 0,036 (-1,37) | 0,009*** -0,057 (3,32) | -0,008* 0,05 (-1,79) | 0,027*** -0,145 (5,01) | 0,012*** -0,078 (5,08) | -0,034** 0,036 (-2,09) | -0,041 0,023 (-0,91) |

| | Mali | Niger | Nigeria | Senegal | South Afri. | Togo | Tunisia | Zambia |
|---------|-------------------------------|------------------------------|----------------------------|-------------------------------|------------------------------|-------------------------------|------------------------------|----------------------------|
| oedcgdp | -0,000 0,001 (-0,27) | -0,000 0,002 (-0,71) | -0,005 0,002 (-1,1) | -0,000 0,004 (-1,06) | -0,006 0,001 (-0,45) | -0,000 0,003 (-0,89) | -0,018*** 0,007 (-2,4) | -0,000 0,000 (-0,09) |
| baril | -0,008** 0,064 (-2,04) | -0,002 0,017 (-0,52) | 0,014 -0,017 (0,3) | -0,005 0,034 (-1,16) | 0,045 -0,011 (0,33) | -0,001 0,007 (-0,26) | -0,03 0,016 (-0,38) | -0,000 0,008 (-0,22) |
| r | 0,013 0,022 (0,34) | 0,089*** -0,789 (3,12) | -0,101 0,14 (-0,24) | 0,009 0,001 (0,23) | -0,101 0,016 (-0,85) | -0,033 0,234 (-0,79) | -1,531*** 0,61 (-2,44) | 0,006 -0,118 (0,45) |
| life | 0,000 -0,002 (1,08) | -0,001 0,003 (-0,77) | 0,004* -0,002 (1,81) | 0,001* -0,002 (1,64) | -0,005 0,000 (-1,12) | -0,000 0,001 (-0,46) | 0,003 -0,001 (1,54) | -0,000 0,000 (-0,17) |
| alph | 0,000 -0,007 (0,38) | -0,001 0,003 (-0,77) | 0,000 -0,000 (0,23) | -0,005 0,001 (-0,01) | -0,001** 0,000 (-2,24) | -0,000 0,000 (-1,38) | 0,001 -0,001 (0,75) | -0,000 0,000 (-0,55) |
| inv | 0,006** -0,054 (1,95) | -0,002 0,043 (-0,22) | 0,079 -0,017 (1,53) | 0,003 -0,014 (1,54) | -0,043 0,011 (-0,7) | -0,002 0,057 (-0,29) | 0,037 -0,009 (1,11) | 0,001 -0,029 (0,92) |
| g | -0,008*** 0,101 (-3,14) | -0,003 0,003 (-1,11) | -0,048 0,005 (-0,59) | -0,011*** 0,057 (-6,62) | -0,055* 0,001 (-1,63) | -0,007*** 0,057 (-2,44) | -0,034** 0,013 (-2,23) | -0,001 0,027 (-0,66) |

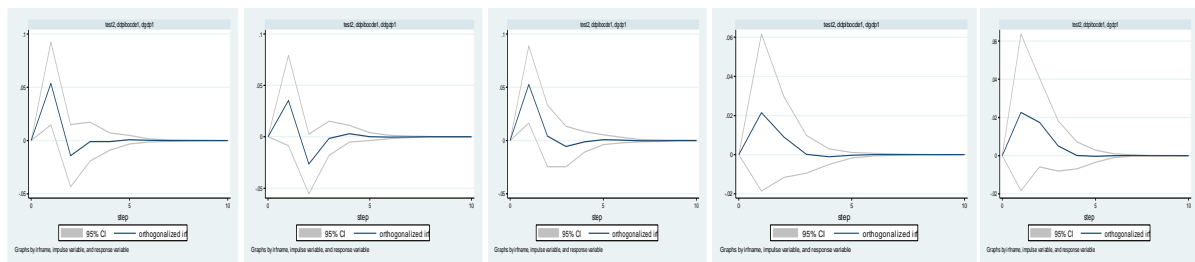
Benin

Botswana

Cameroon

Cent. Rep.

Chad



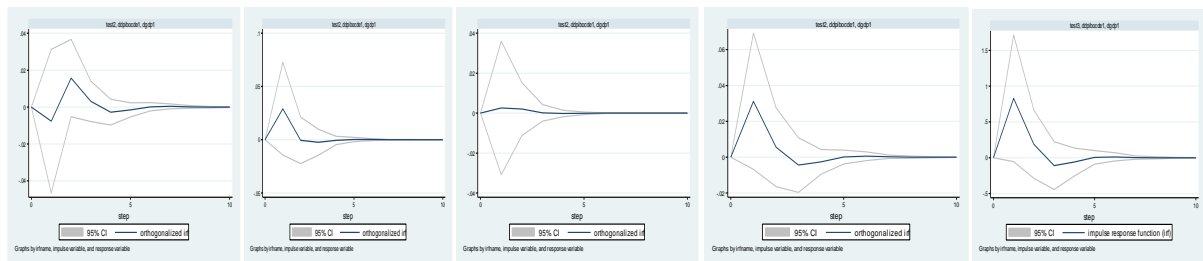
Kenya

Mali

Niger

Senegal

South Africa



Togo

Tunisia

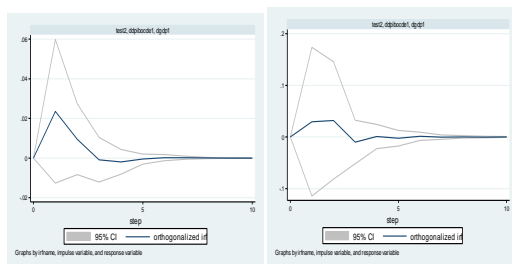


Figure 1- Impulse: real OECD GDP, response: African's real GDP

Algeria

Congo

Nigeria

South Africa

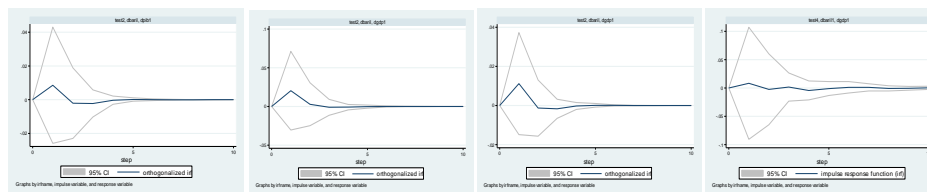


Figure 2- Impulse: world prices of oil, response: African's real GDP

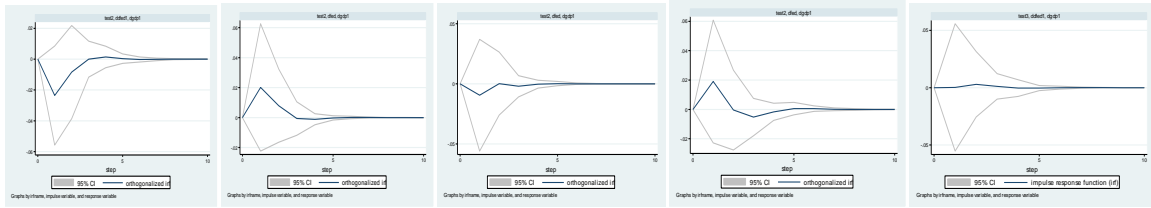
Cameroon

Cent. Rep.

Mali

Senegal

South Africa



Zambia

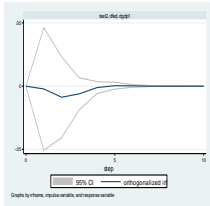


Figure 3- Impulse: Federal funds effective rate, response: African's real GDP

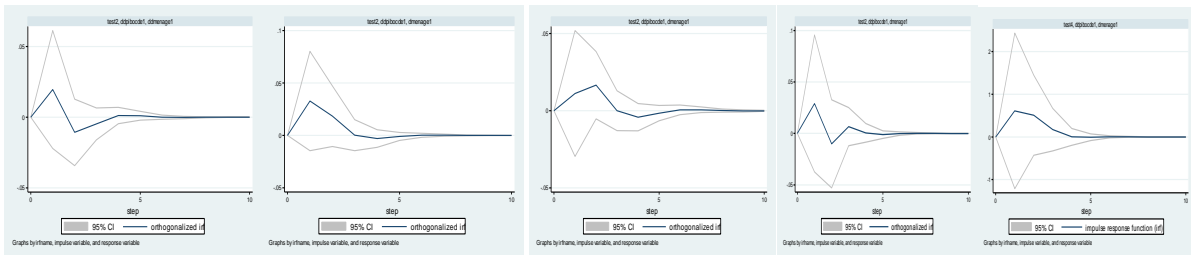
Algeria

Botswana

Cent. Rep.

Kenya

Malawi



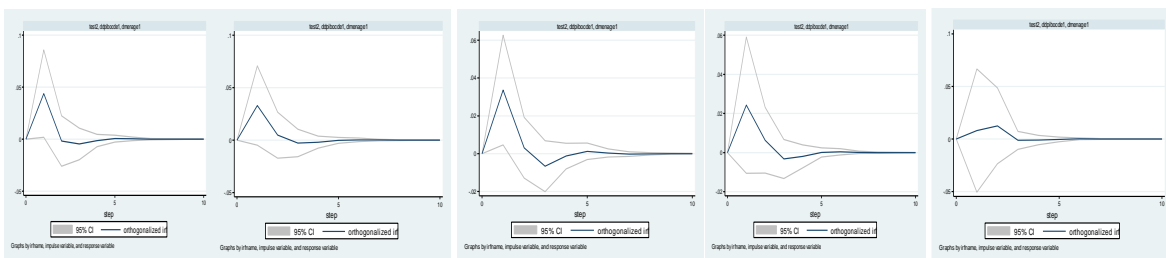
Mali

Senegal

South Africa

Niger

Togo



Tunisia

Zambia

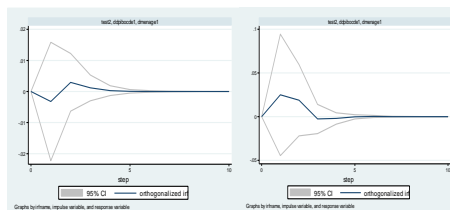


Figure 4- Impulse: real OECD GDP, response: African's household consumption

Algeria Botswana Nigeria Tunisia

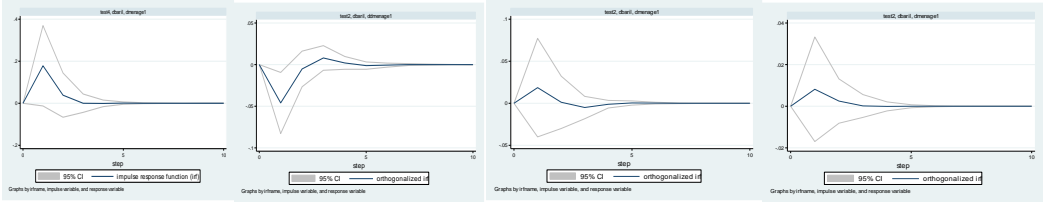
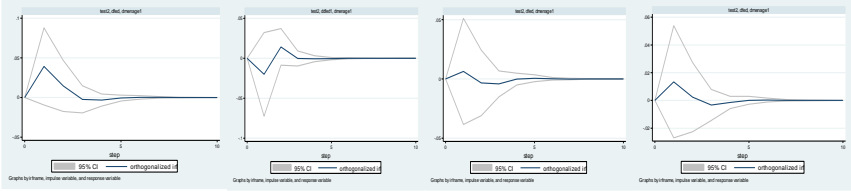


Figure 5- Impulse: world price of oil, response: African's household consumption

Cent. Rep. Chad Mali Senegal



South Africa Zambia

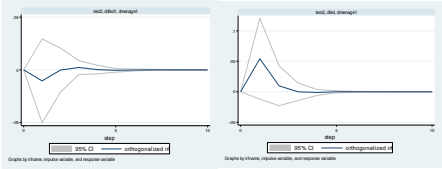


Figure 6- Impulse: Federal funds effective rate, response: African's household consumption

Cameroon Congo Kenya Tunisia

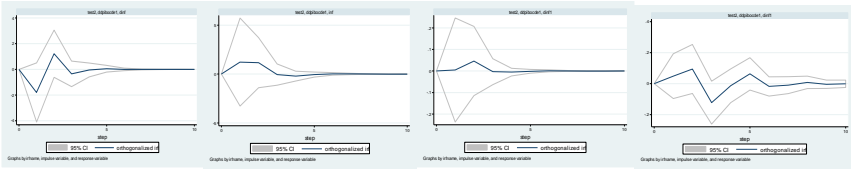


Figure 7- Impulse: real OECD GDP, response: African's consumer prices index

Algeria

Benin

Congo

Mali

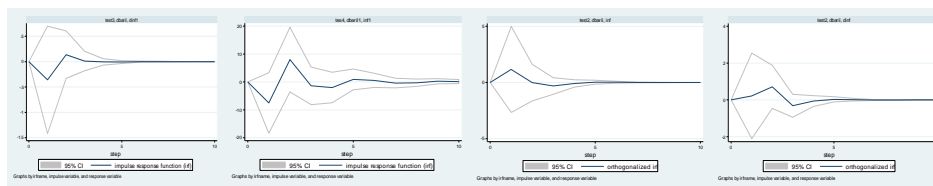


Figure 8- Impulse: world price of oil, response: African's consumer prices index

Algeria

Niger

Tunisia

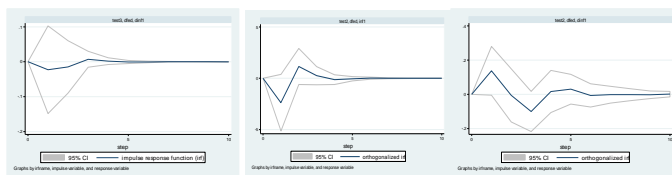


Figure 9- Impulse: Federal funds effective rate, response: African's consumer prices index

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