ISSN No:-2456-2165

Economic Resilience in Sub-Saharan Africa : An Analysis of the Determinants

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Abstract:- This paper examines the macroeconomic factors related to economic structure and institutions that are most important for economic resilience in order to guide future policy actions. This is done through econometric analysis by assessing the absorptive capacity of common shocks for sub-Saharan African countries. The results suggest that factors related to economic structure appear to be the most important. These include exchange rates, terms of trade, trade openness, foreign direct investment and financial development. Institutional factors such as government stability and reduced social conflict increase the absorptive capacity to shocks. These findings reiterate the need to identify and vigorously pursue macroeconomic policies and structural reforms.

Keywords:- *Economic Resilience, Generalized Methods of Moments, Shocs, Structural Factors, Sub-Saharan Africa.*

I. INTRODUCTION

For several decades, the world economy, and more specifically that of developing countries, has been experiencing a great deal of turbulence caused by fluctuations in the international economic situation, which have often had an impact on their economic development to varying degrees. The intertwining of several factors has often been at the origin of such a situation. Indeed, in an economic context marked by trade liberalisation and economic integration promoting greater global competitiveness, exposure factors have increased beyond those linked to multiple threads of history and culture. Among the factors of uncertainty, the interconnection between countries through technology and capital transfer, trade, financial markets, and advances in information and communication technologies are the most observed sources of vulnerability. This interdependence has favoured the proliferation of deep shocks and crises with sinister and perverse consequences on economic performance. An illustration can be seen in the great financial crisis of 2008 which originated in the United States and spread to the global economy with negative repercussions on the real economy.

On the other hand, the abundance of natural resources in most developing countries, such as those in sub-Saharan Africa, has led to high exposure to international price fluctuations, especially with their low diversification (IMF, 2016). Similarly, countries with a high dependence on imports of essential commodities are at the mercy of unpredictable changes in world prices of these products. The oil shocks of 1973 and 1979 and more recently the oil price crash of 2014 are illustrations of this. In addition, economic growth prospects can also be derailed by climate hazards affecting growth performance in agricultural countries in particular. This situation is observed in the case of countries with crops that are highly dependent on rainfall. Other shocks have internal origins. These include unsustainable fiscal policies that put pressure on public finances and structural and institutional weaknesses that exacerbate fluctuations in economic activity.

One way to tackle this problem is economic resilience. Indeed, the latter has been the subject of renewed interest in economics in the aftermath of the Great Recession of 2008, which has led to a renewed interest in the study of shocks, but has reoriented the debate towards the capacity of economies to recover from shocks (Sanchez, 2016). Indeed, the Great Recession and its uneven consequences within and across countries have posed new challenges to policy-making and, in particular, to the design and adoption of policies that can help different economies bounce back from the deep crisis and support inclusive growth (Lagarde, 2017). In this sense, the unevenly distributed effects of the crisis across countries have been the source of a wealth of research in an effort to understand these differences and explore the recovery paths that underpin economic resilience (Brigulio et al. 2006 ; Duval and Vogel, 2008 ; Briguglio et al. 2009 ; Pendall et al. 2010 ; Kose and Prasad, 2010 ; Guillaumont, 2009; Antosiewicz and Lewandowski, 2014; Ngouhouo and Nchofoung, 2021). These studies cover different realities ranging from many European countries to some developing countries, as well as at different levels of analysis (Bergeijk et al. 2017).

In recent years, the focus on the design and development of economic policies capable of maintaining an economy's output at its potential in the face of shocks has increased the scope of economic resilience analysis. In this sense, studies have first relied on theoretical design to define operational measures for empirical analysis. In this respect, two groups of measures seem to emerge. The first have focused on its measurement through composite indicators (Brigulio et al. 2009; Advantage West Midlands, 2010; Ngouhouo and Nchofoung, 2021). This measure is based on economic factors capturing macroeconomic stability and market efficiency and socio-political factors capturing good political governance and social development. The second group focuses solely on the behaviour of macroeconomic aggregates that contribute to macroeconomic and financial

stability such as economic growth and the output gap (Sondermann, 2018; Jolles et al. 2018). On the other hand, some authors have used these measures to try to assess the resilience of economies (Dhwane and Jeske, 2006; Antosiewicz and Lewandowski, 2014; Duval and Vogel, 2008; Elbourne et al. 2008; Hassan and Othman, 2015; Abdullah and Hassan, 2018). It turns out that countries with an advanced stage of development and integration into the global economy are often more resilient (Kose and Prasad, 2010). However, despite these theoretical and empirical achievements, several aspects have not yet been explored, particularly in the context of developing countries such as those in sub-Saharan Africa.

Furthermore, the differences in resilience observed between countries and regions, as revealed by the studies mentioned above, pave the way for research into a new field of analysis in order to understand the factors that explain these differences. This calls for more research, particularly into the factors that determine the economic resilience of a given country or area. In this sense, few studies have been conducted, but those that do exist have focused on structural (Duval et al., 2007; Duval and Vogel, 2008; Martin et al., 2016; Sondermann, 2018) and institutional factors (Gianmoena and Rios, 2018; Jolles et al., 2018). To the best of our knowledge, these studies have focused on European and OECD countries.

However, there is relatively little work on sub-Saharan Africa. With the exception of the notable work of Adom (2016) and Ngouhouo and Nchofoung (2021) on assessing the state of economic resilience. For the few who have looked at the effects of shocks, most have limited themselves to the sources of fluctuations and their impacts on the economy (Hoffmaister et al., 1998; Sissoko and Dibooglu, 2006; Rasaki and Malikane, 2015). According to these authors, the main sources of output fluctuations are external and relate to changes in the terms of trade, primary commodity prices and world interest rates. In addition, the analysis in terms of resilience to the effects of these shocks has often been taken into account in the study of convergence and heterogeneity between countries (Bah, 2015). In addition, by taking into account regional integration, a study by Ehrhart and Jacolin, (2012) tries to highlight the mitigating capacity by showing how the economies of the franc zone could contain the effects of price shocks. Similarly, other authors highlight economic resilience by examining the dynamics of the behaviour of economies following internal and external shocks within a monetary union (Coulibaly and Gnimassoun, 2013).

There is therefore a renewed interest in the lack of in-depth studies on economic resilience in the context of developing countries in SSA. Given the heterogeneity among countries in the region, the effects of shocks may vary from country to country, as may adjustment and recovery. Thus, in order to guide structural reforms, it seems necessary to identify the more detailed structural characteristics of countries that can contribute to their ability to withstand the impact of adverse shocks. Similarly, in order to prioritise between different structural reforms, it is necessary to assess the impact of a wide range of structural and institutional characteristics. Finally, it is also important to recognize that the potential for success of structural reforms is not the same in all areas, as some structural characteristics are linked to the degree of economic development and only change over the long term.

To fill this gap, this paper aims to provide a better understanding of the determinants of economic resilience. The explanatory factors of resilience may be a combination of several economic, social and institutional factors. This article contributes to the existing literature on the determinants of economic resilience.

The remainder of the paper is organised into three sections, including the methodological approach, the results and the conclusion.

II. METHODOLOGY

In order to identify the determinants of economic resilience in sub-Sahara african countries, we start, with some differences, from Sondermann's (2018) modelling strategy based itself on the static seminal approach of Canova et al. (2012) to specify resilience in Sub-Saharan African countries.

A. Model specification

Following Sondermann (2018) and Jolles et al. (2018), we consider a dynamic panel output gap equation to explain the determinants of economic resilience defined in terms of the shock absorbing capacity of each country (measured by the joint shock response coefficient in equation 1). The choice of this model is justified by the fact that it takes into account the individual and temporal dimension. Unlike the study by Duval and Vogel (2008) which analyses the role of structural policies in explaining economic resilience in OECD countries and the study by Jolles et al. (2018) which identifies the determinants of resilience in the Euro zone, this article re-examines these determinants in SSA countries. The aim is to identify the conventional (economic structure-related) and unconventional (institutional) factors that affect the absorptive capacity of an economy, according to the equation below.

$$y_{it} = \alpha + \beta S_t + \gamma X_{it} + \delta S_t X_{it} + D_i + \varepsilon_{it} \qquad (1)$$

Where, y_{it} represents the output gap, S_t common shocks, and X_{it} the set of variables explaining the behaviour of the output gap following a common shock. The interaction action between these factors and common shocks ($S_t X_{it}$) indicates the absorption of the effects of shocks on the output gap, with i and t indicating country and time specificities respectively.

In reality, each economy is subject to both idiosyncratic and common shocks. In addition, shocks can be of different nature, such as productivity shocks, confidence shocks or preference shocks. It is important to note that shocks are not directly observable and have to be estimated.

Focusing on unobserved shocks is interesting for two reasons : i) it highlights how country-specific factors shape the effects of common shocks on output gaps, which is the primary aim of this study ; ii) it is a structural approach given the wide variety of shocks that actually occur, some of which would be difficult to capture in the econometric framework adopted here. However, this modelling choice also has its limitations. In particular, the omission of idiosyncratic shocks and the failure to distinguish between supply and demand shocks increases the risk of omitted variable bias in the econometric estimates. Another potential source of estimation bias is that output gap estimates are subject to measurement error.

Determining common shocks

There are several methods for estimating common shocks but we retain the structural method developed by Sondermann (2018) following the approach of Canova et al. (2011). This method advocates a VAR (Vector Autoregressive) approach to extract common shocks over the period from 1995 to 2017. It is composed of three variables: real GDP, the consumer price index (CPI) and the money supply (M2). Indeed, the analysis of the evolution of the asymmetry of economic shocks reveals the presence of strong asymmetries of supply shocks, inflationary shocks and monetary shocks. These shocks have specific effects on macroeconomic variables. Generally speaking, a positive supply shock leads to an increase in production, thus a decrease in the price level. A positive demand shock does not affect long-run output, but does lead to a change in aggregate demand. Finally, a monetary shock has no long-term effect on output and real balances. On the other hand, it has a significant impact on all variables in the short run. Thus, the three-variable VAR estimated at level[1] with the number of lags determined by the Akaike and BIC[2] criteria is written :

$$Xt = A(L)\,X_{t-i} + \varepsilon_t \quad X_t = \begin{bmatrix} y_t \\ p_t \\ m_t \end{bmatrix} \text{ and } \quad \varepsilon_t = \begin{bmatrix} \varepsilon_{yt} \\ \varepsilon_{pt} \\ \varepsilon_{mt} \end{bmatrix}$$

The residuals are obtained using the Choleski decomposition. Having GDP first (with t the time index) implies that the unpredictable part of GDP is due mainly to pure GDP shocks. For prices (p the unpredictable part is due to GDP and price shocks only, and so on. For money (m) the interpretation of a money demand type relationship is consistent with a final monetary classification. The series on the error term from the VAR specification is then used as a common (unobserved) shock. The graph in the appendice shows the estimation of the common shocks.

[1] For the extraction of shocks from a VAR model, the stationarity properties of the variables are no longer relevant since the estimation of the VAR coefficients will be consistent even if there are unit roots (Canova, 2007)

[2] Let Bayesian information criterion

B. Variable specification and justification

The annual data collected for this study are extracted from the World Bank database (WDI, 2018) for structural variables, and from the ICGR database (2019) for institutional variables. They cover the period 1995-2017 for 25 SSA countries[3]. Several structural and institutional variables are defined to examine their capacity to absorb shocks and increase economic resilience

- *Output gap* : This is the percentage difference between actual output and potential output. It is used as a measure of economic resilience in this study following Duval and Vogel (2008) and Jolles et al, (2018). Its determination is imperative and the problem of method choice arises.
- The choice of the measurement of the output gap
- There are several possible methods for estimating output gaps[4], such as the Hodrick-Prescott (HP) and Baxter-King (BK) filters or the OECD methodology which derives potential output from a production function approach. Most characteristics of business cycles are robust to all these methodological choices (see Duval et al., 2007, for a detailed analysis). The analysis below is therefore based on a single method for assessing economic resilience, the Hodrick-Prescott (HP) gap measure. To this end, a Hodrick Prescott (HP)[5] filter is used to decompose the series into trend and cyclical components to isolate the trend, which is then defined as potential output, by solving the following program :

$$Min \sum_{t=1}^{T} (\ln Y_t - \ln Y_t^*)^2$$

Under restraint,

$$\sum_{t=1}^{T-1} (\left[\ln Y_{t+1}^* - \ln Y_t^*\right] - \left[\ln Y_t^* - \ln Y_{t-1}^*\right])^2 \le \varepsilon$$

We rewrite :

$$Min \sum_{t=1}^{T} (\ln Y_t - \ln Y_t^*)^2 + \lambda \sum_{t=2}^{T-1} \left[(\ln Y_{t+1}^* - \ln Y_t^*) - (\ln Y_t^* - \ln Y_{t-1}^*) \right]^2$$

Where Y_t is the observed GDP at constant prices, Y_t^* is the trend or potential GDP at constant prices ε is a number chosen to be small as a minimisation threshold, λ is a

[3] Anglola, Burkina Faso, Cameroon, Ivoiry Coast, Congo, DRC, Guinea, Botswana, Gabon, Ghana, Gambia, Kenya, Malawi, Mali, Mozambique, Madagascar, Niger, Nigeria, Sierra Leone, Senegal, South Africa, Tanzania, Togo, Ouganda, Zimbabwe.

[4] The output gap is the percentage difference between actual and potential output. While actual output can be observed with some precision, potential output is unobservable and must be inferred from the available data.

[5] The Hodrick-Prescott (HP) filter isolates a stochastic trend by introducing a trade-off between obtaining a good match with the actual series and a high degree of smoothing of the trend series. The stochastic trend is assumed to measure potential output, and the residual is the business cycle component of the output gap.

parameter that determines the smoothness of the underlying trend. Low values of λ produce a trend close to real GDP, while high values create an underlying trend converging to a linear trend. Therefore, λ also determines the length of the cycle. Low values of λ will only identify high frequency cycles and include long cycles in the trend, while higher values of λ will produce longer cycles and tend to give a higher value to the output gap. In line with most of the literature, λ is set to 100 for annual observations.

Generally, the different methods can be grouped into two categories, statistical and economic. Statistical methods implicitly assume that GDP corresponds to a long-term equilibrium component plus short-term disturbances around this trend. They decompose between the trend and the cycle to isolate the trend, which is then defined as potential output. Economic methods derive an estimate of potential output from economic supply relationships, including the 'equilibrium' value of the various components. Unlike statistical methods, economic approaches base their assumptions on economic theory. However, it should be noted that statistical filtering methods in general (the HP and Baxter-King (BK) methods) are criticised for not being model-based. To address this criticism, different approaches have been developed to determine the potential output of an economy. For example, the OECD has introduced an alternative model-based method that takes into account a production function that includes capital, job creation, factor productivity and wages that do not accelerate unemployment (Duval and Vogel, 2008). Claus (2003) also proposes an approach based on a model involving a SVAR (Structural vector autoregressive), in his assessment of potential output in New Zealand. Beyond this criticism, commonly used filtering methods have statistical weaknesses. It is well known, for example, that the HP method creates biases due to the unsatisfactory treatment of parameter observations in a sample, but this is the approach used in this work.

- *Terms of trade* : The terms of trade are the ratio, for a given product, between the price index of exports and that of imports, expressed in the same base year. A 1% improvement in the terms of trade means that the growth in the price of exports is 1% higher than the growth in the price of imports. It also means a deterioration in price competitiveness. Conversely, a decrease in the terms of trade means an improvement in price competitiveness. This ratio can be calculated per product, for a set of products or globally. An improvement in the terms of trade is likely to reduce the importance of shocks and increase the absorption capacity. This variable comes from the WDI database (2018). In interaction with shocks, its expected sign is negative.
- *The exchange rate* : A low real exchange rate makes it possible to increase exports by competitiveness effect, their development loosens the external constraint and makes it possible to import capital not produced locally, which supports growth. Conversely, a high real exchange rate favours the traditional sector for developing countries. The coefficient associated with this variable must be negative.
- *Trade openness :* The resilience of an economy also depends on the degree of integration with the global economy. The openness of an economy is measured by the ratio of imports and exports to GDP. It takes into account that more open economies tend to be more vulnerable to the loss of access to external finance. Thus, lower levels of restrictions on external trade transactions tend to increase a country's ability to respond to a shock. This variable suggests that economies with high levels of external trade are more resilient. The expected sign of the coefficient of this variable in interaction with shocks is negative.
- *Economic diversification :* The Diversification Index variable was calculated from the main export products of each country. Several indicators of economic diversification exist in the literature. The most widely used are : i) the Ogive index which measures the deviation from an equitable distribution of employment across all sectors, ii) the normalised Herfindahl-Hirschman index (HHI) which allows for an assessment of the degree of diversification/concentration of trade and iii) the aggregate specialisation index (close to the Herfindahl-Hirschman index). There is no empirical evidence of a hierarchy concerning these three measures. Therefore, our study is limited to the Hirschman index which corresponds to the sum of all squared shares of each product in total national exports, and can be expressed as follows :

$$HHI = \sum_{i=1}^{N} (xi / X)^2$$

Where xi is the nominal value of domestic exports of product i, X is the nominal value of all domestic exports of the country and N is the total number of export products. Its level of concentration depends on both the number of products (or the number of markets) and the distribution of shares that these products represent. This index takes values between 0 and 1. Values close to 0 indicate perfect diversification and a maximum of 1 represents perfect concentration of exports, either in a single product, or to a single destination country.

- *Foreign direct investment* : In the literature, authors generally use the stock of FDI (Daude and Stein, 2007) and the FDI to GDP ratio (Dje, 2007) to capture FDI. In this paper, we re-examine the determinants of economic resilience in SSA. This region makes very little foreign investment, which is why we use the FDI/GDP ratio, which represents the share of FDI inflows to SSA countries in GDP, in order to take into account the size of each economy.
- *Official Development Assistance* (ODA): This is measured by the ratio of official development assistance to GDP for each country in the sample. This variable represents the contribution of international donors from the North to improving the living conditions of people in the South. Both theoretical and empirical literature has shown that this variable is positively related to economic resilience. This variable is taken from WDI (2018). The expected sign of the associated coefficient is negative.

- *Government expenditure* : This generally refers to total government expenditure and its financial operations. In the literature they are often considered as automatic stabilisers in case of shocks, necessary in the recovery of fiscal policy (Hijzen et al., 2017). This indicator is expressed as a percentage of gross domestic product.
- *Financial development* : In financial liberalisation theories, financial development has gained considerable prominence worldwide. It reflects the abandonment of policies of financial repression, deemed harmful to growth, and the adoption of a policy of financial liberalisation. They show the need to remove restrictions on interest rates, thereby encouraging savings and increasing the amount of financial resources available for investment. It would be an important factor in absorbing shocks. One measure of financial development is the amount of bank credit allocated to the private sector, expressed as a percentage of GDP.
- *Institutions* : Rodrick (1999) and Acemoglu et al (2003) suggest that good quality institutions (stability of government, rule of law, absence of social conflict and corruption) are conducive to greater resilience. This is because external shocks to growth are more important the more latent social conflicts are in an economy and the weaker its institutions for conflict management.

Given the specification of output gaps and the interaction between variables and common shocks in a panel model, we use the generalized methods of moments (GMM) proposed by Blondell and Bond (1998). Widely used in economics, especially in macroeconomics and finance, this method seems relevant to the analysis of the determinants of economic resilience. It has the advantage of identifying unobservable effects for cross-sectional data. It controls for the presence of unobservable heterogeneity, and provides more robust estimators (Greene and Schlacther, 2005). The system GMM estimator controls for unobserved country-specific effects and potential endogeneity of explanatory variables. There are several reasons for choosing the generalized method of moments (GMM) according to Asongu and De Moor (2017). First, the dependent variables must be persistent. Second, the estimation strategy takes into account the endogeneity of all regressors. Third, cross-country variation is not eliminated with the estimation approach. Finally, the system GMM technique corrects for the small sample bias inherent in the difference estimator.

III. RESULTS AND DISCUSSION

Table 1 below presents the results of the estimation of the basic model (equation 1.) by the GMMs on dynamic panels. The aim is to identify the conventional and non-conventional factors that can explain economic resilience through their capacity to absorb common shocks. Overall, the model seems significant because, in accordance with the principles of use of GMMs in a system, the AR (2) and Hansen statistics are insignificant, thus validating the hypothesis of second-order non-correlation of the residuals between the instruments and the absence of over-identification of restrictions.

Table 1: Estimation of the economic resilience determinants equation

	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	(11)
L.gdp_gap	1.349***	0.264***	1.154***	1.168***	1.264***	1.444***	0.986***	0.819***	1.763***	0.889***	0.891***
	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)
SHOC	7.251**	3.787***	1.7827***	6.429***	3.938**	1.930***	1.875***	0.886***	6.045***	1.286***	0.996***
	(0.014)	(0.007)	(0.000)	(0.006)	(0.014)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)
Structurals factors											
TOT*SHOCS	**-1.185***										
	(0.093)										
RATE*SHOC		**-0.464****									
		(0.046)									
DIVER*SHOCS			0.390***								
			(0.000)								
TRADE*SHOCS				**-1.143****							
				(0.043)							
Macroeconomics factors											
DEP*SHOCS					-0.114						
					(0.129)						
FDI*SHOCS						**-0.333*****					
						(0.001)					
CREDIT*SHOCS							**-0.0216****				

							*				
							(0.000)				
APD*SHOCS								0.0718**			
								(0.045)			
Institutionals factors											
Govstab*SHOCS									**-0.560*** **		
									(0.000)		
Conflict*SHOCS										-0.031	
										(0.154)	
Demo*SHOCS											0.102
											(0.203)
Constant	-0.00144*	-0.000435**	-0.0012***	-0.00182***	-0.00171***	-0.00112***	-0.00116***	-0.00122***	-0.0021**	-0.0012***	-0.00152***
	(0.075)	(0.047)	(0.001)	(0.000)	(0.000)	(0.011)	(0.007)	(0.010)	(0.000)	(0.000)	(0.006)
Country fixed effet	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Observations	485	485	485	485	485	460	484	484	485	485	485
AR(1)		0.043	0.007	0.003	0.003	0.004	0.004	0.0153	0.008	0.004	0.007
AR(2)	0.162	0.056	0.320	0.172	0.090	0.057	0.085	0.398	0.255	0.252	0.206
sargan	0.843	0.405	0.193	0.575	0.538	0.159	0.426	0.0673	0.124	0.149	0.307
hansen	0.799	0.0598	0.380	0.837	0.523	0.402	0.585	0.848	0.239	0.893	0.609

Note: * p<0.1 ** p<0.05 *** p<0.01. Student's tally in brackets

TOT : terms of trade ; RATE : real interest rate ; DIVERS : economic diversification ; TRADE : economic openness ; DEP : Govment expenditure ; FDI :foreign direct investment ; CREDIT : domestic investment APD : offocial development aid ; Govstab :govment stability ; cinflict :internal conflict ; demo : democratie

Overall, when examining the resilience factors, it emerges that conventional factors, particularly those linked to economic structure, favour economic resilience. Indeed, the absorption measured in terms of the interaction of the factor considered with the common shocks is manifested by a negative sign for the interaction variable, thus translating the capacity of the factor to absorb shocks.

As for the factors related to economic structure, the coefficient on the terms of trade is negative and significant. This indicates that the higher its value (i.e. when there is an appreciation or improvement in the terms of trade), the narrower the output gap in the face of a common shock. That is, actual output tends towards potential output. Thus, the appreciation of the terms of trade, due to the increase in exports, is a factor in the absorption of common shocks. When they represent the most important source of economic fluctuations in SSA (Haffmaister et al., 1998; Sissoko and Dibooglu, 2006), their improvement is likely to reduce fluctuations and thus contribute to economic resilience. This result is in fact consistent with terms-of-trade theory, particularly for Africa (Deaton and Miller, 1996), according to which higher relative export prices allow for greater purchases of production inputs and investments in productivity-enhancing measures, such as more efficient production technologies.

We also find that the coefficient associated with the exchange rate variable in interaction with shocks has a negative and significant sign. This suggests that the exchange rate is a shock absorber. Indeed, according to the literature (Collins and Razin, 1997 for example), small variations or a fall in real exchange rates allow for an increase in exports through a competitiveness effect, their development loosens the external constraint and allows for the import of capital not produced locally, which favours growth. Conversely, high real exchange rates favour the traditional sector for developing countries. The existence of monetary unions for most SSA countries favours a certain stability of exchange rates, which constitutes a factor of absorption in the face of shocks.

Similarly, the coefficient of trade openness is negative and significant. This negative sign of the estimate of the interaction of trade openness and common shocks shows that high openness to international trade increases absorption of shocks by reducing the output gap, as it allows the economy to benefit more from a recovery in export markets. Indeed, a high degree of trade openness is explained by an increase in trading partners and therefore an increase in exports, which creates a surplus in the balance of trade necessary to maintain the economy's trend in the face of shocks. Briguglio et al (2009) showed that some small island states such as Singapore, which are intrinsically vulnerable to external shocks, were able to resist external shocks and maintain their level of development precisely because of their trade openness, which favours a high concentration of exports ; as did Jolles et al. (2018).

However, diversification in interaction with common shocks has a positive and significant coefficient. This reflects a low shock absorption capacity for the latter. Indeed, one of the main characteristics of SSA countries is the low diversification of their exports, which is not able to mitigate the impact of shocks. It is generally accepted that diversified economies are likely to be more resilient to shocks.

For macroeconomic factors, we find that FDI and financial development interact with shocks with significant coefficients and negative signs. Thus, it appears that capital inflows in the form of FDI, when used effectively (i.e. in the presence of good institutions), increase investment, allowing recipient firms to better withstand shocks, thus contributing to economic resilience.

Furthermore, financial development appears to be an important factor in absorbing shocks. Indeed, the significance of the coefficient associated with financial development (in terms of credit granted to the private sector) shows the capacity of the financial sector to direct capital towards highly profitable investments. This increases the shock absorption necessary for financial stability and economic growth. This result is in line with the literature on the subject (Levine, 1997)

However, while public expenditure is an important element of fiscal policy, particularly in terms of automatic stabilisers in the event of shocks, it is marginal in helping to absorb shocks in SSA countries. This can be explained by the pro-cyclical tendency of fiscal policy in most SSA countries and does not constitute a resilience factor in this respect. Yet it is widely accepted in the literature that public spending, when used effectively, can contribute to economic stability (Besley and Persson, 2014). Moreover, the absorptive capacity that determines the rapid recovery of an economy from a negative shock is enhanced when the economy has discretionary instruments that it can use to counter the effects of negative shocks, such as a strong fiscal position, which means that policymakers can use public spending to counter the effects of negative shocks (Briguglio et al., 2009)

With regard to institutions, the general view nowadays is that institutions modulate and shape long-run economic growth trajectories defining and delimiting the context that agents in the economic system operate in, mainly through the definition of incentives to behave in a certain way (Acemoglu et al. 2003, 2005). Two of these unconventional determinants are identified in these estimates (government stability and internal conflict). Indeed, the coefficient associated with these variables interacting with common shocks are significant and show positive signs contrary to expectations. This suggests that institutions are not conducive to absorbing shocks. Generally, government institutions have always been weak, with mostly corrupt and inefficient bureaucracies (Collier and Gunning, 1999). The significance observed for these variables reflects efforts to improve the quality of institutions, which individually are still weak to respond effectively to negative shocks. The interaction with other factors could be an important factor for economic resilience.

Sensitivity testing

In order to test the sensitivity of our results, we change our dependent variable, namely the output gap, by real GDP. Indeed, following the logic of Canoval et al. (2012) and sondermann (2018), resilience can be approximated by real GDP, as the focus is on the occurrence of shocks. In this respect, the impact of shocks is materialised by extreme fluctuations in GDP. Thus the results obtained from the GDP regressions are contained in Table 2 below. Overall, the results do not change but they do vary significantly.

Table 2 : Estimation of equation (1) with GDP as the dependent variable

	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	(11)
L.GDP	0.994***	0.963***	0.998***	0.988***	0.996***	0.991***	0.993***	1.022***	1.002***	0.985***	1.000***
	(0.003)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.00351)
SHOC	7.353***	4.912***	1.546***	10.36***	4.333***	1.796***	1.996***	0.827***	3.625***	8.606***	1.593***
	(0.007)	(0.00)	(0.000)	(0.001)	(0.002)	(0.000)	(0.000)	(0.000)	(0.000)	(0.020)	(0.220)
Structural factors											
TOT*SHOCS	**-1.274****										
	(0.039)										
RATE*SHOC		**-0.482*****									
		(0.000)									
Diver*SHOCS			0.262***								
			(0.002)								
TRADE*SHOCS				**-2.100*****							
				(0.004)							
Macroeconmics factors											
DEP*SHOCS					**-0.146****						

					(0.026)						
FDI*SHOCS						**-0.348*** **					
						(0.000)					
CREDIT*SHOCS							**-0.0221*** **				
							(0.000)				
APD*SHOCS								0.151***			
								(0.000)			
Institutionals factors											
Govstab*SHOCS									**-0.217*** **		
									(0.004)		
Conflict*SHOCS										**-0.898****	
										(0.039)	
Demo*SHOCS											-0.00442
											(0.0615)
Constant	0.170*	0.898***	0.0802**	0.331***	0.148**	0.256**	0.209*	-0.465***	0.00449*	0.380	0.0334
	(0.099)	(0.000)	(0.054)	(0.005)	(0.038)	(0.041)	(0.059)	(0.002)	(0.096)	(0.319)	(0.0816)
Country fixed effect	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Observations	485	485	485	485	485	460	484	484	485	485	485
AR(1)	0.0132	0.014	0.011	0.006	0.002	0.003	0.004	0.008	0.008	0.022	0.006
AR(2)	0.155	0.127	0.244	0.247	0.087	0.226	0.098	0.314	0.215	0.354	0.141
sargan	0.220	0.213	0.200	0.828	0.101	0.456	0.529	0.176	0.747	0.267	0.444
hansen	0.521	0.210	0.249	0.853	0.237	0.375	0.245	0.783	0.338	0.220	0.301

Note: * p<0.1 ** p<0.05 *** p<0.01. Student's tally in brackets
Source: Author's calculations based on World Bank (WDI), International Country Risk Guide (ICRG)

Table 2 shows that the determinants of resilience identified above are almost the same when considering GDP as a proxy for economic resilience. However, the effect of government stability stands out as a resilience factor, particularly in terms of absorbing the effects of shocks. Moreover, the reduction of internal conflicts facilitates the absorption of shocks and thus increases economic resilience in the same way as public spending. All this shows that our results are robust.

IV. CONCLUSION

The purpose of this paper was to re-examine the determinants of economic resilience in Sub-Saharan Africa. Most of the work on economic resilience has focused on analysing its consequences. Curiously, it has failed to address the question of why some countries are more resilient than others and vice versa. This has led to an interest in understanding the factors that even cause resilience. Addressing this concern would lead to more appropriate policy recommendations. By applying the method of generalized moments in a system to our model, our results suggest that conventional determinants explain resilience in Sub-Saharan Africa (terms of trade, exchange rate, trade openness, foreign direct investment, financial development). Beyond these conventional determinants, one of the non-conventional determinants was identified (government stability).

In view of these results, several recommendations can be made to increase resilience in SSA countries. First, advocate a counter-cyclical fiscal policy to mitigate the effects of shocks and strengthen the governance process in African countries to improve the means of transfers between countries. And secondly, to encourage better management of official development assistance through transparency. Thus, all these measures could lead not only to strengthening economic resilience in SSA countries, but also increase the region's development potential.

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ISSN No:-2456-2165

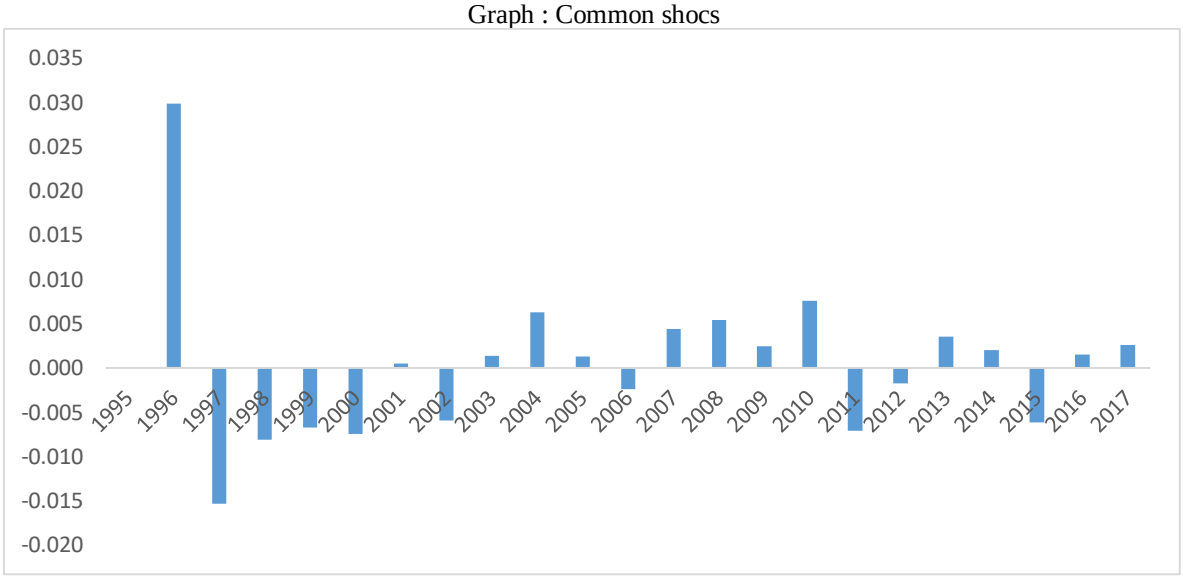
APPENDICES

TABLE : DESCRIPTIVE STATISTICS

Variable	Observations	Mean	Standard error	Min	Max
GAP	575	0.0001948	0.0397884	-0.29579	0.180347
TOT	575	115.9732	36.37841	21.3967	251.586
RATE	575	740.867	1222.707	0.00275	9125.74
TRADE	575	68.37082	30.0072	20.7225	277.798
DIVERS	575	0.1944377	.2066725	0.0022	0.859
DEP	575	5.05e+09	1.34e+10	0.622	8.70e+10
FDI	575	3.711711	5.658216	-8.58943	50.018
CREDIT	574	18.86224	26.14199	0.491388	160.125
APD	575	6.434519	5.963238	-.0846154	40.74074

Source : Authors

Graph : Common shocs



Source : Authors

[1]