Fragility and macroeconomic outcomes in ECOWAS

By Joseph A. OMOJOLAIBI [a]
Abdullah O. OLADIPUPO [b]
& Adaobi G. OKUDO [c†]

Abctract. This study examined the nature of the interactions between fragility and macroeconomic outcomes in ECOWAS. This is despite the backdrop of evidences showing that macroeconomic policies sufficiently drive macroeconomic outcomes. Meanwhile sub-Saharan African countries have taken the backbench on almost any standard measures of macroeconomic performance within the last two decades. Contemporaneously, the region dominates the top 50 percentiles of ranking on almost all dimension and indicators of fragility. Using a panel data for the 15 countries covering the period between 1995-2016 and employing the Panel Vector Autoregressive (PVAR) estimation techniques, the findings from this work show that the seven macroeconomic outcomes used in the study respond to fragility negatively and that fragility accounts for major sources of shocks in these economies. The study recommends that ECOWAS should employ a formidable approach to blocking this distortion called fragility.

Keywords. Panel VAR, Shocks, Resource Curse, Sub-Saharan Africa, ECOWAS.
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1. Introduction

Arguments within the spheres of economic discus have it that, macroeconomic outcomes in developing economies results from manipulation of macroeconomic policies. The Washington consensus is foremost for such propositions, Williamson (2000), Stiglitz (2005). This position is not without empirical justification as the connection between macroeconomic performance and outcomes are somewhat established, Easterly (2005). However, this proposition becomes contentious especially as sub-Saharan African countries have taken the backbench on almost any standard measures of macroeconomic performance within the last two decades. Contemporaneously, the region dominates the top 50 percentiles of ranking on almost all dimension and indicators of fragility. These ambiguities call for the need to examine the drivers of this relationship. Meanwhile, mainstream economic thinking

[a] Department of Economics, University of Lagos, Akoka, Yaba, Lagos, Nigeria.
☎. +2348094852557 ✉. omojo_laibi@yahoo.com
[b] Department of Economics, University of Lagos, Akoka, Yaba, Lagos, Nigeria.
☎. +2348050506485 ✉. jomojolaibi@unilag.edu.ng
[c†] School of Business and Public Administration, California State University, Bakersfield, California, 93311, USA.
☎. +19094144550 ✉. okudo.adaobi@gmail.com

posits that macroeconomic outcomes are a result of the path of factor accumulation (Solow, 1956), human and physical capital development (Romer, 1986), technical progress and innovation (Aghion & Howitt, 1992; Romer, 1990), and more recently, economic policy and institutions (Easterly, 2005; Acemoglu, Johnson, & Robinson, 2005), these factors still do not completely explain the differences in economic performance around the world; as instances abound of countries that have satisfied the theoretical conditions for favourable macroeconomic outcomes and yet have recorded disappointing results. This suggests that there could be other deep underlying factors that may matter, perhaps even more, for understanding economic performance, particularly for a region with dynamic and evolving political systems. Secondly, given that the channels of transmission from state fragility situations to the macro economy could be multifaceted and interconnected, it is important to identify the most significant channels of transmission in other to properly manage and concentrate domestic and international interventions to fragile states around those mediating channels.

The worldwide concern about fragility and the challenges it poses to the general welfare of humanity and socio-economic development is borne out of the key role of states in the international political and economic system. Fragility anywhere, whether permanent, or temporary localized (national or sub-regional) or widespread, will adversely impact the functioning of the international political and economic systems as it compromises the role of countries in development, management of shared and scarce global resources and in collective national and international human security. Development discourse focusing on fragility only gained prominence within the last two and half decades ago. Myriads of definitions have been coined by development practitioners to capture the multifaceted and dynamic nature of the discourse. Camack *et al.*, (2006), observed the term fragility is replaced and comes with different wording, "failed", "failing", "crisis", "weak", "rogue", "collapsed", "poorly performed", "ineffective or shadow", each with its own specific manifestation.

Rocha *et al.*, (2008) noted that fragility can be entrenched or transitory and thus poses challenges of different magnitudes from socio-economic perspective. Thus no one situation or form of fragility can describe fragility in a country, Menacol (2010). Bertocchi & Guerzoni (2011) were exhaustive in their explanation of fragility, as the condition associated with various combinations of the following dysfunctions; inability to provide basic services and meet vital needs, unstable and weak governance, persistence and extreme poverty, lack of territorial control and high propensity to conflict and civil war. Fragility is particularly relevant and pronounced in those areas of the world, such as Sub-Saharan Africa, where it appears to be specifically far-reaching. Sub-Saharan African countries are over represented among fragile states, with drastic consequences for their eligibility for substantial aid flow and for their growth prospect, Bertocchi & Guerzoni (2011). The European Report on Development (2009) and

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Marshal & Cole (2009) showed that sub Saharan African is one of the regions in the world that eloquently reflects characteristics of state fragility. Out of a total of 48 countries in sub-Saharan Africa, 22, representing 46% have been classified as fragile, having been characterized by; weak government, insufficient security and legal framework, ineffective administration, poor public services, high rates of conflicts and civil wars, growing extreme poverty. The African Development Banks 2012 Thematic Review has it that state fragility matter because around a third of African countries, home to 200 million people can be classified as fragile and are home to a growing share of Africa's poor that are susceptible to instability with potential consequences beyond their borders. Conflicts and fragility are among the most important constraints on Africa's development.

There is increasing evidence on the persistent character of the phenomenon of state fragility. In fact, the probability that a country that was classified as fragile in the year 2001 remains in the same category in 2009 is 0.95. Accordingly, the 35 countries that were qualified as fragile by the World Bank in 1979 still had the same fragile quality in 2009 (European Report on Development, 2009). As shown by Andrimihaja *et al.,* (2011), beside the common characteristic of weak economic growth among fragile states in comparison to non-fragile states, the former states appear to be engulfed in a "fragility trap". The results show a substantial qualitative difference between the former and the latter states. In fact, the glaring difference is the possibility of falling into a trap of inferior equilibrium: a country reflecting characteristics of a fragile state is susceptible of being engulfed in a vicious cycle of weak investment, feeble growth and poverty. Hence, it could be inferred from the highlighted consequences of state-fragility that, African countries which are already suffering from a plethora of economic woes are paying the hard price (Easterly & Levine, 1997; Sachs & Warner, 1997).

A sustainable blow is being dealt by the phenomenon of fragility on most economies of the work, the sub-Saharan African region inclusive. The worrisome nature of this phenomenon and its consequences on sustainable development in Africa, and West Africa in particular, has made it attract a searchlight at both local and international level. In fact the European Report, 2009, is entirely focused on ending fragility in Africa. Earlier works have described the endogenous relationship between fragility and growth, Vailling & Moreno-Torres (2005). Maier (2010), argues as a consequence to the neoclassical growth theory, fragility does not allow for sufficient levels of human and physical capital required to fuel economic growth. Cilliers & Sisk (2013), in their discussion on long term state fragility identify high levels of income inequality and the related skewness in allocation of benefits and resources along ethnic/tribal and geographic entities, as key distinguishing characteristics of fragile state. However, studies reviewed in the the IMF 2014, shows that, getting out of fragility and building resilience is strongly associated with economic reforms and sound macroeconomic policies. This position is in contrast with earlier assertion that ambiguities

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surround the fragility-macroeconomic outcomes relationship. It is in a quest to establish the association between these duos, that this work finds premise.

Having laid the foundation of this work in this section, the next section looks at the theoretical, empirical and methodological reviews of literatures on fragility. Section three presents the theoretical and empirical framework of the study, which includes the data description and estimation methods and models. The penultimate section gives the quantitative investigation and results while in the last section makes remarks about the findings and conclusion.

2. Literature review

Developing specific theories of fragility is still a difficult task in research. Earlier works have relied on explanations of its emergence which have been advanced within a widely interdisciplinary, often non-quantitative literature. However, this work will extract a set of hypotheses that can guide empirical investigation, generate testable implications, and offer an interpretation of the resulting evidence. The literature here is reviewed in terms of theories and empirics/methodology that are germane to the theme of discussion.

2.1. Theoretical review

2.1.1. Resource curse theory

The resource curse theory as posited by Karl (2005), in its narrowest form, says that resource-rich countries experience negative economic growth rates. Resource curse is the negative relation between natural resources dependence and economic growth rate of a country. Countries that depend on oil revenue for their survival are the most economically troubled, the most authoritarian and the most conflict- ridden in the world. De Soysa (1999) argues that being 25% dependent on oil for government revenues leads a state to be four times more likely to be engaged in a conflict. For Karl (2005), the development level of oil exporter countries has been negative for the past 40 years. When compared to other countries, mineral and oil exporting countries suffer from high poverty, poor economic performance, poor health care, widespread malnutrition, poor educational performance and low life expectancy. Sachs & Warner (1997) selected ninety five developing countries as a sample and they tried to find the relationship between natural resources based export and national growth in the period between 1970 and 1990. They found that only two countries, Malaysia and Mauritius, could sustain 2% per annum growth during this period. They concluded their study by arguing the results that extremely resource- abundant countries such as oil states in the Gulf, Mexico and Venezuela have not experienced sustain rapid economic growth (Sachs & Warner, 1997).

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2.1.2. Social contract theory

Emerging today is a view of the social contract as a process of sustaining equilibrium between the expectations and obligations of the institutions in power and those of the rest of society (Lessnoff, 1990). The social contract remains valid and legitimate, if the extent to which it creates and maintains equilibrium between society's expectations and obligations and those of state authority and institutions, is discernible, otherwise the state fails. The social contract theory explains the processes by which everyone in a political community, either explicitly or tacitly, consents to the state authority, thereby limiting some of her or his freedom, in exchange for the state's protection of their universal human rights and security and for the adequate provisions of public goods and services. This agreements calls for individuals to comply with the state's laws, rules, and practices in pursuit of broader common goals, such as security or protection, and basic services. The social contract emerges from the interaction between: expectations that a given society has of a given state; state capacity to provide services, including security, and to secure revenue from its population and territory to provide these services (in part a function of economic resources; andélite will to direct state resources and capacity to fulfill social expectations. It is crucially mediated by, the existence of political processes through which the bargain between state and society is struck, reinforced and institutionalized and legitimacy, which plays a complex additional role in shaping expectations and facilitating political process (OECD, 2008: 17). Jones *et al.*, (2008), OECD (2011) describe a fragile setting as one lacking effective political processes that can bring state capacities and social expectations into equilibrium. In the lexicons of policy, fragility refers to badly disordered political arrangements and weak state legitimacy. In such circumstances, public authorities cannot deliver services or collect public revenues. Hence, the state and society are not bound in mutually reinforcing ways. If there are external or internal shocks, political communities are unable to renegotiate their social contract, then conflict can occur and public authorities may lose the monopoly on legitimate violence. The absence of a social contract is therefore at the heart of fragility.

2.1.3. The bad Neighbours Hypothesis

There are several channels by which fragile states exert an influence on their neighbours macroeconomic outcomes. Although fragility does not appear to be contagious, it does lead to the diffusion of political instability to neighbouring states. A typical example is the Liberian experience, where President Charles Taylor provided mercenaries, money, weapons and infrastructure to rebel groups in Sierra Leone with the objective of gaining control over regional diamond mines and economic networks, Iqbal & Starr, (2008). Further, there are also macroeconomic implications of the movement of refugees to neighbouring countries as a result of fragility. In addition to its potential for being an incubation ground for violent groups and crime, refugee movements create pressure on health and education

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infrastructure through the spread of diseases, e.g., malaria and AIDS, and the overpopulation of schools. For example, there is evidence that the refugee movements from Burundi and Rwanda to Tanzania have exacted heavy consequences on the health and school participation in the Kagera region. These effects are very likely to be passed on to the macroeconomic performance of the county. Empirical evidence shows that an estimated 80 percent of the cost of fragility is borne by neighbouring countries, with the bad-neighbours effect estimated at about 0.6 percent of lost output growth per neighbour see Chauvet, Collier, & Hoefler (2011), and European Report (2009).

2.1.4. Growth theory

Growth theories from the classical to the neo-classical, assumes that growth is fundamentally and positively related or linked with capital accumulation, labour productivity (population) and the level of technology. Among their assumptions is that therate of technological progress is determined by a scientific process that is separate from and independent of, economic forces. The submitted that a economy recovers quickly and automatically in case of displacement and converges to the steady growth rate. Implicit in their proposition is that long run growth rate is exogenous. The neoclassical created a lacuna, as no explicit mention is made about factors that cause negative growth or displaces the economy from the steady growth rate.

The endogenous growth model and other theories that followed explained the dynamics of growth and economic performance adding factors hitherto not included in the neoclassical. Among which were, the variations in the stock of natural resources, Sachs & Warner (1995, 1999), and the stock of social capital which includes education, Acemoglu *et al.,* (2002), Auty (2001). Gylfason (2011) broke down these into six categories – real capital, human capital, foreign capital, social capital, financial capital and natural capital. A submission of this theory is that a economy does not recover automatically, it has to be driven internally to converge. They explained further this convergence does not happen instantaneously; rather it takes a longer time. Their prediction is that an economy converges to their steady with the speed of convergence depending on the distance from the steady state. Barro & Sala-i- Martin (2004) also predicts that the speed of convergence depends on the type of capital that is destroyed with slower recovery if human capital rather than physical capital is destroyed, because it has a higher adjustment cost. The poverty trap model predicts that conflicts has a direct effects on a economy steady state and as a result similar economies do not converge Azariadis & Drazen (1990), Rodrik (1999) Collier (1999). In a bid to confirm this, Barro (1991) incorporated two measures of political instability into the growth model. Both of these, the number of revolutions and or coups per year Barro & Wolf (1989), and the number of political assassinations per million populations negatively affect growth. He explained that both of these variables distort property rights and thereby hampers investment and decrease growth. In line with this

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proposition by Barro & Wolf (1989), Barro (1991) the work intends to add to the growth model a variable whose variant, political instability has shown a negative impact on growth; fragility.

2.2. Empirical/methodological review

Brinkerhoff, Vailling & Moreno-Torres (2005), point out that the root causes of fragility includes factors such as, past armed conflict, poor governance, political instability, militarization, an ethnically and socially heterogeneous and polarized population, weak or declining economic performance, demographic stress, low level of human development, environment stress and bad neighbors. In line with this position Chauvet *et al.,* (2007) have evidenced neighboring countries are closely affected by the cost of failing state. On average, countries neighboring fragile state loose around 0.6% of growth per year, but if all neighbors of the country are fragile state the figure rises to 1.0% per year.

Nkurunziza (2017) posited that political fragility induces low capital accumulation. Countries with the most emblematic wars in Africa including Algeria in 1990s, Angola from the 1970s to near 2000s, Burundi in 1990s, the Democratic Republic of Congo in 1990s and 2000s, Mozambique in the 1970s and 1980s and Uganda in the 1980s post very low, mostly negatively rate of capital accumulation during the period of political fragility. Landregan & Poole (1990), Barro (1991) Barro & Lee (1993), Easterly *et al.,* (1993), Easterly & Rebelo (1993), Persson & Tabellini (2006) all found that government and social instability and political violence often affect economic performance. Knack & Keefer (1995) and Easterly & Levine (1997), confirmed that revolutions inhibit economic performance. Following the same trend Alesina & Perrotti (1996) confirmed that political violence (assassination, death from political violence, coups and a dictatorship dummy) reduces economic performance. In recent line of literature Jong & Pin (2009) find that only the instability of political regime has a robust and significant effect on growth. Organski & Collier (1977) presented evidence on catch up. They found out that the effect on countries that suffered from the losses of the civil war, dissipated after 15-20 years when the countries had returned to pre-war growth trends. Murdock & Sandler (2004) found that civil war reduces a countries growth by 85% in the first 5years and while there is recovery, growth is still reduced to 31% after 35 years. Rodrik (1999) argued that growth rates have lacked persistence in, many countries since the 1970s because of domestic conflicts. Collier (1995) lays out how civil wars reduce the desired stock of factors of production and how the direction of civil war affects post war performances.

Wolf, (2005), argues fragility affects macroeconomic outcomes through the investment channels; both physical and human capital investments, and domestic and foreign investments. Apart from the fact that state fragility reduces the volume of investments, especially FDI, it also affects the composition of investments by tilting incentives towards the accumulation

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of less specialized capital goods, often having lower returns, which can be easily divested in response to fragility shocks. European Report (2009), added that the associated ease with which these investments could be divested or reallocated constitutes, in its self, a source of macroeconomic volatility. On the human capital side, state fragility induces reductions in the quality and quantity of investments in health and education; it also alters the composition of skilled versus unskilled labour, as households would rather spend short periods learning different vocations that would allow them to cross between sectors in response to fragility shocks, than spend several years studying a profession.

Alemeyahu (2017), using a combination of the Autoregressive distributive lag model and the logit and probit model for robust results founds out that the workings of macroeconomic policies are not enough in fragile state but a combination of a holistic approach which includes, inclusive and democratic politics, improving governance and institutional improvement are necessities for macroeconomic stabilization in fragile state. Chuku & Onye (2007) studied how state fragility conditions affect macroeconomic outcomes in sub-Saharan African economies, and identify some of the most plausible transmission mechanisms. Applying dynamic panel estimation techniques and structural vector autoregressions to data on 48 sub-Saharan African economies over the period 1995 to 2014, they show that countries with greater fragility suffer higher macroeconomic volatility and crisis; they also experience weaker growth.

Chuku & Onye (2017) studied how state fragility conditions affect macroeconomic outcomes, captured by macroeconomic vitalities, crisis and performance, in sub-Saharan African economies, and identify some of the most plausible transmission mechanisms. They show that countries with greater fragility suffer higher macroeconomic volatility and crisis; they also experience weaker growth. Conversely Campos *et al.,* (1999) suggest that the presence of fragility brings about growth. They argued that fragility can force otherwise recalcitrant governments to undertake long-delayed reforms. In support of this argument Carment, Samy & Prest (2008) over a cross-sectional sample of world countries finds that per capita income is the main driver of fragility, with higher income being associated with lower fragility.

3. Theoretical framework and research methodology

3.1. The theoretical framework

This study leans on the Neo-classical growth theory framework developed mainly by Solow (1956), and Barro & Sala-I-Martin (1992). Starting with General Cobb-Douglas production function model:

$$Y_{it} = A_{it} K_{it}^{\alpha} L_{it}^{\beta} \qquad (1)$$

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Where Y_{it} is the total amount of production of the final good at time t in country i, k_{it} is the capital stock at time t in country i, A_{it} is technology at time t in country i, and L_{it} is total employment in country i, at time t.

Defining $k_{it} = \frac{K_{it}}{L_{it}}$ as the stock of physical capital per unit of effective labor, and $y_{it} = \frac{Y_{it}}{L_{it}}$ as output per unit of effective labor in country i at time t. They derived the following equation:

$$\frac{dk_{it}}{dt} = S_{it} Y_{it} - (g + n + \delta) \tag{2}$$

When g is technological progress of A, n was the growth rate of the labor force and δ is depreciation of K. The production function in the intensive form could be written as $y_{it} = K_{it}^{\propto}$. Then intensive form of steady state of capital is;

$$\ln K_i^* = \frac{1}{1-\alpha} \ln S_{it} - \frac{1}{1-\alpha} \ln(g_i + n_i + \delta) \tag{3}$$

Substituting the steady state k* we obtained

$$ln\, y^* = ln(A_{it)} + g_{it} \frac{\alpha}{1-\alpha} ln\, S_i - \frac{\alpha}{1-\alpha} ln(g_i + n_i + \delta) \tag{4}$$

Following Barro & Sala-i-Martin (1992) for unconditional convergent equation will be:

$$\ln y_{it} - \ln y_{it-1} = \alpha + \beta \ln y_{it-1} + v_{it} \tag{5}$$

Since determinants of economic growth differ across countries, Barro (1990), Barro & Sala-i-Martin (1992) favor the notion of conditional convergence:

$$\ln y_{it} - \ln y_{it-1} = \alpha + \beta \ln y_{it-1} + \gamma x_{it} + v_{it} \tag{6}$$

Where t indicates the time interval, $(t-1)$ is the initial of the time interval, Xit is the matrix of other variables that can affect economic growth, vit is error term, and y is real GDP per people.

3.1. Model specification

In analyzing the impact of fragility on macroeconomic outcomes in ECOWAS this work specifies a Eight-Variable Panel Variable Vector Autoregressive Model. The panel vector auto-regression (PVAR) methodology joins the panel data approach with the traditional VAR method (Love & Zicchino, 2006). There are three major advantages of the PVAR method: firstly, this method makes a flexible framework that combines the traditional VAR approach with panel data and increases the efficiency and the power of analysis while capturing both temporal and

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contemporaneous relationship among variables (Mishkin & Schmidt-Hebbel, 2007). Secondly, the PVAR method can takes into account complex relationship and identifies dynamics responses of variables following exogenous shocks using both impulse response functions and

Variance decompositions. In that way, it provides a systematic way of capturing the rich dynamic structures and co-movements between different variables over time (Omojolaibi *et al.,* 2014). Thirdly, traditional VAR approach treats all the variables in the system as endogenous, while the PVAR technique allows for unobserved individual heterogeneity and can tackle the data limitation problems (Kandil *et al.,* 2015).

The model for this work follows the Bertocchi & Canova (2002) and Bertocchi & Canova (2011), who adopted the Standard Barro Regression Equation to analyses the impact of colonization on growth (2002) and fragility on growth (2011), (see also King & Levine, 2007 and Rousseau & Watchel , 2007) .

$$Y_{it} = \beta X_{it} + \gamma FR_{it} + \mu_{it} \qquad (7)$$

Where1$\bar{y}_{it}$is the growth rate of real per capita GDP, FR_{it} is a index of fragility and X_{it} is a set of baseline explanatory variables that have been shown empirically to be robust determinants of growth. In this work the X variables include the log of initial real per capita GDP, which should capture the tendency for growth rates to converge across countries and over time, and the log of the initial secondary school enrollment rate, which should reflect the extent of investment in human capital. The following variables are included in X_{it} as macroeconomic outcomes; Trade openness, Unemployment rate, Foreign Direct Investment and Inflation Rate.

The panel VAR model is a s specified below:

$$Z_{it} = A\ (L)Z_{it-1} + e_{it} \qquad (8)$$

Where Z_{it} is a matrix of endogenous variables ($A(L)$ is a matrix polynomial in the lag operator, L, with country i = 1…….15

Following the base line specification above, the explicit form of the PVAR is as follows:

$$GRPGDP_{it} = a_0 + \sum_{j=1}^{n} a_{1j}GRPGDP_{1t-1} + \sum_{j=1}^{n} a_{2j}FR_{2t-j} + \sum_{j=1}^{n} a_{3j}TROP_{3t-j} + \sum_{j=1}^{n} a_{4j}INFR_{4t-j} + \sum_{j=1}^{n} a_{5j}FDI_{5t-j} + \sum_{j=1}^{n} a_{6j}UNEMR_{6t-j} + \sum_{j=1}^{n} a_{7j}lnSER_{7t-j} + \sum_{j=1}^{n} a_{8j}lnRPGDP_{8t-j} + \mu_{1it} \qquad (9)$$

$$FR_{it} = a_9 + \sum_{j=1}^{n} a_{10j}FR_{10t-1} + \sum_{j=1}^{n} a_{11j}GRPGDP_{11t-j} + \sum_{j=1}^{n} a_{12j}TROP_{12t-j} + \sum_{j=1}^{n} a_{13j}INFR_{11t-j} + \sum_{j=1}^{n} a_{14j}FDI_{14t-j} + \sum_{j=1}^{n} a_{15j}UNEMR_{15t-j} + \sum_{j=1}^{n} a_{16j}lnSER_{16t-j} + \sum_{j=1}^{n} a_{17j}lnRPGDP_{17t-j} + \mu_{2it} \qquad (10)$$

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$$TROP_{it}=a_{18}+ \sum_{j=1}^{n}a_{19j}TROP_{19t-1}+ \sum_{j=1}^{n}a_{20j}GRPGDP_{20t-j}+ \sum_{j=1}^{n}a_{21j}FR_{21t-j}+ \sum_{j=1}^{n}a_{22j}INFR_{22t-j}+\sum_{j=1}^{n}a_{23j}FDI_{23t-j}+ \sum_{j=1}^{n}a_{24j}UNEMR_{24t-j}+ \sum_{j=1}^{n}a_{25j}lnSER_{25t-j}+\sum_{j=1}^{n}a_{26j}lnRPGDP_{26t-j}+\mu_{3it} \tag{11}$$

$$INFR_{it}=a_{27}+ \sum_{j=1}^{n}a_{28j}INFR_{28t-1}+\sum_{j=1}^{n}a_{29j}GRPGDP_{29t-j}+ \sum_{j=1}^{n}a_{30j}FR_{30t-j}+\sum_{j=1}^{n}a_{31j}TROP_{31t-j}+ \sum_{j=1}^{n}a_{32j}FDI_{32t-j}+ \sum_{j=1}^{n}a_{33j}UNEMR_{33t-j}+ \sum_{j=1}^{n}a_{34j}lnSER_{34t-j}+\sum_{j=1}^{n}a_{35j}lnRPGDP_{35tj}+\mu_{4it} \tag{12}$$

$$FDI_{it}=a_{36}+ \sum_{j=1}^{n}a_{37j}FDI_{37t-1}+\sum_{j=1}^{n}a_{38j}GRPGDP_{38t-j}+ \sum_{j=1}^{n}a_{391j}FR_{39t-j}+\sum_{j=1}^{n}a_{40j}TROP_{40t-j}+ \sum_{j=1}^{n}a_{41j}INFR_{41t-j}+ \sum_{j=1}^{n}a_{42j}UNEMR_{42t-j}+ \sum_{j=1}^{n}a_{43j}lnSER_{43t-j}+\sum_{j=1}^{n}a_{44j}lnRPGDP_{44tj}+\mu_{5it} \tag{13}$$

$$UNEMR_{it}=a_{45}+\sum_{j=1}^{n}a_{46j}UNEMR_{46t-1}+\sum_{j=1}^{n}a_{47j}GRPRGDP_{47t-j}+ \sum_{j=1}^{n}a_{48j}FR_{48t-j}+\sum_{j=1}^{n}a_{49j}TROP_{49t-j}+ \sum_{j=1}^{n}a_{50j}INFR_{50t-j}+ \sum_{j=1}^{n}a_{51j}FDI_{51t-j}+ \sum_{j=1}^{n}a_{52j}lnSER_{52t-j}+\sum_{j=1}^{n}a_{53j}lnRPGDP_{53tj}+\mu_{6it} \tag{14}$$

$$lnSER_{it}=a_{54}+ \sum_{j=1}^{n}a_{55j}lnSER_{55t-1}+\sum_{j=1}^{n}a_{56j}GRPRGDP_{56t-j}+ \sum_{j=1}^{n}a_{57j}FR_{57t-j}+\sum_{j=1}^{n}a_{58j}TROP_{58t-j}+ \sum_{j=1}^{n}a_{59j}INFR_{59t-j}+ \sum_{j=1}^{n}a_{60j}UNEMR_{60t-j}+ \sum_{j=1}^{n}a_{61j}FDI_{61t-j}+\sum_{j=1}^{n}a_{62j}lnRPGDP_{62tj}+\mu_{7it} \tag{15}$$

$$lnRGDP_{it}=a_{63}+\sum_{j=1}^{n}a_{64j}lnRPGDP_{64t-1}+\sum_{j=1}^{n}a_{65j}GRPRGDP_{65t-j}+\sum_{j=1}^{n}a_{66j}FR_{66t-j}+\sum_{j=1}^{n}a_{67j}TROP_{67t-j}+ \sum_{j=1}^{n}a_{68j}INFR_{68t-j}+ \sum_{j=1}^{n}a_{69j}UNEMR_{69t-j}+ \sum_{j=1}^{n}a_{70j}FDI_{70t-j}+ \sum_{j=1}^{n}a_{71j}lnSER_{71t-j}+\mu_{8it} \tag{16}$$

Where; $a_0 \dots a_{71}$ are parameters to be to be estimated, (*GRPGDP*),*Growth Rate of real per capita GDP*

(*RPGDP*), *Real Per Capita Gross Domestic Products*, (*FR*)*Fragility index*, (*TROP*),*Trade Openness*, (*INFR*) *,Inflation Rate,(FDI), Foreign Direct Investment, (UNEMR),Unemployment Rate,(SER),School enrolment rate* , μ_t = stochastic error term.

3.3. Data requirement and sources

The data for this study are obtained mainly from secondary sources; particularly from World Development Indicator (World Bank, 2016) and Center for Systemic Peace, Failed State Index table (2016).

4. Presentation of empirical result

4.1. Trend analysis

The figure above shows the behavior of fragility and foreign direct investment. Fragility fluctuates and is associated with periods of low, medium and high values. In the above, higher fragility is associated with lower foreign direct investment. This description is realistic. Uncertainties, which is a feature of fragility drives away investment. Countries with higher fragility experience lower inflow of FDI.
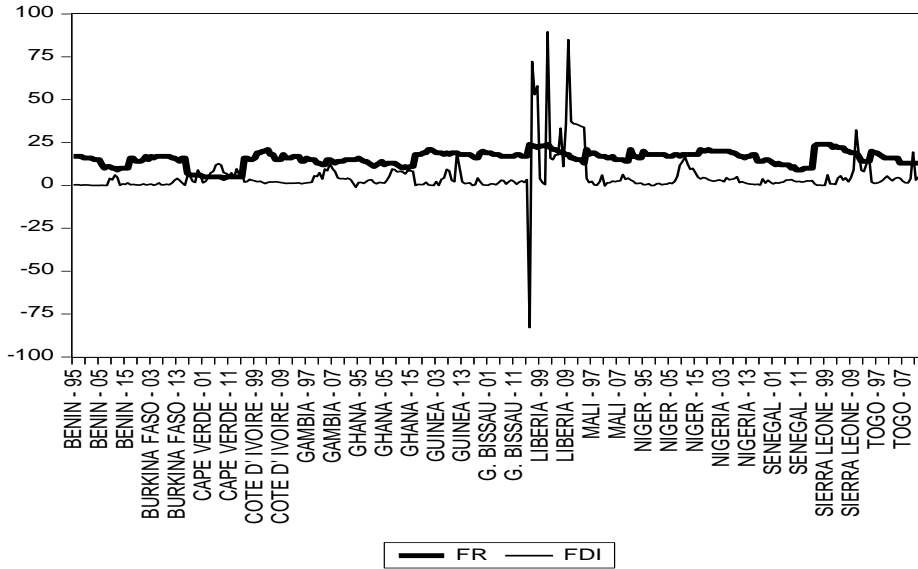
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Figure 1. *Trend of Fragility and Foreign Direct Investment*
Note: Authors' computation using data from World Development Indicator of the IMF
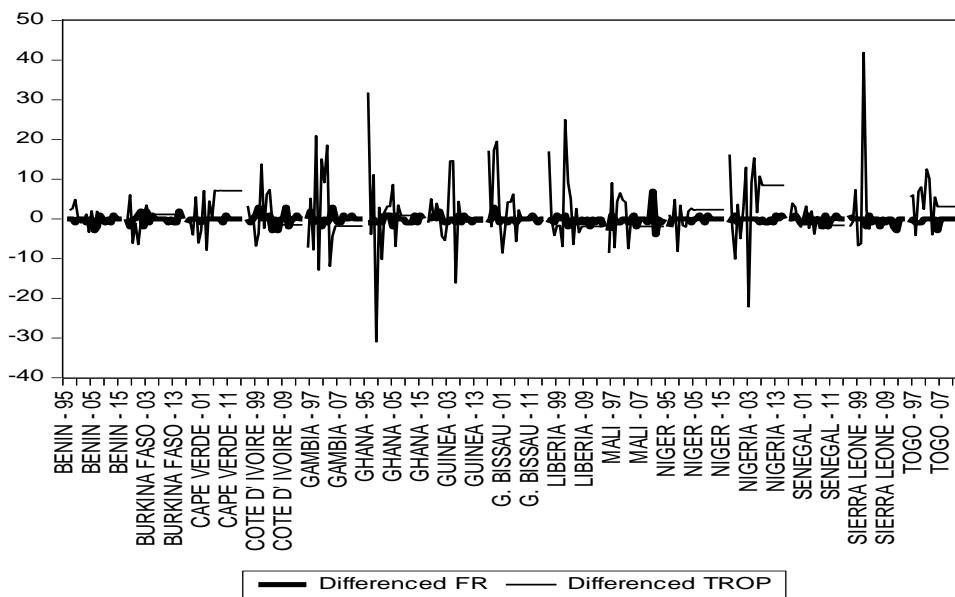(2016) and Center for Systemic Peace (2016).

Figure 2. *Trend Analysis of Fragility and Trade Openness*
Source: Authors' computation using data from World Development Indicator of the IMF
(2016) and Center for Systemic Peace (2016).

Figure 2 shows the behavior of fragility and trade openness. Both variables are unstable. Lower fragility index is associated with unstable level of trade openness. It can be inferred that, trade openness, which is manifested byglobalization and trade liberalization, open doors to fragility.
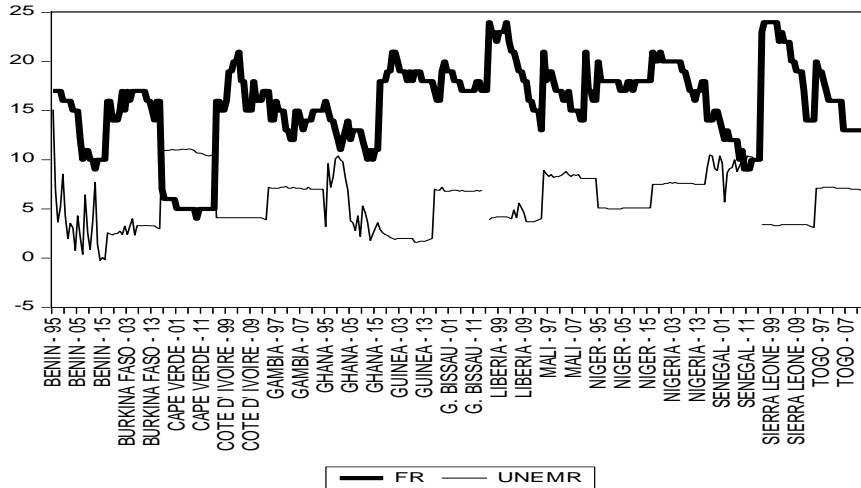
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Figure 3. *Trend Analysis of Fragility and Unemployment*
Source: Authors' computation using data from World Development Indicator of the IMF (2016) and Center for Systemic Peace (2016).

Figure 3, above shows the behavior of fragility and unemployment across the ECOWAS countries. The mixed results shows higher fragility is associated with higher rate of unemployment in some, others experience either lower fragility or higher unemployment rate, and others have a higher fragility rate causing them lower unemployment rate. Benin republic experiences the first case of this relation. Burkina Faso had the opposite of what obtains in Benin republic. Nigeria has a stable unemployment rate amidst unstable fragile situations. In Sierra Leone an initially increasing fragility is associated with stable unemployment rate, at the same time when fragility fell, unemployment remained stable.
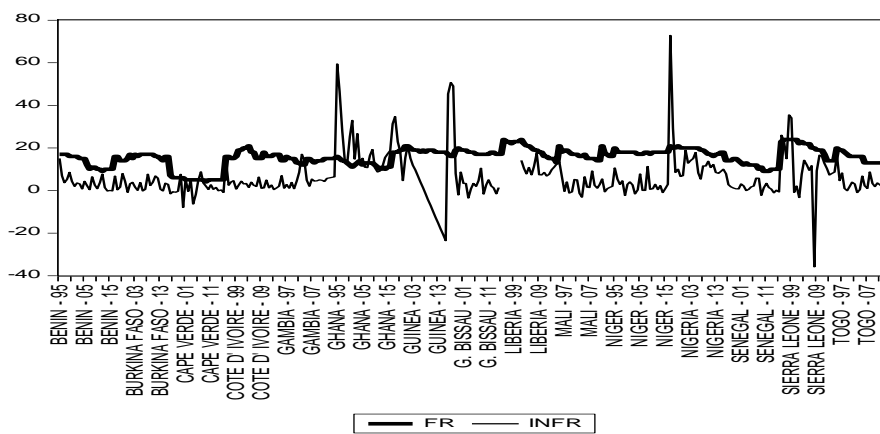

Figure 4. *Trend Analysis of Fragility and Inflation*
Source: Authors' computation using data from World Development Indicator of the IMF (2016) and Center for Systemic Peace (2016).

Figure 4 above shows a relatively stable fragility level against a fluctuating inflation rate. While fragility remains high, inflation moves below it. Guinea Bissau experiences a negative rate of inflation with a relatively stable fragility rate. In Cape Verde a falling fragility is associated with an unstable rate of inflation.
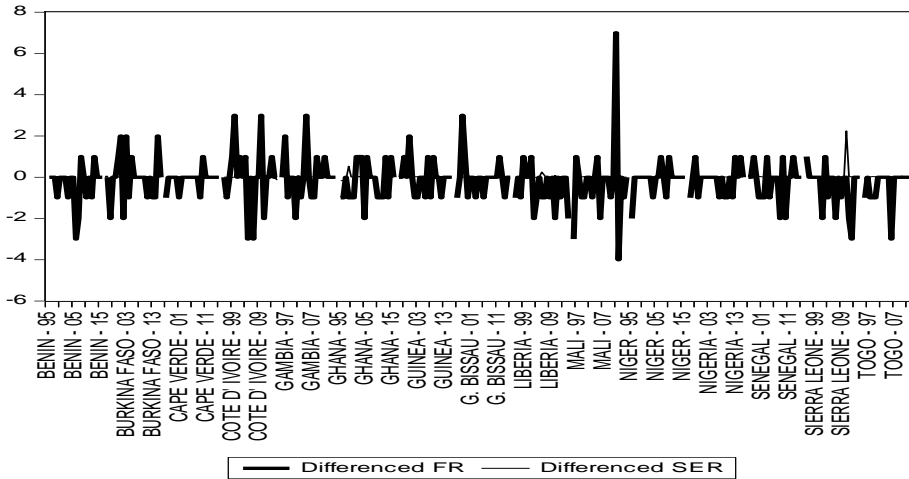
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Figure 5. *Trend Analysis of Fragility and School Enrolment Rate*
Source: Authors' computation using data from World Development Indicator of the IMF
(2016) and Center for Systemic Peace (2016).

In Figure 5 above fragility fluctuating behavior leaves school enrolment rate relatively stable. This behavior implies that fragility does not hinder human capital development. However, this illustration is contestable.
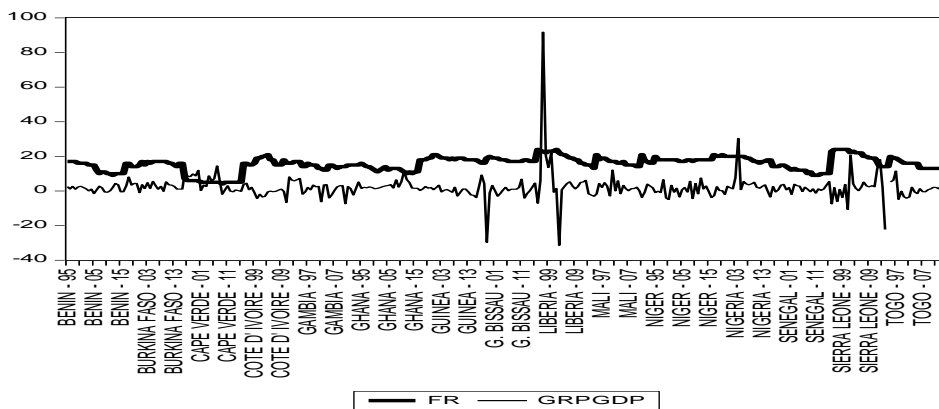

Figure 6. *Trend Analysis of Fragility and Growth of Per Capita GDP*
Source: Authors' computation using data from World Development Indicator of the IMF
(2016) and Center for Systemic Peace (2016).

Showing in Figure 6 above is the behavior of fragility and growth rate of per capita GDP. While different growth rate of GDP behaves with different levels of fragility, Cape Verde happens to be the only country where lower fragility behaves with rising real per capita GDP. Liberia experienced at some point a higher growth rate per capita of GDP, relative to a rising fragility.

4.2. Descriptive statistics
In the table below the summary descriptive statistics for each of the individual variables in the model is presented. The statistics presented include the mean, median, standard deviation, skewness, Jarque-Bera statistic, among others. The data was pooled for the 15 countries in ECOWAS, for the period of 1995-2016.

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Table 1. *Descriptive statistics*

	FDI	FR	GRPGDP	INFR	RPGDP	SER	TROP	UNEMR
Mean	4.954182	15.56908	1.562044	6.105476	2004.523	0.809694	76.53129	5.949155
Median	2.275512	16.00000	1.509975	3.957806	1568.787	0.851368	70.76730	6.800000
Maximum	89.47596	24.00000	30.34224	72.83550	6168.285	1.091257	158.3790	11.10200
Minimum	-1.087801	4.000000	-31.34253	-35.83668	577.6570	-1.30402	29.60148	-0.247361
Std. Dev.	9.332246	3.986176	4.907122	10.22511	1277.274	0.267432	26.95447	2.661443
Skewness	5.562491	-0.934267	-1.105308	2.156165	1.703525	-4.685345	0.524186	0.092474
Kurtosis	43.43612	3.933467	20.02111	14.72230	5.422341	31.61185	2.557636	2.055867
Jarque-Bera	22278.71	55.26187	3731.663	1976.107	221.3592	11481.67	16.40041	11.72418
Probability	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000	0.000275	0.002845
Sum	1506.071	4733.000	474.8614	1856.065	609374.9	246.1470	23265.51	1808.543
Sum Sq. Dev.	26388.52	4814.549	7296.194	31679.52	4.94E+08	21.67047	220142.6	2146.234
Observations	304	304	304	304	304	304	304	304

Source: Authors' computation using data from World Development Indicator of the IMF (2016) and Center for Systemic Peace (2016).

From the table above there are 304 observations. The average value of fragility in the West Africa region, ECOWAS is 15.6. This value shows that West African countries on the average are experiences medium fragility. The FR has a standard deviation of 9.3. The data on FR also shows that is negatively skewed but has a positive kurtosis. The data for some of the variables appears to be skewed to the right. The Jarque-Berra statistic, tests the data are from the normal distribution. The null hypothesis is a joint hypothesis of the skewness being zero and the excess kurtosis being zero. The p-value being zero indicates that the null hypothesis of normal distribution is rejected. SER has the lowest average and the lowest standard deviation from the observation. However, it is negatively skewed with a positive kurtosis. The data with the highest mean is the RPGDP while the SER shows the lowest.

Table 2. *Correlation Matrix*

	GRPGDP	FDI	FR	INFR	RPGDP	SER	TROP	UNEMR
GRPGDP	1							
FDI	0.011142792	1						
FR	-0.132780673	0.03172145	1					
INFR	0.07501522	0.06331226	0.0978383	1				
RPGDP	0.184549061	-0.1044835	-0.512809	0.070537971	1			
SER	-0.000490446	0.076322	-0.395536	-0.04743060	0.243248557	1		
TROP	-0.019584148	0.0921259	-0.18064	0.066918453	0.389696465	0.0111631	1	
UNEMR	0.070819115	-0.1010271	-0.46888	0.030767724	0.433330174	0.2587503	0.214427	1

Source: Authors' computation using data from World Development Indicator of the IMF (2016) and Center for Systemic Peace (2016).

The correlation matrix shown above has some implications on the extent of association between the variable of interest and other variables in the model. The degree of association between Fragility and other variables in the model is very weak, fair and mixed. A 13% weak and negative association exists between FR and GRPGDP. FR and FDI are weakly and positively associated with a coefficient of (0.032). A similar association exists between FR and INFR as in FDI, with a coefficient of 0.098. However, RPGDP and UNEMR both have a moderate and negative association with

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FR, with (-0.51) and (-0.46) respectively. Lastly FR is weakly and negatively associated with SER with a coefficient of (-0.39). With this kind of association the data is free from multicollinearity.

4.2.1. Panel VAR analysis

The table below shows the extracted estimate of the response of all the macroeconomic outcomes considered in this to fragility. The details of these estimates are in the appendix.

Table 3. *Response of Fragility to Macroeconomic Outcomes*

PERIOD	FR	FDI	GRPGDP	INFR	RPGDP	SER	TROP	UNEMR
1	1.026459	0.041309	-0.81705	-0.32771	-13.4031	0.000322	0.206494	-0.03541
	(0.04292)	(0.34954)	(0.28941)	(0.35893)	(6.16251)	(0.00834)	(0.37062)	(0.05998)
2	0.957986	-0.26579	-0.14324	-0.26542	-17.0418	-0.00525	0.542585	-0.02922
	(0.04640)	(0.23980)	(0.11437)	(0.25977)	(7.61574)	(0.00759)	(0.39731)	(0.05972)
3	0.897086	-0.38903	-0.03787	-0.13739	-18.4192	-0.01033	0.736776	-0.02498
	(0.05507)	(0.21510)	(0.10334)	(0.23272)	(8.84436)	(0.00765)	(0.44425)	(0.06396)
4	0.842320	-0.42411	-0.01219	-0.04411	-19.4562	-0.01433	0.900394	-0.02113
	(0.06524)	(0.21574)	(0.09652)	(0.23244)	(10.3178)	(0.00808)	(0.50520)	(0.07037)
5	0.791878	-0.41517	-0.00296	0.018963	-20.4345	-0.01732	1.047740	-0.01761
	(0.07535)	(0.21734)	(0.09071)	(0.23429)	(11.9677)	(0.00857)	(0.57219)	(0.07738)
6	0.744645	-0.38518	0.000458	0.062034	-21.4206	-0.01946	1.181292	-0.01447
	(0.08479)	(0.21579)	(0.08595)	(0.23274)	(13.7176)	(0.00901)	(0.64053)	(0.08415)
7	0.699991	-0.34633	0.001073	0.092098	-22.443	-0.02092	1.301934	-0.01168
	(0.09337)	(0.21187)	(0.08193)	(0.22818)	(15.5233)	(0.00934)	(0.70781)	(0.09030)
8	0.657562	-0.30497	0.000230	0.113500	-23.5178	-0.02181	1.410248	-0.00922
	(0.10101)	(0.20677)	(0.07845)	(0.22186)	(17.3607)	(0.00957)	(0.77276)	(0.09570)
9	0.617151	-0.2643	-0.00136	0.128936	-24.6548	-0.02226	1.506726	-0.00705
	(0.10774)	(0.20126)	(0.07535)	(0.21480)	(19.2166)	(0.00970)	(0.83474)	(0.10031)
10	0.578630	-0.22581	-0.00332	0.140111	-25.8597	-0.02235	1.591807	-0.00512
	(0.11359)	(0.19578)	(0.07257)	(0.20761)	(21.0837)	(0.00975)	(0.89343)	(0.10415)

Table 3 above shows the responses of macroeconomic variables to fragility. Fragility has positive effects on itself, this support the view by researchers that fragility is self-reinforcing and once a country enters into the fragility trap it takes time to come out. At the initial period fragility reinforces itself more than 100%, positively. The rate reduces overtime, only to 67% in the tenth period.

Fragility has 4% positive effects on foreign direct investment in the initial period. This is not against what earlier scholars on this discussed have posited. This situation is due to the difficulties associated with moving their physical capital from the fragile state. The subsequent period, particularly by the second period, the response of FDI to fragility turns negative. This situation means inflows of foreign owned physical businesses will cease. However a total withdrawal of Foreign Direct Investment is not shown by the results above, meaning that the stock of FDI reduces but not by a 100%. The result above shows 26%, 38%, 42%, 41%, 38%, 34% reduction from the second to the seventh period respectively. The lowest stock of FDI, 19% will be experienced in the 10th period.

Growth rate of per capita GDP, responded to fragility with mixed responses. It started with the highest negative response to rate of 81% in the

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initial period, the negative response remains, though at a lower rate. After a while the response changed to positive and later a negative response ensued. An explanation for this is the huge share of country's GDP that would have be committed to ending fragility, in whatever manifestation comes. Fragility in the form of conflicts will require a country to boost the share for security, in the national budget. This explains the situation. The response by GRPGDP turns out positive, after the 5th, responding to as low as 0.04%. The response further plummeted to a negative 0.3% in the tenth period. The argument by Vaillings & Moreno (2005), that a lower rate of growth is a consequence and cause of fragility.

Inflation rate also has mixed responses to fragility. Initially inflation responded negatively to fragility. This means that inflationary situation is borne by fragility. Inflation could also be a cause of fragility. Results in the variance decomposition lend credence to this. Fragility caused a 32% rise in inflation, for the first three periods. It however responded positively after the fourth period, reducing a sustained prices rise by 1.8%, 6.2%, 9.2%, 1.1% from the fifth period to the eight periods and to 7% in the tenth period.

The real per capita GDP shows a negative response to fragility throughout all the period at a increasing rate. It responded from a negative 13% in the first period up to 25 % fall in RGDP in the tenth period. Initially it responded negatively at a high rate but the rate of negative response decreased as the period increases.

The school enrolment rate experiences a positive response in the first period of fragility. A very low positive response of 0.03%, as available on the table. This rate decreased consistently after the first period. Fragility in the form of social conflict reduces human capital, which is captured, in this work by SER. Barro (1991), argued that the ease with which countries would converge to the steady state of growth will be determined by the nature of loss resulting from conflict or political instability, a longer time if human capital is destroyed.

Trade openness shows positive responses to fragility. Starting a 20% positive response initially, 90% positive response in the fourth period, 104 % response in the fifth period, 130% in the seventh period, 150% positive response in the 9th period and 159% positive response in the 10th period. This results or response is not without realistic justifications. Trade openness is the outcome of globalization and trade liberalization. Smuggling of goods and ammunition, international sponsorship of terrorism and arms dealing have been accompanied by trade liberalization. The data lend credence to this fact.

Unemployment rate has shown decreasing response to fragility. Fragility negatively affects unemployment. This rate according to the results in the table continuously initially increased negatively but later fell. Depending on the nature of unemployment experienced in the region, youth unemployment has been associated with increasing fragility. The value was highest in the tenth period, 10%.
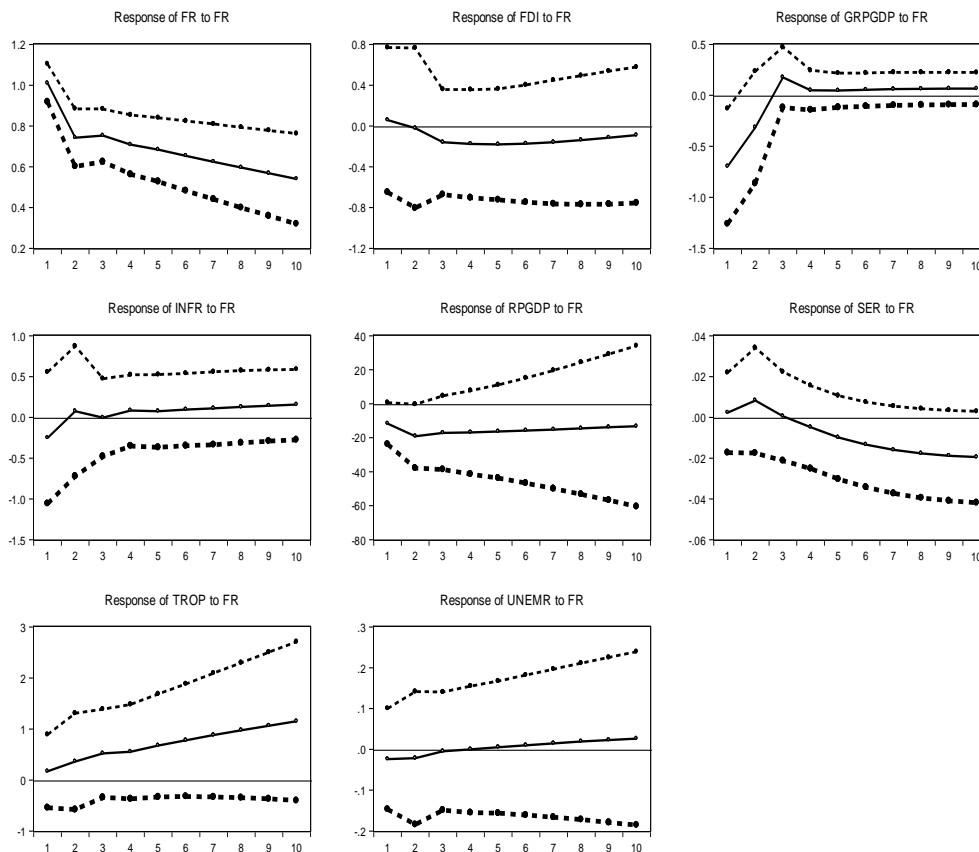
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Response to Cholesky One S.D. Innovations ± 2 S.E.

Figure 7. *Impulse Response Function Graph*

Table 4. *Variance Decomposition of Fragility and Macroeconomic Outcomes*

PERIOD	S.Error	FR	S. Error	FDI	S. Error	GRPGDP	S. Error	INFR
1	1.026459	100.0000	5.911315	0.004883	4.928291	2.748530	6.074405	0.291053
2	1.409664	99.20516	6.837155	0.154772	4.978716	2.775906	7.161924	0.346713
3	1.681921	98.13564	7.140919	0.438679	4.989419	2.769772	7.528150	0.347105
4	1.895125	97.05201	7.265499	0.764507	4.993890	2.765411	7.664496	0.338177
5	2.069571	96.02089	7.331560	1.071458	4.996179	2.762912	7.721695	0.333789
6	2.215947	95.04666	7.375628	1.331419	4.997711	2.761219	7.750454	0.337722
7	2.340843	94.11691	7.409488	1.537755	4.998963	2.759841	7.768484	0.350212
8	2.448722	93.21786	7.437412	1.694373	5.000094	2.758593	7.782148	0.370254
9	2.542795	92.33871	7.461305	1.809017	5.001160	2.757424	7.793820	0.396514
10	2.625468	91.47215	7.482256	1.889976	5.002183	2.756341	7.804441	0.427666

Source: Authors' computation.

Table 4. *Variance Decomposition of Fragility and Macroeconomic Outcomes (Continues)*

PERIOD	S.Error	RPGDP	S.Error	SER	S.Error	TROP	S.Error	UNEMR
1	104.6476	1.640418	0.141093	0.000520	6.269524	0.108479	1.014743	0.121734
2	161.9196	1.792913	0.183667	0.081956	8.907182	0.424814	1.382796	0.110202
3	207.4014	1.881492	0.208262	0.309801	10.90194	0.740312	1.633869	0.102314
4	247.0820	1.945758	0.223911	0.677324	12.56400	1.070981	1.822257	0.095693
5	283.4810	1.997776	0.234389	1.163926	14.01299	1.419989	1.970075	0.089861
6	317.8556	2.043193	0.241683	1.743231	15.30880	1.785206	2.089170	0.084701
7	350.9230	2.085289	0.246948	2.387061	16.48675	2.162822	2.186851	0.080157
8	383.1347	2.126174	0.250889	3.068305	17.57010	2.548564	2.268031	0.076175
9	414.7954	2.167278	0.253948	3.762866	18.57534	2.938139	2.336206	0.072705
10	446.1215	2.209597	0.256405	4.450736	19.51484	3.327401	2.393967	0.069697

Source: Authors' computation.

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Table 4 above shows fragility's share of theshock related to any of the macroeconomic outcomes. The share of fragility in shocks related to it is 100% in the initial level and falls continuously till the last period. Shocks from FDI are accounted for by fragility initially at 0.4%. At this rate other macroeconomic outcomes account for the remainder including FDI. This value rises through the last period to 1.88%. Meaning that, shocks to FDI starts low with fragility, but is later consumed by the phenomenon. GRPGDP is accounted for by 2.74% fragility and remains steady throughout the period. Inflation has a steadily increasing rate of share accounted for by fragility. RGDP, School enrolment rate and trade openness also have increasing share of shock in them resulting from fragility. However fragility has a initially high share of shock in UNEMR but later falls.
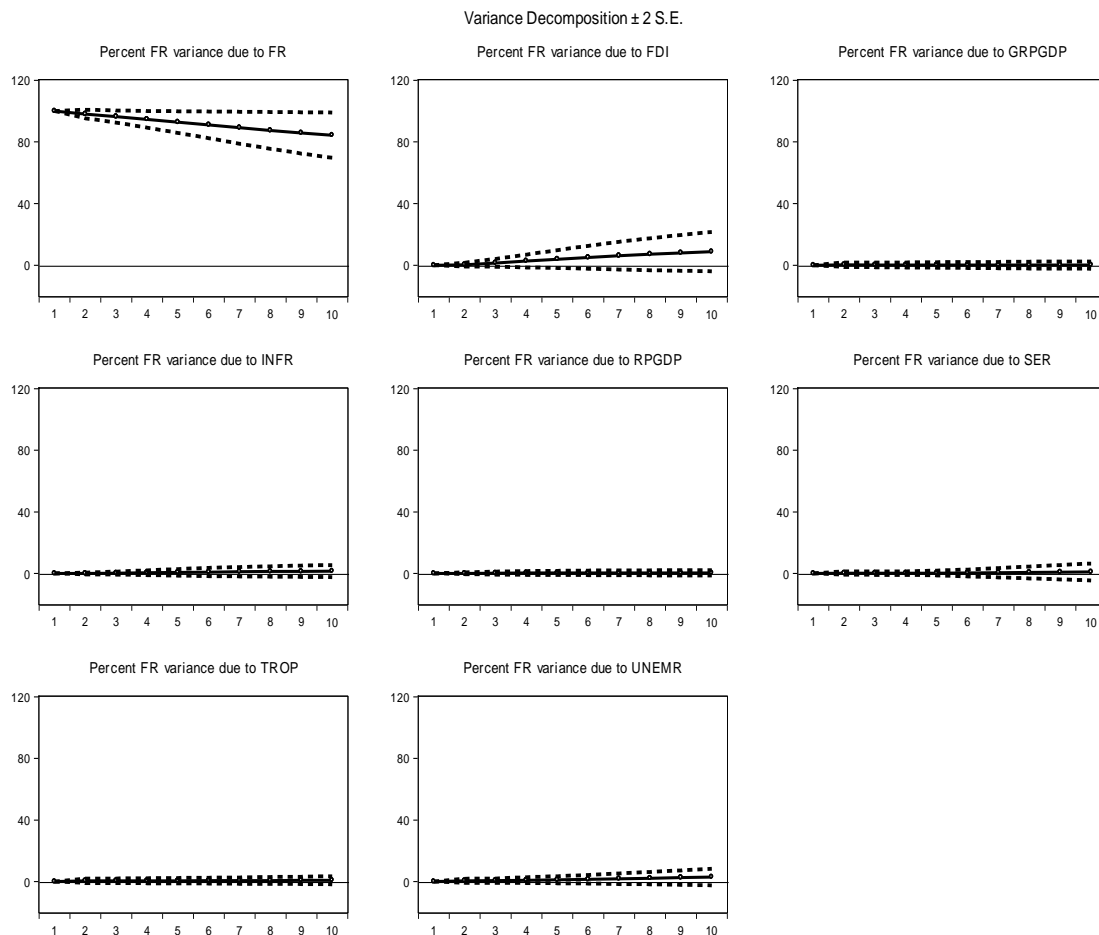
Figure 8. *Variance Decomposition Graph*

5. Conclusion and policy implications

The result of the quantitative investigation carried out in this work shows that fragility impacts macro-economy of ECOWAS. Of a high and destabilizing implication is this phenomenon on macroeconomic outcomes considered in this work such as, inflation, trade openness, foreign direct investment, school's enrolment rate, unemployment rate, growth rate of

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per capita GDP, and real per capita GDP. This has strong implications on the social, political and economic environment of the region. Fragility is self reinforcing, from the details of the estimate in the previous chapter, as it accounts for more that 100% of itself. This explains the neighborhood hypothesis or the spillover implications of the phenomenon to close related region, which sends a strong signal to sub-Saharan Africa countries in general and ECOWAS states in particular.

The decreasing inflow of Foreign Direct Investment in the ECOWAS states has been empirically confirmed to be in a part the consequences of fragility. This decreasing inflow of FDI is meant to increase as the phenomenon of fragility persists. The empirical results show a continuous decrease or evacuation of foreign physical capital in form of foreign direct investment in ECOWAS, state. The findings also shows a consistent decline will meet the growth rate of GDP and the per capita real GDP should the phenomenon persists. This will cause a substantial fall in the social welfare of the people. The declining nature of these variables is also shown by the need to spend more on curbing the phenomenon, thereby reducing the social beneficial impacts of government expenditure. The ECOWAS policy of trade liberalization has shown its negative impact being a driver of fragility. Trade openness has being the source of increasing fragile situation prevalent in the region. Trade openness has the highest positive response to fragility. It increased from a lowly 20% to a very high value of 150% within ten periods.

The phenomenon of unemployment is also shown to have responded well to fragility. This situation has been empirically justified. The problem of youth unemployment in the region could bear a explanation for this. Unemployed youth have been the source of manpower for evil minded people. Their role in political hooliganism is also a pointer to this empirical justification. Sustained rising general price level, inflation rate was empirically confirmed to respond to fragility.

The channels through which the region can attain convergence have been empirically proved to be inflicted by fragility. This has a strong negative impact on the sustainability of development in the region. This work recommends the following:

The trade liberalization policy of ECOWAS should be thoroughly reconsidered. That trade openness which should be a means through which countries would exchange growth enhancing resources has turned out to be the source of fragility, requires that that aspect of trade openness be strongly attended to. ECOWAS state should define items to be traded among countries. A formidable authority that would ensure strict compliance to the terms of the trade liberalization agreement, established, both at constituting state and ECOWAS level. The government of ECOWAS state should also censure or monitor all that globalization has to offer. ECOWAS should revive her military authority, ECOMOG with full force so as to take care of conflicts in the regions without necessarily seeking international assistance when crisp occurs.

Government of ECOWAS state should see to emphasize education beyond the four walls of the schools. Vocational training and other forms of skill acquisition development programmes should be made part of the national curriculum on human capital development. The high placing of emphasis on education in the class rooms has told more on the level of unemployment in these countries especially among the youths. Unemployment has been tested to have a positive response to fragility.

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