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Macroeconomic Spillover and Single Currency Adoption: An Inter-regional Analysis

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Abstract

The merging and sustenance of the economies of different countries require the integration of several aspects of those economies, including price levels and money market activities. The member countries within the West African Monetary Zone have resolved to introduce a single currency, the ECO. It is therefore, necessary to assess their readiness by testing how key macroeconomic indicators from these countries relate. Using the recent innovative accounting methodology to test if there are differences in the way these countries respond to shocks from the major markets after a decade of setting convergence criteria to harmonize their economies. The paper used a monthly money market indicator (interest rate) and price levels (consumer price indices) for the period between January, 1990 and December, 2010. The results indicate that the countries' respond differently to shocks from the major markets (i.e. China, United States and United Kingdom). This is an indication that the countries are yet to be integrated to pave the way for the introduction of the common currency.

JEL Classification: F31; F36; GI5.
Keywords: Macroeconomic Spillover; Single Currency; Inter-regional Analysis.

1. Introduction

There are continuing efforts at the monetary integration and unionization in West Africa. However, several academics argue that a monetary union between West African states would be costly because of the magnitude of asymmetric shocks (Tapsoba, 2010). According to Jain and Bhanumurthy (2005), the macroeconomic impact of international financial integration depends on the extent of domestic financial integration, that is to say, the integration of domestic institutional interest rates such as deposit and loan interest rates with domestic money market rates which themselves turn on the regulatory and competitive structure of domestic financial markets. Macroeconomic factors in one country can have an impact on the financial markets of another especially if they are within a regional body.

Adjasi, Havey and Agyapong (2008), Allen and Carlette (2010) were of the view

that there is a link between the real economy and the financial market. They discovered that macroeconomic variables such as money supply, trade deficit, consumer price index, and interest rate are good predictors of what happens on the capital market. Madura (2001) identified economic variables, market-related variables and firm specific variables as the factors that influence stock prices. In his view, macroeconomic variables such as interest rates, economic growth, consumer trends, balance of trade, inflation and exchange rates can influence corporate earnings and are therefore, closely monitored by investors. In addition, microeconomic variables such as specific firm policies which affect future cash flows and dividend to be distributed to shareholders also affect stock prices.

Charalamos and Qureshi (2008) found considerable dissimilarities in the economic characteristics of member countries, particularly WAMZ countries as well as significant heterogeneities within the CFA franc zone, and some interesting similarities between the central African and WAMZ countries.

Nnanna (2006) posit that sound macroeconomic policies backed by strong political commitment at the highest level on a sustained basis represents the necessary and sufficient success factors for the creation of monetary and economic unions, globally. He contends that statistical evidence reveals that expanded trade, macroeconomic stability, measured by: low rate of inflation and exchange rate stability, sustained growth and narrowing of fiscal balance, have become more entrenched in the regional groupings that have firmly established their economic and monetary union arrangements.

According to Hoguet (2010), in the short term, emerging market equities will be subject to the vicissitudes of global risk appetite. For instance, a widening of the sovereign crisis to a large market like the UK or Japan would unambiguously be bad for emerging market economies and equities. He posits that in the short- and medium-term scenario, the superior fiscal, demographic and growth profiles of emerging markets are likely to lead to a further reduction in the home bias and substantially increased capital flows to the emerging world. However, sharply higher flows may lead to capital controls in some markets. He suggested that happenings in the developed world (prolonged period of below trend growth and given an emerging markets' inflation), emerging economies inevitably will grow less rapidly than otherwise. He warned that it is a mistake to think that emerging market crises are a thing of the past.

Dungey, Fry, González-Hermosillo and Martin, (2002) quantified the impact of financial contagion in global bond markets crisis and near collapse during the latter part of 1998. The discernible contagion from these two crises to both developing and major markets was severe. The proportion of total volatility attributable to contagion varies widely across countries, but it is not always the case that it is more substantial for developing countries. Similarly, Bae, Karyoli and Stultz (2000), found that for a range of international equity markets, developing markets are more susceptible to international financial crises than developed markets; so Kaminsky and Reinhart (2002), propose that developed markets act only as a conduit between regions of developing markets. Many more works on the spillover have been found between emerging and developing and developed markets, but none relates to the economies of the WAMZ member countries. Whereas Lane (2006), Hartmann et al (2003) concentrated on the EU, Kwakye (2010) concentrated on specific countries in the zone or outside the zone. The paper looks at how countries in the zone respond to spillover effect from the major markets. The rest of the paper is divided into five sections. Section two looks at the review of related literature, then the methodology, followed

by the empirical analysis, the discussions, conclusion and policy recommendations in that order.

2. Literature Review

At the higher and deeper level of regional integration, the law of price posits that countries would have similar prices or prices should quickly converge at the equilibrium for the region. This also presupposes that countries in a region respond to externalities in a similar way if not the same. Hence, it is appropriate to test how individual countries in a bloc respond to macroeconomic activities from the developed markets. Among the macroeconomic variables that have the tendency to spillover to other countries within the region is inflation (imported inflation), unemployment, aid flow, productivity or growth, news and announcements, capital market's volatility, etc. (Fleming & Lopez, 1999; Ehrmann & Fratzscher, 2004).

Hamao, Masulis and Ng (1990) found evidence of volatility spillovers from the US to Japan and the UK, as well as from the UK to Japan, but not in the other directions. Lin, Engle and Ito (1994) found that the returns of US and Japanese markets are interrelated, with effects going in both directions. Bae, Karyoli and Stultz (2000), concludes that emerging markets are more susceptible to international financial crises than developed markets. Therefore, it is imperative to understand how developments in the financial market, and their price level influence those of the West African Monetary Zone (WAMZ), as they prepare to introduce the common currency.

In recent studies, Kaminsky and Reinhart (2002), discovered that developed markets act as a conduit between regions of developing markets. Indeed, there have been many more works focusing on contagion effects of one developed market on the other; alternatively, between developed and emerging markets and among emerging. Using a common factor model, Forbes and Chinn (2004) showed that there are regional spillovers from the largest economy in a given region to nearby countries. According to Hoguet (2010) with the happenings in the developed world, emerging economies inevitably will grow less rapidly than otherwise. He warned that emerging market like their counterparts in the developed markets can experience crises.

The information flow theory and asymmetry theory explain the contagion or spillover effects in a regional market; and hence the need to monitor, collect and analyse relevant information. Becker, Finnerty and Friedman (1995) found that spillovers between the US and UK stock markets are in part due to US news and information. Furthermore, Wongswan (2003) found that macroeconomic announcements in the US and Japan affect equity markets in Korea and Thailand. However, such news has been found to explain only a small share of the equity market spillovers between mature economies (Connolly & Wang, 2003). Andersen et al. (2005), also show that US, German and British stock markets respond to US macroeconomic news. Such evidence points to the fact that there are international equity market linkages; with the US markets leading the way as the key market driver. Apart from the financial markets, the export destinations of these countries like other African countries are often the European Union market (Giovannetti & Sanfilippo, 2009) and change in policy is likely to affect the countries, although recent empirical evidence points towards China. According to Biggeri and Sanfilippo, (2009), there has been a sharp increase in overall economic relations between China and Africa in 2006. As of 2008, China was about the second trade partner (and the first exporter) to Africa, after the United States (Giovannetti & Sanfilippo, 2009).

Many more works on the spillover have been found between emerging and developing and developed markets (Ehrmann & Fratzscher, 2004), but none relates to

the economies of the WAMZ member countries. Hence the present work sought to fill such a gap by hypothesizing that:

....The developments on the advanced financial markets affect those within the WAMZ

An important motivation for the present study was the non-identical nature of cross market linkages across countries over time, although, there is clear evidence for cross-market linkages (Bekaert & Harvey, 1995). Hence, the interest in investigating the nature of inters regional spillover effect. In determining the factors from a country that could spillover into the other, this study like (Hofmann & Remsperger, 2005; Balogun, 2007) use inflation, however, this is not the only variable from one country that affects or spill into others.

Blanchard and Quah (1998) found evidence of high degree of correlation between inflation shocks between CFA countries, although the use of ordinary correlation analysis has been heavily criticized. Laxton and Prasad (2000), Nguyen and Wu (2010) identified real GDP growth and unemployment, as some of the shocks that may diffuse from major markets (or markets with leadership information) to others. For instance, documented in Nguyen and Wu (2010), empirical studies demonstrate strong evidence for the informational leadership[1] of the US on the Asia-Pacific region. They indicated that shock transmission is possible where different markets are linked through real and financial integration.

Moreover, there are major differences between the West African economies, which presuppose that the economies are likely to be affected in different ways by the events from major countries. For instance, Nigeria a major oil exporter faces a very different pattern of trade shocks than the other economies of the region from the developed countries. However, the paper assumed a common effect from major economies into the zone.

3. Methodology

3.1 Data sources and data type

Data is made of monthly average interest rates (R) and consumer price index(CPI) from the member countries in the WAMZ namely, Ghana (GH), Gambia (GA), Guinea (GU), Nigeria(NG), Sierra Leone(SRL), Liberia(LIB) and from three major countries, namely United States (US), United Kingdom(UK) and China (CH). Data span covers the period from January 1990 to December 2010. The sources for the different data include the International Financial Statistics Yearbook, various issues and the World Bank database.

3.2 Model specification

The paper conducted recent econometric techniques on the monthly time series of financial market variables. To empirically examine the spillover effects from major financial market to those in the zone, the impulse response or the innovative accounting methodology was employed.

The equations 1 to 8 present the matrix notation of the procedure. The two variables first order VAR model 2v.-VAR(1) in reduced form may be get it as

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[1]see Kim and In (2002), Kim (2005), Wongswan (2006), Kim and Nguyen (2009), Nguyen and Wu (2010) amongst others.

$$\begin{bmatrix} y_t \\ z_t \end{bmatrix} = \begin{bmatrix} a_{10} \\ a_{20} \end{bmatrix} + \begin{bmatrix} a_{11} & a_{12} \\ a_{21} & a_{22} \end{bmatrix} \begin{bmatrix} y_{t-1} \\ z_{t-1} \end{bmatrix} + \begin{bmatrix} e_{1t} \\ e_{2t} \end{bmatrix} \tag{1}$$

The VMA representation of eq. (1) is

$$\begin{bmatrix} y_t \\ z_t \end{bmatrix} = \begin{bmatrix} \bar{y} \\ \bar{z} \end{bmatrix} + \sum_{i=0}^{\infty} \begin{bmatrix} a_{11} & a_{12} \\ a_{21} & a_{22} \end{bmatrix}^i \begin{bmatrix} y_{t-1} \\ z_{t-1} \end{bmatrix} + \begin{bmatrix} e_{1t-i} \\ e_{2t-i} \end{bmatrix} \tag{2}$$

In rewriting (2) in terms of $\{\varepsilon_{yt}\}$ and $\{\varepsilon_{zt}\}$ sequences, the vector of errors can be rewritten as

$$\begin{bmatrix} e_{1t} \\ e_{2t} \end{bmatrix} = B^{-1}\varepsilon_t = [1/(1-b_{12}b_{21})] \begin{bmatrix} 1 & -b_{12} \\ -b_{21} & 1 \end{bmatrix} + \begin{bmatrix} \varepsilon_{yt} \\ \varepsilon_{zt} \end{bmatrix} \tag{3}$$

Combining (2) and (3) gives

$$\begin{bmatrix} y_t \\ z_t \end{bmatrix} = \begin{bmatrix} \bar{y} \\ \bar{z} \end{bmatrix} + [1/(1-b_{12}b_{21})] \sum_{i=0}^{\infty} \begin{bmatrix} a_{11} & a_{12} \\ a_{21} & a_{22} \end{bmatrix}^i \begin{bmatrix} 1 & -b_{12} \\ -b_{21} & 1 \end{bmatrix} \begin{bmatrix} \varepsilon_{yt} \\ \varepsilon_{zt} \end{bmatrix} \tag{4}$$

By defining a 2 x 2 matrix φ_i with elements $\varphi_{jk}(i)$ as

$$\varphi_i = \left[A_1^i/(1-b_{12}b_{21}) \right] \begin{bmatrix} 1 & -b_{12} \\ -b_{21} & 1 \end{bmatrix} \tag{5}$$

Thus, the VMA representation of eq. (1) can be written in terms of $\{\varepsilon_{yt}\}$ and $\{\varepsilon_{zt}\}$ sequences

$$\begin{bmatrix} y_t \\ z_t \end{bmatrix} = \begin{bmatrix} \bar{y} \\ \bar{z} \end{bmatrix} + \sum_{i=0}^{\infty} \begin{bmatrix} \varphi_{11}(i) & \varphi_{12}(i) \\ \varphi_{21}(i) & \varphi_{22}(i) \end{bmatrix} \begin{bmatrix} \varepsilon_{yt-i} \\ \varepsilon_{zt-i} \end{bmatrix} \tag{6}$$

or more compactly,

$$x_t = \mu + \sum_{i=0}^{\infty} \varphi_i \, \varepsilon_{t-i} \tag{7}$$

It must be noticed that the author(s) just 3 lines from the end of page 4 probably they would like to say

$$\sum_{i=0}^{\infty} \varphi_{jk}^2(i) \text{ is finite} \tag{8}$$

as Enders, (1995) very well describes.

From the above:
   a. The coefficients of φ_i is used to detect the effect of ε_{yt} and ε_{zt} shocks on the complete time path of y_t and z_t .
   b. The four elements $\varphi_{jk}(0)$ are named impact multipliers and the coefficient $\varphi_{12}(0)$ is the instantaneous impact of a one unit change in ε_{zt} on y_t.

    c. The elements $\varphi_{11}(1)$ and $\varphi_{12}(1)$ are the one period responses of one unit change in $\varepsilon_{y,t1}$ and $\varepsilon_{z,t1}$ on y_t.

    d. $\varphi_{11}(1)$ and $\varphi_{12}(1)$ represent the effects on unit change in ε_{yt} and ε_{zt} on y_{t+1}

The cumulated sum of the effects of ε_{zt} on y_t is stated as in equation 6 after some number of periods (say n periods):

$$\sum_{i=0}^{n} \varphi_{12}(i). \tag{9}$$

The increase in the number of periods helps determine the long run effect. The long run multiplier effect is obtained as n approaches infinity (Humpe, 2007). Based on the notion that the variables y_t and z_t are stationary, for all j and k equation 8 is obtained: $\sum_{i=0}^{\infty} \varphi_{jk}(1)$. As Lütkepohl and Krätzig (2004); Burgstaller (2002) and Humpe (2007) stated, the four sets of coefficients $\Phi_{11}(i), \varphi_{12}(i), \varphi_{21}(i)$ and $\varphi_{22}(i)$ are named impulse response functions.

4. Results

The test of spillover effect was looked at from the two key macroeconomic indicators – interest rate and consumer price index.

4.1 Interest rate

The results of the analysis of the data on interest rate of the nine countries are displayed in Tables 1 and 2, and Figures 1 to 3. The interest rate represents the money markets in the zone.

A preliminary analysis indicates that the highest dispersion is found in the money market rate data of Guinea, Sierra Leone, Ghana, Gambia and Nigeria respectively. Liberia had the least variation in its money market rate. It also, indicated that money market rates for all countries are non-symmetric (positively skewed), except for the US. The positive values of the money market rates of the countries indicate that the longer tails extend in the direction of high values.

The p-values of Jarque-Bera statistics is less than five per cent for all the countries, hence the alternative hypotheses for all countries can be accepted – that the data are not normally distributed. This means the null hypotheses of normal distribution is rejected at the 5% significance level. The mean money market rates for all countries are relatively high, showing correspondingly high volatility.

Table 1. Descriptive Statistics

	CHR	GAR	GHR	GUR2	LIBR	NGR	SRLR	UKR	USR
Mean	5.5	14.5	27.2	12.5	16.5	14.7	30.7	5.9	3.9
Median	3.3	13.5	27.0	6.0	15.4	14.0	25.0	5.5	4.5
Maximum	10.4	29.0	45.0	60.0	26.4	26.0	73.5	14.8	8.2
Minimum	2.7	9.0	12.5	4.0	12.7	6.0	20.0	0.5	.1
Std. Dev	2.8	5.1	10.1	15.7	2.9	4.2	13.0	3.0	2.1
Skewness	.5	1.6	.4	1.7	1.3	.2	1.6	1.12	-.2
Kurtosis	1.5	5.1	2.1	4.4	4.1	3.5	4.3	5.0	2.1
Jarque-Bera	31.3	161.1	15.4	148.8	83.9	4.9	129.2	94.3	8.7
Prob	.0	.0	.0	.0	.0	.0	.0	.0	.0
Sum	1365.8	3599.0	6719.5	3103.5	4095.1	3648.2	7588.5	1458.3	968.0
Sum Sq.Dev	2012.3	6544.0	25317.3	60901.4	2105.3	4368.3	41702.1	2254.7	1087.19
Coef of var	.52	.35	.37	1.25	.18	.29	.42	.51	.5
Ob	24	24	24	24	24	24	24	24	247

4.1.1 Tests for the order of integration, I(1) vs. I(0)

The results of the tests for the order of integration of money market rate are reported in Tables 2. In using the ADF test (intercept, no trend), the null hypothesis of a common unit root could not be rejected for all the countries at levels. The same result was obtained when the series was tested with intercept and trend, with only the US rates deviating from the rest of the countries. Indeed, from the descriptive statistics (Table 1), the US has on the average the least money market rates among the countries for the period understudy. Again, its rates are negatively skewed compared to the rest of the countries. However, the series for all the countries attain stationarity upon the first difference.

Table 2. Unit root test for Interest Rate

	Level				First Difference			
	ADF		PP		ADF		PP	
Variable	Intercept, no trend	Intercept, trend	Intercept, no trend	Intercept, trend	Intercept, no trend	Intercept, trend	Intercept, no trend	Intercept, trend
	Prob.	Prob.	Prob.	Prob.	Prob.	Prob.	Prob.	Prob.
GAR	.14	.37	.33	.63	-.00	.00	.00	.00
GHR	.61	.30	.69	.45	.00	.00	.00	.00
GUR	.19	.37	.19	.33	.00	.00	.00	.00
LIBR	.09	.29	.00	.02	.00	.00	.00	.00
NGR	.49	.39	.37	.23	.00	.00	.00	.00
SRLR	.56	.66	.45	.43	.00	.00	.00	.00
CHR	.77	.91	.74	.85	.00	.00	.00	.00
UKR	.09	.09	.14	.23	.00	.00	.00	.00
USR	.14	.00	.37	.49	.00	.00	.00	.00

The results for the PP test (intercept, no trend indicated that the null hypothesis of a common unit root could not be rejected for all the countries at levels except for Liberia. The result was not different when the series was tested with intercept and trend. Liberia has least variability in money market rates among the countries during the period of study. However, the series for all the countries attain stationarity upon the first difference. On the whole, the results show some similarity in macroeconomic behaviour among the major markets and those in the WAMZ. This means that

happenings on the money markets in the major markets have the tendency to affect that of the WAMZ. The results suggest that the entire variable are I (1), thus, impulse response computed from the vector error correction model (VECM) is a valid method of exploring the responses to innovations among the variables after if it is established the variables cointegrate. The Johansen (1991, 1995) cointegration test was used to investigate the degree of linkage between the markets. The cointegration and VECM results are not reported but are available on request. We considered all countries as a system to assess the responses of individual WAMZ markets responds to innovation in financial market of the China, United States and United Kingdom. The lag length was determined by Akaike (AIC) Information Criterion using 2 lags in the general VAR model.

4.1.2 Results from the Impulse Response Functions

The impulse response functions are reported in Figures 1 to 9. Impulse response analysis sought to explain the dynamics and to trace the reaction of each variable to a particular shock at a particular time. A generalized impulse response function which is ordering invariant is employed to avert the so-called Wold-ordering problem.

The Figures present the results of the impulse response of the shocks from the selected major markets on WAMZ. For the countries to be exhibiting similarity in their money markets, which could form the basis for starting a common currency, they are expected to be responding in similar ways to shocks from the advanced markets.From Figure 1, a percentage deviation in the USR, in the short run, results in reduced rates for GAR. The shock further decreases interest rates in the long run. The curvature of NGR is a quadratic in nature with a minima and maxima points.

In the case of NGR, there is short-run positive increased rate, followed by a sharp fall in money market rates in the medium term. In the long run, the shock has a negative effect on NGR. The situation in GUR is that of the opposite for GAR. The impulse responses show that a deviation in the USR has a negative impact on that of NGR. The shock impacts from the USR to GHR, GUR, LIBR, and SRLR have similar behaviour. The curvature for these countries indicated a smooth curve that accelerates throughout. It begins low in the short run and rises smoothly in the long run, but nonlinear. In effect, the countries do not respond similarly to shock from the US.

In the case of shock from UKR, the results (Figure 2) again indicate that GHR, GUR, LIBR, and SRLR exhibits similar behaviour – the shock to the countries starts at its minimum impact in the short run and increases steeply over time.

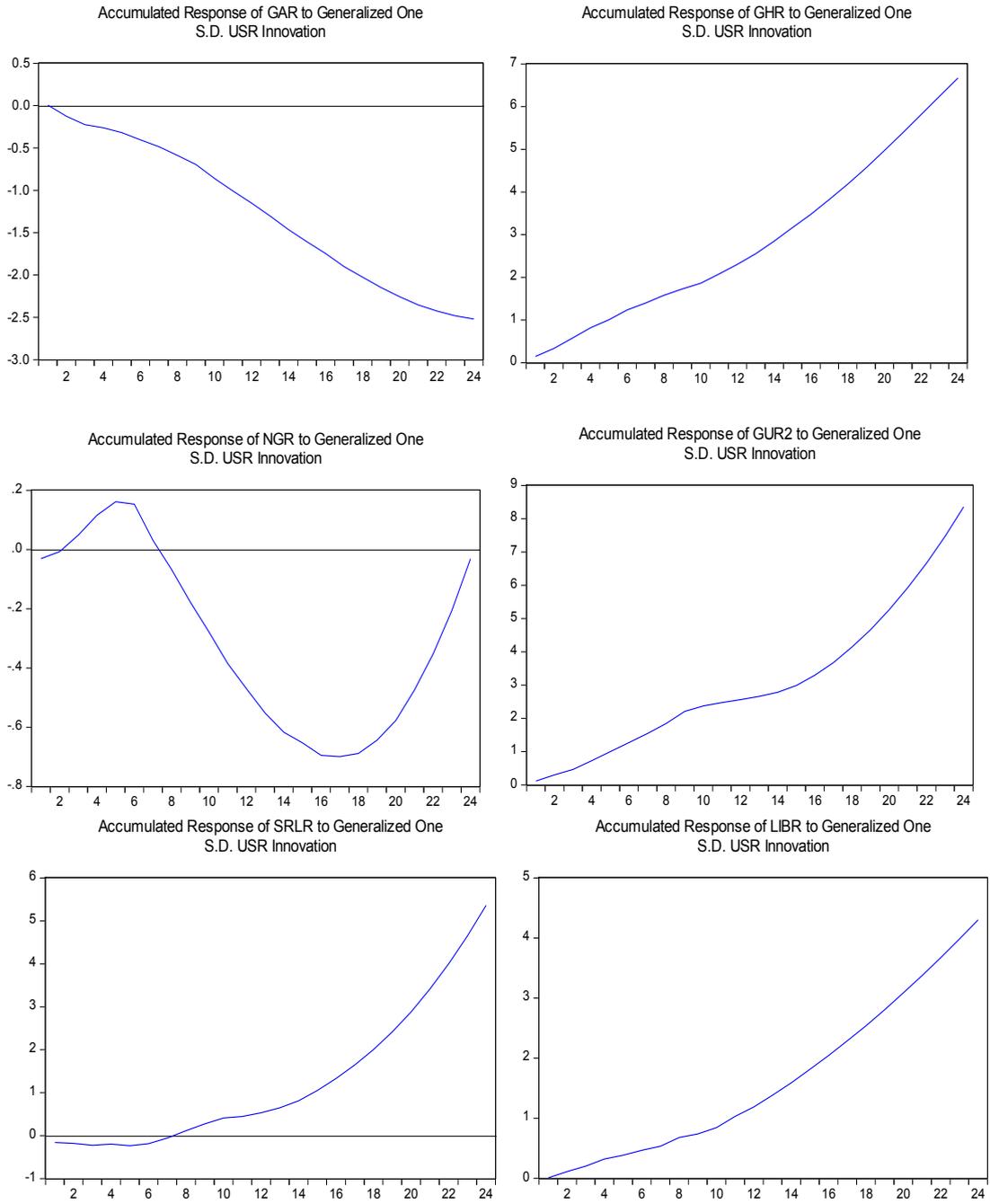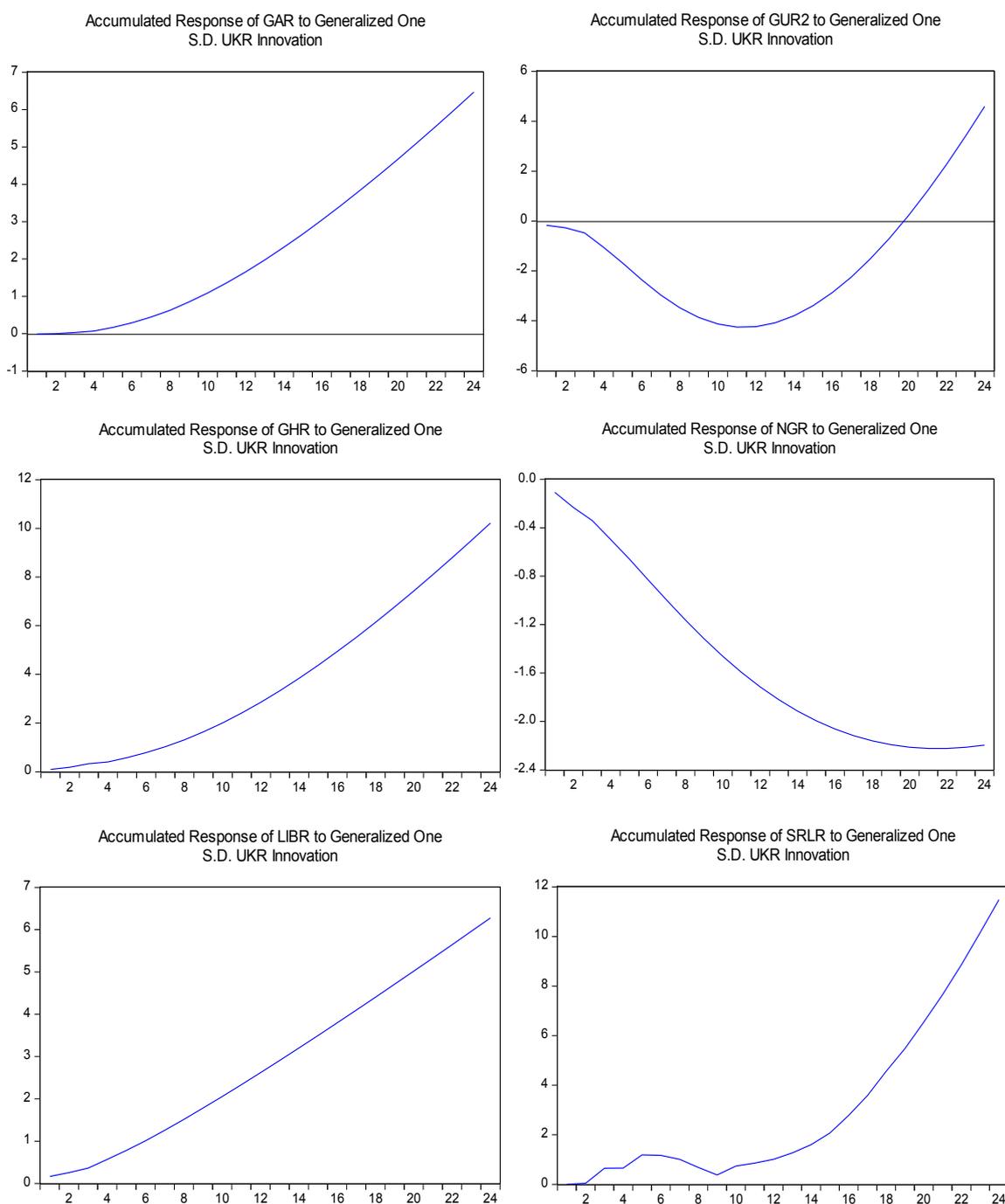## Figure 1. Response of WAMZ countries to US Interest Rates

Figure 2. Response of WAMZ countries to UK Interest Rates

Accumulated Response of GAR to Generalized One
S.D. UKR Innovation

Accumulated Response of GUR2 to Generalized One
S.D. UKR Innovation

Accumulated Response of GHR to Generalized One
S.D. UKR Innovation

Accumulated Response of NGR to Generalized One
S.D. UKR Innovation

Accumulated Response of LIBR to Generalized One
S.D. UKR Innovation

Accumulated Response of SRLR to Generalized One
S.D. UKR Innovation

For NGR, the shock uptake rate starts at its maximum value in the short run. The uptake rate declines steeply initially, and then the curve gradually levels out in the long run. The curvature for NGR in Figure 2 is a form of an inverse rectangular hyperbolic function.

The nature of the response by GUR is in form of U-Shaped curve. The GUR is in the negative, falls, and gets to a minimum in the medium term and begins to rise and eventually registers positive rates in the long run. Again, the results indicate the countries do not respond in a similar manner to shock from the UK.

Figure 3 provides the results of the responses of WAMZ countries to the shock from CHR. From the cointegration results. It was found that there was no long-run

relationship between CHR and GAR, GUR, LIBR and SRLR. GUR shows step-wise negative responses in the short run to shock from CHR. Similar behaviour is exhibited by SRLR and LIBR. GAR in the short run would respond with a fairly increasing rate and then rates would remain constant all through. LIBR after registering negative rates and assume some positive rates all through.

Figure 3. Response of WAMZ countries to Interest Rate of China
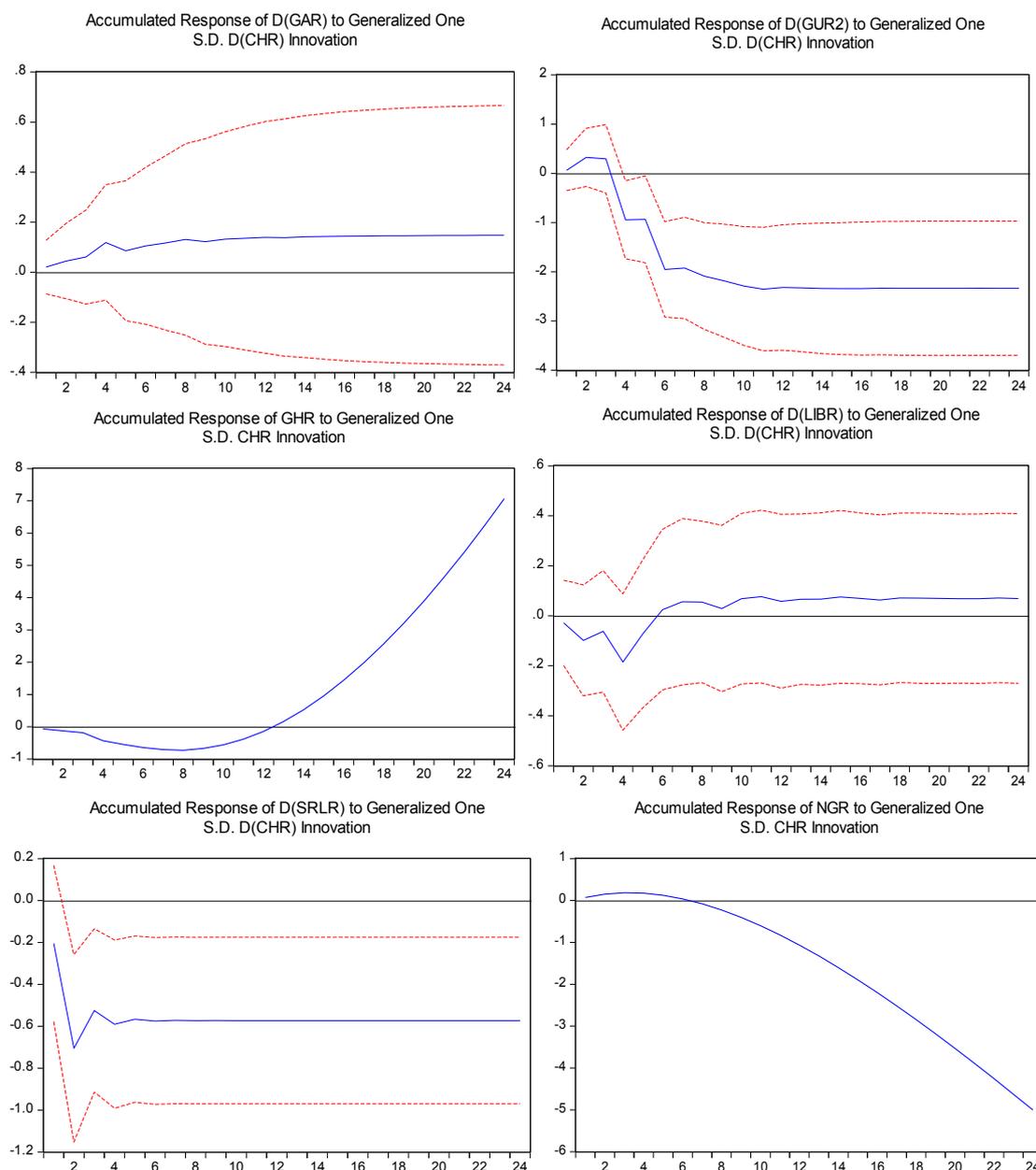
The nature of the response curve of NGR to shock from CHR is a "south-west" opening hyperbola. The NGR depicts negative values, indicating that a percentage deviation in CHR is responded by negative values or rates by NGR in the medium and long run. However, in the short run, there is a fairly positive response from NGR. GHR response to the change in shock from CHR is directly opposite that of NGR. GHR initially responded negatively to the shock from CHR. The rates assume positive

values and increases throughout the period. Once more, the results indicated that the countries do not respond similarly to shocks from a major market.

4.2 Consumer Price Index

The preliminary analysis shows that the highest dispersion is found in the consumer price index data of CHCPI for the major countries. SRLCPI had the highest dispersion in the WAMZ. This is followed by NGCPI, GHCPI, UKCPI and GUCPI, and LICPI respectively. The USCPI had the least variation among the group. It also, indicated that consumer price indices for all countries are non symmetric (positively skewed), except that of US. The positive values of the consumer price indices of the countries indicate that the longer tails extend in the direction of high values.

The p-values of Jarque-Bera statistics (Table 3) is less than five per cent for all the countries, hence the alternative hypotheses for all countries can be accepted – that the data are not normally distributed. This means the null hypotheses of normal distribution is rejected at the 5% significance level. The mean indices are relatively high, showing correspondingly high volatility.

Table 3. Descriptive Statistics of Consumer Price Index

	CHCPI	GACPI	GHCPI	GUCPI	LICPI	NGCPI	SRLCPI	UKCPI	USCPI
Mean	4.6	5.8	21.3	14.2	10.0	20.3	25.3	2.7	2.7
Median	2.8	4.9	16.4	14.4	9.0	12.9	14.9	2.3	2.7
Maximum	27.7	21.0	70.8	42.6	26.5	89.5	124.2	8.5	6.2
Minimum	-2.68	-2.9	7.3	1.47	-1.05	-2.49	-21.7	.54	-2.1
Std. Dev	6.3	4.7	13.7	9.1	4.8	19.5	31.0	1.7	1.27
Coef of var	1.35	.80	.64	.64	.49	.96	1.23	.66	.4
Skewnes	1.8	1.0	1.7	.6	.8	1.6	1.8	1.64	-.2
Kurtosis	6.0	3.7	6.0	3.5	3.6	5.0	5.3	5.1	5.0
Jarque-Bera	262.8	54.1	248.4	25.5	16.8	180.7	216.3	176.2	52.1
Prob.	.0	.0	.0	.0	.0	.0	.0	.0	.0
Sum	1291.4	1624.0	5900.2	3923.2	1324.2	5628.1	6999.9	746.3	751.7
Sum Sq. Dev	10981.2	6113.4	51754.1	22886.5	3126.0	104555.	265724.	865.8	440.3
Ob	27	27	27	27	13	27	27	27	276

4.2.1 Tests for the order of integration, I(1) vs. I(0)

The results of the tests for the order of integration of CPI are reported in Tables 4. In using the ADF test (intercept, no trend), the null hypothesis of a common unit root could not be rejected for five of the countries (GACPI, GHCPI, NGCPI, CHCPI at levels, whilst the others (GUCPI, LICPI, SRLCPI and USCPI) were stationary levels. The number of countries that are stationary at levels fell to only two (GUCPI and LICPI) when the series was rotated with intercept and trend. However, the series for all the countries attained stationarity upon the first difference.

The results for the PP test (intercept, no trend) indicated that the null hypothesis of a common unit root could not be rejected for four of the countries (GHCPI, NGCPI, CHCPI and UKCPI) at levels, whilst the others (GUCPI, LICPI, SRLCPI, GACPI and USCPI) were stationary levels. However, the series for all the countries attain stationarity upon the first difference. O the whole, the results showed dissimilarity in CPI behaviour among the countries. This means that inflationary effect from one

country is not likely to be transferred to other economies among the group of countries in the study.

Table 4. Unit Root Test

Variable	Level				First Difference			
	ADF		PP		ADF		PP	
	Intercept, no trend	Intercept, trend	Intercept, no trend	Intercept, trend	Intercept, no trend	Intercept, trend	Intercept, no trend	Intercept, trend
	Prob.	Prob.	Prob.	Prob.	Prob.	Prob.	Prob.	Prob.
GACPI	.34	.67	.04	.14	.00	.00	.00	.00
GHCPI	.28	.24	.09	.13	.00	.00	.00	.00
GUCPI	.01	.01	.02	.07	.00	.00	.00	.00
LICPI	.01	.03	.01	.02	.00	.00	.00	.00
NGCPI	.26	.28	.26	.41	.00	.00	.00	.00
SRLCPI	.03	.09	.03	.11	.00	.00	.00	.00
CHCPI	.38	.52	.36	.57	.00	.00	.00	.00
UKCPI	.30	.42	.24	.62	.00	.00	.00	.00
USCPI	.02	.10	.01	.11	.00	.00	.00	.00

4.2.2 Results from Impulse Response Function

From Figure 4, a percentage deviation in the USCPI, in the short-run, results in fairly increasing rates for all countries except GACPI. GACPI initially would experience some negative rates in the short- run. The rates then assume positive and increasing rates all through the long-run. The shock impacts from the USCPI to the WAMZ countries have similar behaviour. The curvature for these countries indicated a smooth curve that accelerates throughout. It begins low in the short run and rises smoothly in the long- run, but nonlinear. In effect, the countries do not respond similarly to shock from the US.

In the case of shock from UKCPI, the results (Table 5) show divergent responses from the countries. Whereas, GUCPI and SRLCPI move in tandem, the rest of the countries exhibits different behaviour in terms of their responses to the shock from UKCPI. GACPI responds negatively to the shock from UKCPI. The response curve of GHCPI is parabolic in nature, sloping downwards from left to right.

Though both GACPI and GHCPI curves slope downwards from left to right, the GHCPI curve drops faster than that of GACPI. GUCPI and SRLCPI curves slope positively in response to the shock from UKCPI. Both curves start slowly in the short run, and accelerate all through the long run. LICPI also begins and rises sharply in the short run, attains its maximum point, and thereafter, falls sharply, plunging into a negative index in the long run. NGCPI only responds to shock from the UKCPI in the short run, but not in the long run. In sum, the countries' consumer price indices do not act similarly to shocks from external markets, especially from the UK.

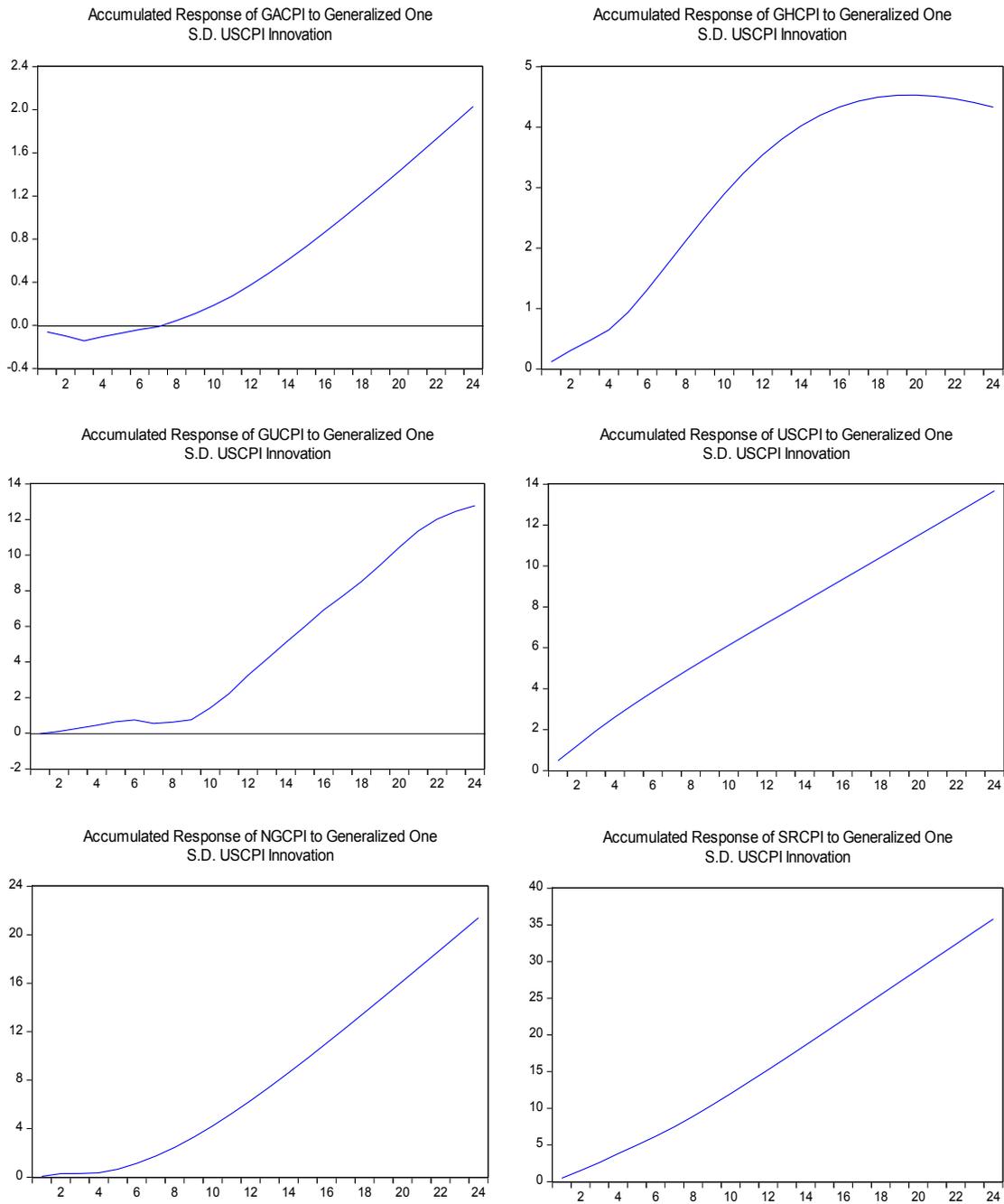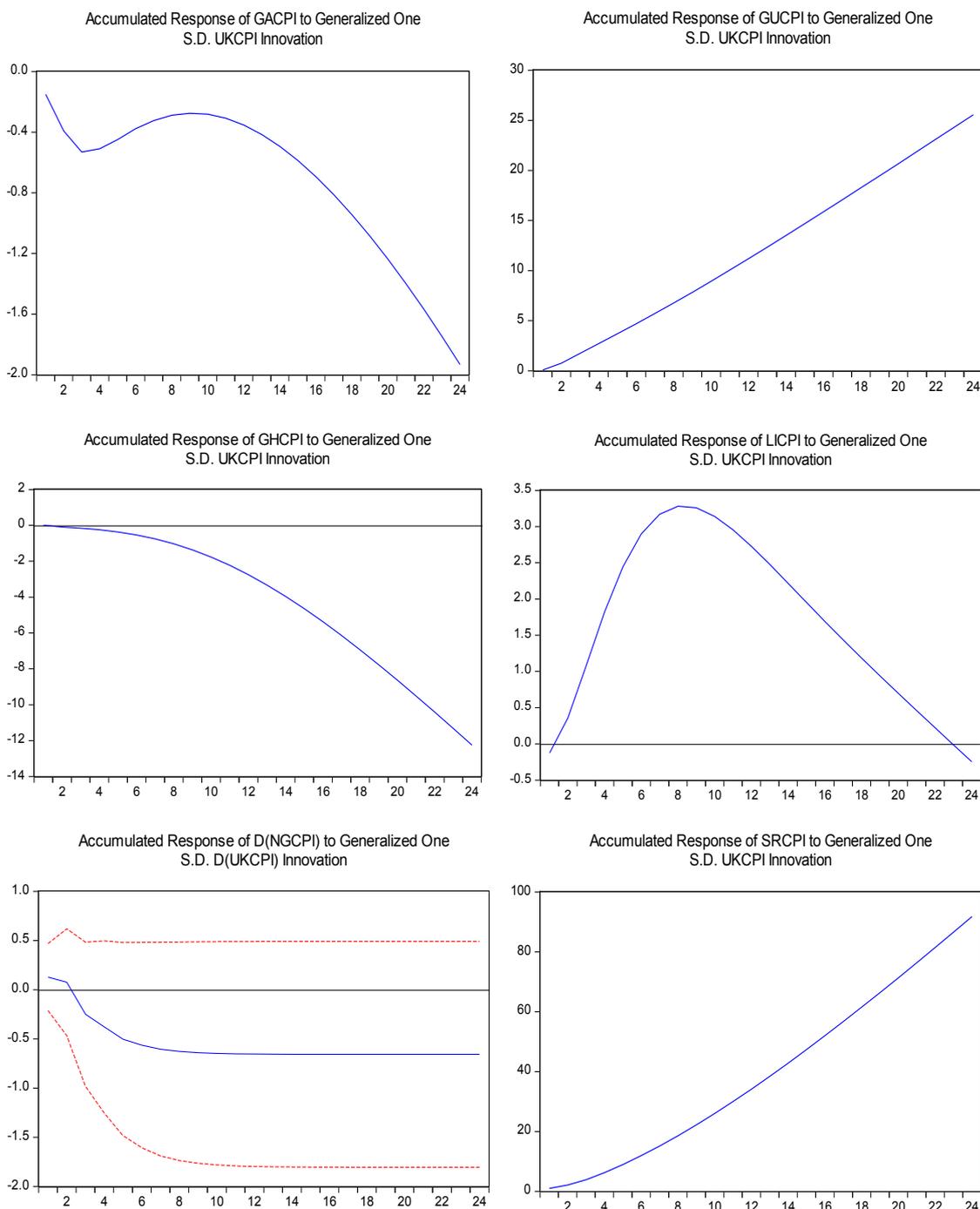**Figure 4. Response of WAMZ countries to Consumer Price Index of the US**

Figure 5. Response of WAMZ countries to Consumer Price Index of UK

From Figure 6, LICPI and SRLCPI response in the same manner to shock from CHCPI. The nature of the curve for the two rates is such that it all begins in the negative and accelerates upwards, assuming positive values all through in the long run. NGCPI responds with fairly falling rates with negative values, attaining minimum turning point and then rising (taking on positive values) all through in the long run. This suggests once again that the rates for these countries do not respond similarly to shocks from the advanced markets.

Figure 6. Response of WAMZ countries to Consumer Price Index of China
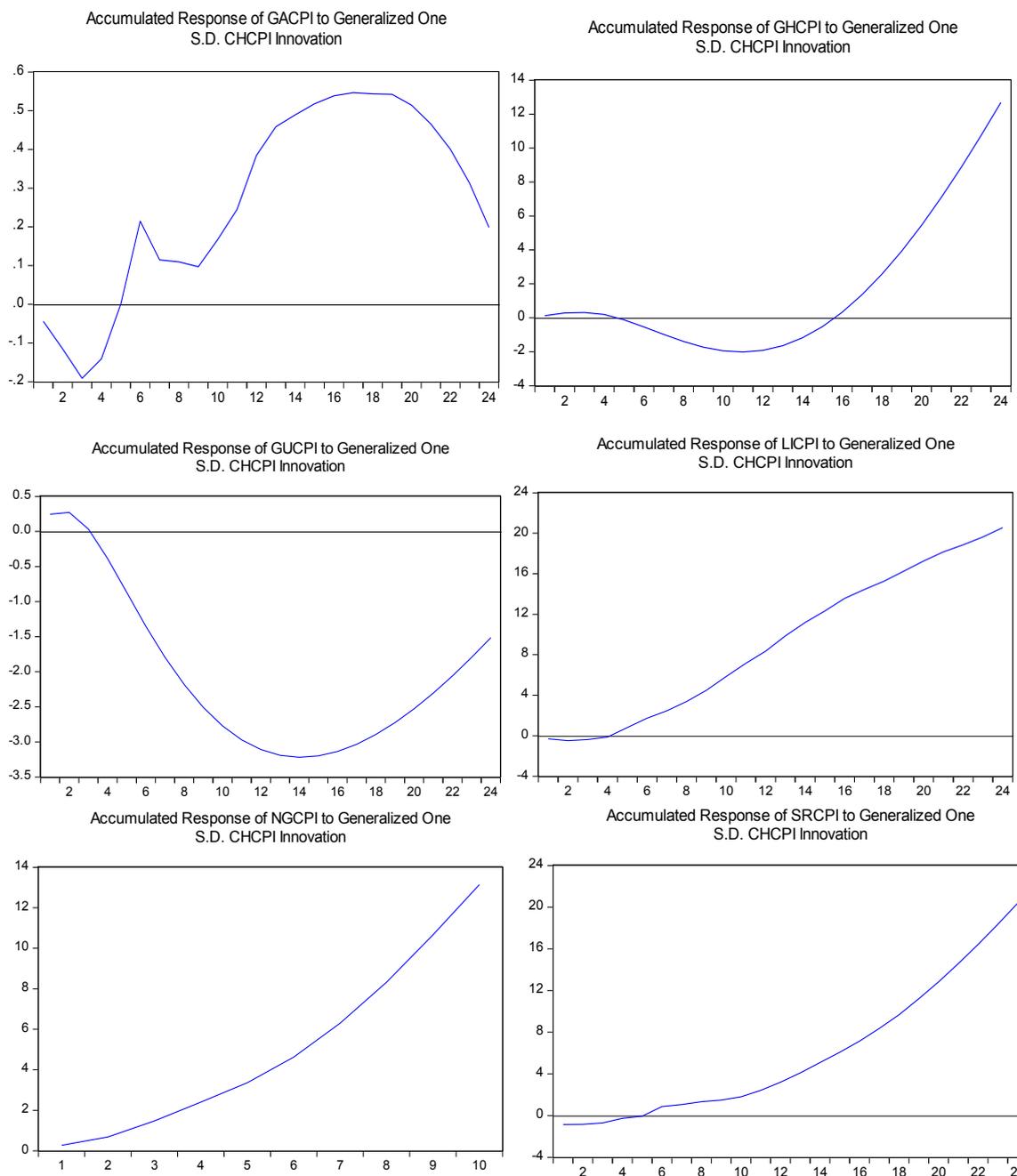
5. Discussion

There are differences in behaviour of the markets within the zone, especially in reverting to equilibrium after a shock. There are spillover effects from major markets into the zone. Where such spillovers are felt, member countries respond to such effects differently. Furthermore, a shock from a member country is received differently by others. However, there were instances where the financial markets of two countries indicated co-movement, but not for the whole group.

Two variables (interest rate and consumer price index) for three selected advanced markets (the United States of America, the United Kingdom, and China) were used, in

the case of the interest rates, it was observed that three of the member countries – Ghana, Guinea, and Liberia responded similarly to shock in interest rates from the United States of America (USA). The rest of the countries responded differently to shock from the USA. The results indicate a positive relationship between the interest rates of Ghana and Guinea in the long run. This means that a shock in interest rates of the USA has a negative consequence on the rates in these countries as it causes the rates in these countries to an upsurge. In the short run, if the interest rates of the USA soar that of Liberia would decrease but would also rise in the short run.

The implication is that when the rates soar, it becomes quite attractive to invest in the USA. This would mean international investors would prefer to invest in the USA. In some cases, some investors may even move their investments into the USA market – thus reducing the volume of investments, which would ultimately drive interest rates up in these countries. It should be noted that little empirical evidence exists on how WAMZ member countries respond to shocks in interest rates from the USA.

The response to interest rate's shocks from the United States from Gambia indicates a dampening effect. The nature of the graph (Figure 5.1) implies that as long as the interest rate in the USA increases, it becomes a preferred destination for investors who can affect the industrial output of the Gambia and ultimately, their demand for funds. As Allen and Carlette (2010) and Adjasi et al (2008) points out, there is the impact of interest rate on the real economy. The current finding supports this view. The results also indicated that in the short run, shock in interest of the USA would increase the interest rate of Nigeria, but dampens the rate of Nigeria in the medium term and the long term.

Once lending rate increases in the USA, cross border borrowing from the USA becomes expensive and unattractive. Therefore, demand for domestic financing in Nigeria would increase eventually increasing interest rates due to high demand for capital in the short run.

In the long run, however, as domestic cost of capital increases and sometimes higher than that of the USA because of the pressure on domestic financial demand, it would be unattractive to borrow from the domestic market as the increasing cost of capital would have its negative impact on corporate bodies, and this would eventually, reduce demand for capital and force interest rates down. As indicated, the findings of the study are different from few earlier studies in the zone. The key differences laid on focus. The findings indicate that not all countries respond to shock from the USA interest rate in the same way.

In the case of the United Kingdom (UK) interest rate, it was also observed that the interest rates of a group of countries in the zone (Gambia, Ghana, Liberia, and Sierra Leone) respond positively to shock in interest rates from the UK. Some possible reason that was suspected to have accounted for this is a trade. The export destinations of these WAMZ countries like other African Countries are often the European Union market (Giovannetti & Sanfilippo, 2009) and policy initiative like upward adjustment of interest rates would have its impact on them (WAMZ countries). One possible reason for a shock in an interest rate from UK to increase the rates in these WAMZ countries is that such shocks would be transmitted to the WAMZ through trade. For commodities that can be imported from these WAMZ countries, increase in lending rate in the UK would increase cost of capital and eventually output. This would increase the demand for export of these WAMZ countries as well as demand for capital, which would ultimately push up interest rates in these countries.

In case of Nigeria, the shock from the UK interest rate has a negative impact on its interest rate. Similar explanation as in the case of the USA may be the cause of this reaction. The finding is different from earlier studies (Ehrmann & Fratzscher, 2004)

that have focused on the USA and Euro zone. Again, there is evidence of dissimilarity in market behavior among WAMZ countries.

The findings also indicated that there are differences in the way WAMZ countries respond to shocks in interest rates from China. Ghana responds with a positive interest rate to shock from China in the long run; Nigeria once again indicated a negative response to shocks from China. The rest of the countries only responded to shocks from China's interest rate in the short run. This means that although shocks from China are transmitted to the rest of the WAMZ countries, apart from Nigeria and Ghana, the effect often does not last in the long run.

Some possible reasons that may account for these are the differences in trade and investment to these countries. Ehrmann and Fratzscher (2004) indicated the strong spillover effect between the USA, and Euro are due to stronger economic ties. The present study unlike the previous ones (Tapsoba, 2010) looked at China as an emerging trading partner of the WAMZ. Previous studies have concentrated on spillover between the USA and Asia (Hamao et al, 1990).

On the consumer price index (CPI), the results indicated that all member countries of the WAMZ respond positively to shocks in the consumer price index from USA. The USA is one of the major trading partners of the region, and a price change on that market is likely to diffuse to the WAMZ's markets through trade. When the prices on the USA market increases, then it becomes expensive to import from that market. In effect, any additional cost of import is added to the price of the commodity resulting in an imported inflation. In addition, shocks often diffuse from markets with leadership information (see Nguyen & Wu, 2010) to recipient markets like that of the WAMZ. The finding is similar to Wongswan (2004), Hofman and Remsperger (2005) who found similar transmission of shock from the major to emerging markets.

In the case of the UK and China, the findings indicated differences in terms of responses to shock by the member countries in the WAMZ. For shock from the UK, Ghana and Nigeria responded in the opposite. When the CPI of UK increased, that of the two, countries fell. Guinea and Sierra Leone responded positively to price shocks from the UK. This may be due to the argument that has been put forth by some earlier studies, which indicate that developing countries tend to respond positively to changes in prices to their major trading partners. Some of the price hikes are through imported inflation or demand for more money to meet increased cross border prices. From the results, it can be deduced that whenever the CPI goes up, imports become expensive. This can lead to the demand for money in the domestic market to meet increasing capital requirements. Two things may happen- increased domestic demand for credit can spark inflation. Furthermore, prices of the products imported from such sources would carry elements of imported inflation, which could push up prices in the domestic country. Countries that are not yet exporters of such products or have alternate import destinations are not likely to be affected by such hikes from the importing country as in the case of Gambia and Ghana. Unlike years ago, most of these countries now import more from China.

Price changes in the UK impact positively on Nigeria only in the short run. As indicated earlier, some countries within the ECOWAS are shifting their attention in trade from Europe to the Far East and Asia (Biggeri& Sanfilippo, 2009). According to Biggeri and Sanfilippo, (2009), there has been sharp increase in overall economic relations between China and Africa in 2006. As of 2008, China was about the second trade partner (and the first exporter to) to Africa, after the United States (Giovannetti & Sanfilippo, 2009). This was expected to increase. The US and Europe are no more the only major trading partners because of competition from China and Japan. In view of this, countries like Nigeria may be affected by the shocks from the UK only in the

short run but not in the long run. This is further confirmed by the positive impact of shocks in CPI from China to Nigeria. The results also indicate that in the long run, shock from CPI of China impacts positively on that of Ghana, Liberia, and Sierra Leone. In the case of Guinea, the alternative may be the Francophone countries. Blanchard and Quah (1989) found evidence of high degree of correlation between inflation shocks between CFA countries.

6. Conclusions and Recommendations

The paper aimed at determining the inter-financial market's development effects from major markets into WAMZ. The rationale was to be able to present argument on the desirability of financial market's integration in adopting a common currency. The findings of the study revealed differences in response to shock transmission from major markets into the zone. This implies the countries' financial markets behave differently.

Furthermore, at the level of a currency union in the hierarchy of regionalisation, countries should have achieved and adopted a common tariff system for members and respond similarly to external shocks due to common policy initiatives. This is not the case of the WAMZ. Countries respond differently to shocks from outside the block. This is an indication that their economies are not integrated, and thus not ready for a single currency. It is imperative that countries work to harmonize their money markets and adopt common fiscal and monetary policies that would help integrate their economies and propel them for the common currency.

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