EXTERNAL CREDIT AND MACROECONOMIC AGGREGATES IN EMERGING MARKETS: SOME STYLIZED FACTS

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Abstract

This study focuses on background information of the aggregate economy and fluctuating situations in emerging countries with respect to external credit shocks. In particular, the study describes the changing nature of some selected emerging market business cycle from 1970-2015. Hence, the study demonstrated the cyclical properties of a large annual number of macroeconomic time series for a group of 6 (six) emerging countries, using a statistical technique with a modified version of the Hodrick-Prescott (1997; HP) filter as developed by McDermott (1997). It discussed the cross-correlation patterns between output and macroeconomic time series of the sampled countries and attempted to identify relatively robust regularities that can guide theoretical research in macroeconomics. The evidence of the study holds relevance not only for Nigeria, but for other economies that have undergone economic transition and reforms. An important finding is that emerging economies are characterized by higher output (real GDP) volatility, which made them more suscecible to external shocks. While Nigeria is more prone to output volatility than any of the sampled economies, external sources of credit shocks have impacted more on real economic activities of Nigeria than the domestic sources.

Keywords: Fluctuating, Emerging Countries; Macroeconomics; Volatility and External Shocks

1. INTRODUCTION

In recent time, evidence has clearly shown that Africa is increasingly connected with the rest of the world through trade and financial linkages. For instance, Africa`s real export value has quadrupled between 2000

to 2010, with Europe, United States and China as the main destinations. In 2012, 60 percent of the African countries have export GDP ratio of 30 percent or more, while 80 percent of them have export GDP ratio of more than 20 percent. Moreover, Africa`s financial linkage through Foreign Direct Investment (FDI), Remittances, Private Capital Flows and Official Development Assistance (ODA) has also increased significantly during the last decade (Gurara & Ncube, 2013). With external financial flows hitting a record high of over US$ 200 billion in 2012. This growing economic linkage has raised the importance issues of susecibility of developing and emerging economies to the adverse structural changes in advanced economies.

As a result, this study focuses on background information on the aggregate economy and fluctuating situations in some selected emerging countries with respect to external credit shocks. In particular, the study describes the changing nature of the selected emerging markets business cycle from 1970-2015. Following the business cycle stylized facts as expressed by Agenor, McDermott and Prasad (2000) and Ghate, Pandey and Patnaik (2011) to corroborate existing theoretical and extant literature in showing evidence of volatile macroeconomic aggregates and external credit shocks in selected emerging economies. This study examines the channels of transmission of external credit shocks and how macroeconomic components volatility response to external shocks in selected countries including Nigeria.

Recent areas of research across global economy have given more understanding about the factors that affect the behavior of macroeconomic time series, using different econometric techniques. This body of literature has documented a wide range of empirical regularities in macroeconomic fluctuations and credit shocks across different economies. Hence, stylized facts have often been used as an empirical basis for formulating theoretical models and a way to discriminate among alternative classes of models (Agenor *et al.* 2000). As a result, several of the new studies have focused on developed economies (see Ortiz, 2008; Meeks, 2009 and Bordo and Haubrich, 2010), with little attention to developing and emerging economies. This could be as a result of limitations on the quality and frequency of data and may be due to the fact that, data for some key variables are not easy to collate. Meanwhile, documenting stylized facts on macroeconomic fluctuations and credit shocks in emerging markets could be valuable for analyzing whether similar empirical regularities are observed across countries from different continents. Differences observed in developed economies could provide an empirical basis for constructing analytical models that incorporate features particularly important to emerging markets. Our findings may have important policy implications for designing stabilization and adjustment programmes. In achieving this task, this paper is divided into six sections. The second section examined brief literature review, section three focuses on the statistical technique, section four focuses on the analysis of results and discussion of findings, while section five centers around summary, the final section focuses on conclusion and recommendations.

2. BRIEF LITERATURE REVIEW

Though a burgeoning literature has begun to document these facts for developing and emerging countries (see Mendoza, 1995; Kouparitsas, 1997; Kose and Riezman, 1998; Rand and Tarp, 2002; Aguiar and Gopinath, 2007; Ghate *et al.* 2011; Hevia, 2014), with focuses on specific sets of bivariate correlations. This study builds on the existing literature by documenting a wide range of regularities in macroeconomic fluctuations for a group of six emerging economies. These countries were choosing on the basis of availability of data of reasonable quality, the need to include different geographic areas with a wide range of macroeconomic experiences and by looking for a consistent set of relationships among macroeconomic variables in a group of countries` structural changes. The sample period for the data series used in the study runs from 1970 to 2015, this period is wide enough to show the dynamics and regularities of each variable overtime. The regularities are based on annual data for the following emerging markets: Nigeria, South Africa, Egypt, Brazil, Malaysia and China. The data set which was sourced from databank of World Bank, covers a wide range of macroeconomic variables: External market capitalization, domestic market capitalization, financial depth, remittances inflow, official development assistance, real GDP, foreign reserves, consumption and investment. Hence, the study is able to examine the macroeconomic fluctuations in many dimensions, in contrast to many earlier studies. Nevertheless, the results are useful in that they indicate which of the economies has greater macroeconomic volatility. This set the stage for more formal structural models of macroeconomic fluctuations.

3. STATISTICAL TECHNIQUE

Statistical techniques and econometric methods are commonly used in studying macroeconomic fluctuations in the literature to examine empirical relationships. Therefore, statistical measurement technique is more suitable to achieve the objective of obtaining the strength and direction of relationship between external credit shocks and macroeconomic variables in the study, as similar to Agenor *et al.* (2000) approach. In

using this approach, it is important to decompose all the macroeconomic series into their trend and cyclical components, because certain empirical characterizations of data are valid, only if the data are stationary. Hence, the study adopts the atheoretic statistical technique in describing the macroeconomic fluctuations phenomenon in the selected emerging markets.

This approach is derived from Agenor *et al.* (2000) and has been similarly adopted by Alege (2008) it consists of the following steps: (i) Testing the stationarity properties of the variables; (ii) Obtaining detrended variable by using a modified version of the Hodrick-Prescott (1997;HP) filter as developed by McDermott (1997); (iii) Computing autocorrelation statistics of the detrended series; (iv) Computing correlation coefficients of the variables to ascertain their cyclical behavior and (v) Plotting graphs to illustrate the movements and behavior of the variables used in the study. Three major statistical analyses were examined for this purpose. These include: first, the measurement of the amplitude of fluctuations which include volatility and relative volatility: the volatility is expressed as standard deviation of the variable being considered, while relative volatility measures the ratio of standard deviation of the variable to that of the real economic activities. Here, a high relative volatility above one indicates that the variable is subject to high fluctuations. Second, the measurement of the direction of movement of a variable. Here, the determination of the direction of movement of a variable is usually with respect to macroeconomic aggregates. Cross-correlation coefficients were obtained between credit shocks channels and macroeconomic variables and the degree of co-movement between a variable and another. Third, the measurement of phase shift, which help to determine whether or not a variable change before or after a GDP component changes.

The direction of fluctuations is measured in terms of co-movement of the credit shocks variables, in relation to macroeconomic variables using value of their contemporaneous bivariate correlation coefficient $\Delta(0)$, which is their contemporaneous values. The strength of contemporaneous correlation between credit shocks and macroeconomic aggregates can be described as strong, weak or uncorrelated, depending on the value of their correlation coefficient such that, if (i) $0.26 \leq |\Delta(0)| < 1$, it indicates stronger contemporaneous correlation; (ii) $0.13 \leq |\Delta(0)| < 0.26$, it indicates strong contemporaneous correlation; and (iii) $0 \leq |\Delta(0)| < 0.13$, it indicates strong contemporaneous correlation (Agenor *et al.* 2000).

The direction of the degree of co-movement of time series data with one another are obtained by taking the magnitude of the bivariate cross correlation coefficient of credit shocks and macroeconomic variables, where $\Delta(j)$, $j \in \{0, \pm1, \pm2, . . .\}$. The sign of the bivariate contemporaneous correlation indicates (+ or -) and the magnitude represents the strength of the association, such that, it is (i) Procyclical if $\Delta(j) > 0$, that is positive; (ii)Counter-cyclical if $\Delta(j) < 0$, that is negative; and(iii)Acyclical if (j) = 0. Another very important measurement of fluctuations is the phase shift. This helps to determine whether or not a macroeconomic variables lead, lag or coincident (synchronize) credit shocks variables (see successive subsections).

4. ANALYSIS OF RESULTS AND DISCUSSION OF FINDINGS

As indicated earlier, the central objective of the study is to examine the transmission of external credit shocks to real economic activities of emerging markets. The Table 3.1 attempt to situate the nature of real GDP with respect to how it responds to external credit shocks arising from the identified sources across each of the emerging markets. Among the countries observed, Nigeria show the highest level of real GDP volatility being around 0.0834, as compared to China, Brazil, Malaysia, Egypt and South Africa with 0.0707, 0.0409, 0.0337, 0.0309 and 0.0253 respectively. While in the case of Nigeria, the volatility of each source of credit shocks is very high, being 2.1202, 1.3766, 1.3056, 0.8558 and 0.2393 respectively for remittances inflow, official development assistance, external market capitalization, domestic market capitalization and financial depth respectively. As noticed in the table, the amplitude of fluctuations revealed by the relative volatility seems to be persistent with remittances inflow, official development assistance (ODA), external market capitalization, domestic market capitalization, and financial depth, having relative volatility figures of 25.42, 16.51, 15.65, 10.26 and 2.87 respectively. These figures are very high as this statistic indicates extreme volatility when greater than one (Agenor *et al.* 2000). The economic implication of this is that, external sources of credit shocks have impacted more on real economic activities of Nigeria than the domestic sources, as a result of this, any credit shock from the external economy has more impact on the economy.

In addition, the analysis indicates a positive contemporaneous correlation between credit shock variables (domestic market capitalization, 0.36; remittances inflow, 0.35; external market capitalization, 0.19 and official development assistance, 0.06) and real GDP, but a negative contemporaneous correlation with financial depth (-0.11). A positive contemporaneous correlation indicates that the degree of co-movement is pro-cyclical, while the negative contemporaneous correlation indicates counter-cyclical. The implication of this, is that the Nigerian financial system is rather weak to spur necessary output growth without external

sources, while much of the fluctuations experienced by the Nigerian economy is traceable to external shock sources, which demonstrates how suscecible the Nigerian economy is to external credit shocks.

In the same vein, for the other emerging markets, the extent of real GDP volatility in China (0.0707) is ranked next to Nigeria (0.0834), while Brazil, Malaysia, Egypt and South Africa have 0.0409, 0.0337, 0.0309 and 0.0253. This pattern also follow in the volatility of credit variables, with domestic market capitalization recording higher volatility in Nigeria (0.8558) and China (0.7815) as compared to Malaysia (0.2766), Brazil (0.2431), South Africa (0.2013) and Egypt (0.1153), while the relative volatility seems to be persistent with external market capitalization, remittances inflow and official development assistance. This evidence shows that the high output (GDP) volatility recorded by emerging markets could be as a result of external shocks from the developed economy. While, contemporaneous correlations are positive for Nigeria, China, South Africa and Malaysia, but negative in most cases for Egypt. For the economies with positive contemporaneous correlations, the correlations generally peak at above zero, which is procyclical. This suggests that output fluctuations noticed in emerging markets are largely impacted by external factors. This further explains that business cycle fluctuations in emerging markets tend to be correlated with business cycle swings in developed economy.

Table 3.1: Cyclical Behaviour of Real GDP and Sources of Credit Shocks in Nigeria and other Emerging Markets

	Nigeria	South Africa	Egypt	Brazil	Malaysia	China
Real GDP Volatility	0.0834	0.0253	0.0309	0.0409	0.0337	0.0707
Domestic Market Capitalization	Procyclical	Procyclical	Counter-cyclical	Procyclical	Procyclical	Procyclical
Contemporaneous Correlation	0.363	0.054	-0.365	0.039	0.170	0.226
Volatility	0.8558	0.2013	0.1153	0.2431	0.2766	0.7815
Relative volatility	10.26	7.96	3.73	5.94	8.21	11.05
Phase shift	Leading	Leading	Leading	Leading	Leading	Lagging
External Market Capitalization	Procyclical	Procyclical	Counter-cyclical	Procyclical	Procyclical	Procyclical
Contemporaneous Correlation	0.193	0.220	-0.055	0.391	0.221	0.296
Volatility	1.3056	0.2544	0.1131	0.2922	0.3077	0.9912
Relative volatility	15.65	10.06	3.66	7.14	9.13	14.02
Phase shift	Lagging	Leading	Leading	Leading	Leading	Leading
Financial Depth	Countercyclical	Procyclical	Counter-cyclical	Procyclical	Procyclical	Countercyclical
Contemporaneous Correlation	-0.105	0.120	-0.120	0.080	0.171	-0.196
Volatility	0.2393	0.0648	0.1515	0.2873	0.1151	0.0654
Relative volatility	2.87	2.56	4.90	7.02	3.42	0.93
Phase shift	Leading	Leading	Leading	Leading	Leading	Leading
Remittances Inflow	Procyclical	Procyclical	Procyclical	Procyclical	Procyclical	Procyclical
Contemporaneous Correlation	0.351	0.303	0.076	0.057	0.330	0.184
Volatility	2.1202	0.2533	0.2596	0.6818	1.3118	0.5345
Relative volatility	25.42	10.01	8.40	16.67	38.93	7.56
Phase shift	Leading	Leading	Leading	Leading	Leading	Lagging
ODA Inflow	Procyclical	Procyclical	Countercyclical	Procyclical	Countercyclical	Procyclical
Contemporaneous Correlation	0.059	0.090	-0.164	0.154	-0.364	0.047
Volatility	1.3766	0.1046	2.0888	1.8388	1.7421	15.2293
Relative volatility	16.51	4.13	67.60	44.96	51.69	215.40
Phase shift	Leading	Leading	Leading	Leading	Leading	Leading

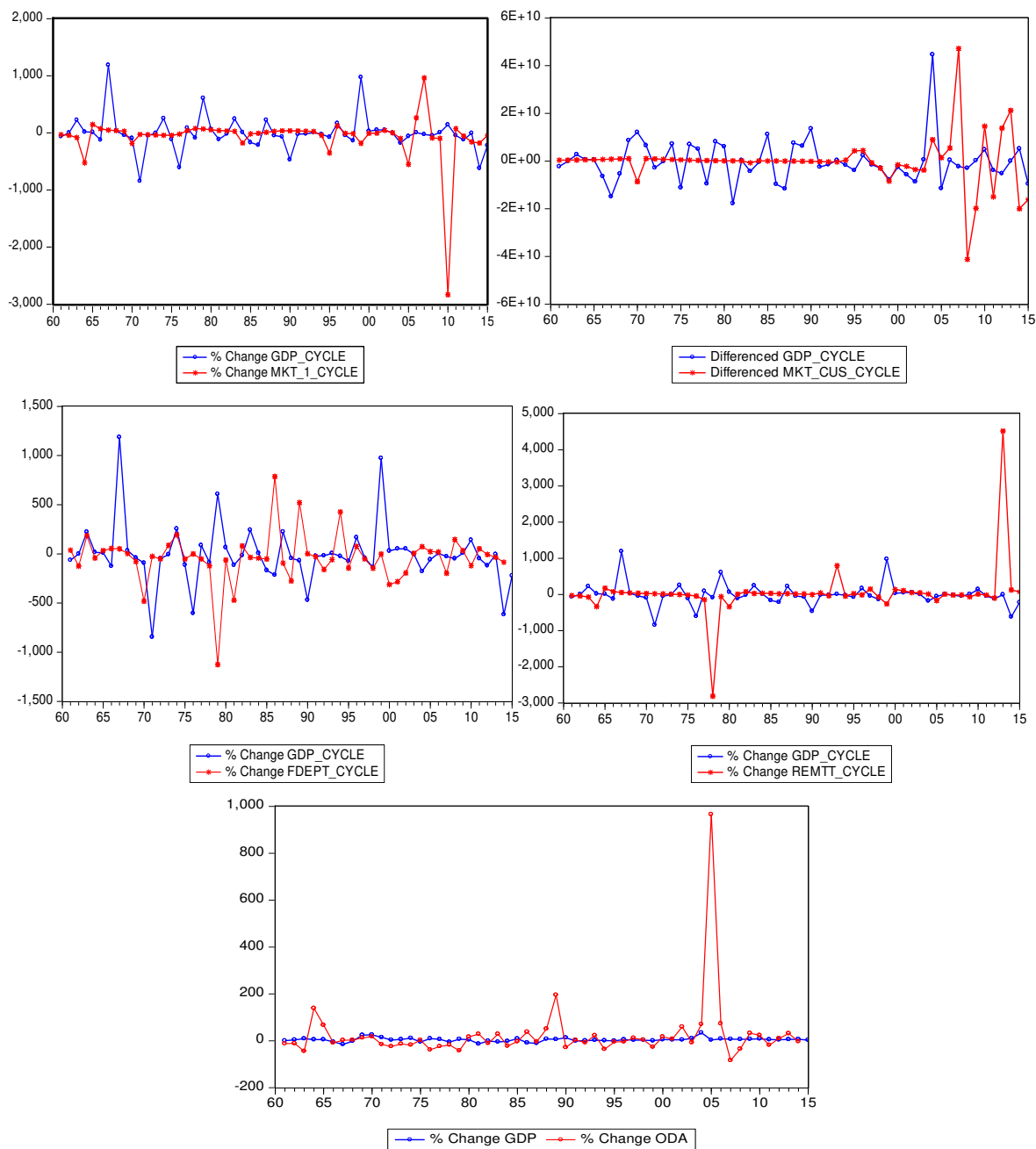**Source**: Authors' Computations using data from Worldbank data bank (2017)

Figure 3.1: Cyclical Trend of Real GDP and Credit Variables in Nigeria

Source: Worldbank data (2017)

The study further examines the relationship between fluctuations in domestic investment of respective economies and credit shocks variables. The understanding of the relationship could be particularly important for the emerging markets since they have trade and credit links with developed economies. The magnitude of these links through macroeconomic fluctuations and the channels through which, shocks transmit between these two sets of economies are of much importance towards achieving the main objective of this study. This relationship has been well documented in the literature for developed economies, but rather scarce in the case of emerging markets including Nigeria. Hence, examining this relationship will give analytical value from the perspective of macroeconomic modelling and stabilization programs.

Domestic investment measures the physical investment used in computing GDP when assessing the economic activities of a nation. It is an important component of the GDP, because it provides an indicator of the future productive capacity of the economy. In the identified economies, the volatility of their domestic

investment is extremely high, especially for Nigeria with 1.3382, which is more than double of countries like South Africa (0.6377), Egypt (0.6508) and Brazil (0.6374). In theory, both Neo-Classical and Marxist economists have placed their main emphasis on investment as the engine of growth. Meanwhile, going by the higher volatility of this variable in Nigeria, the economy has not really done much to absorb any economic crisis from both within and abroad. In the same vein, relative volatility of these variables seems to be persistent. For instance, various relative volatility figures from external credit shock variables show that, the economy is more prone to shocks from remittances and official development assistance, than other variables.

These reports justify the fact that shocks propagated by the external economy have direct adverse effect on the Nigeria economy. Also, given that the economy is capital inflow-driven, the contemporaneous correlations between Nigerian economy and credits shocks is positive in all cases, which is procyclical in nature. The case of Nigeria is also similar to other emerging countries, with very high domestic investment volatility which make their economies prone to shocks originating from the external economy.

Table 3.2: Cyclical Behaviour of Domestic Investment and Credit Shocks Variables in Nigeria and other Emerging Markets

	Nigeria	South Africa	Egypt	Brazil	Malaysia	China
Gross Investment Volatility	0.2141	0.1162	0.1139	0.1144	0.1444	0.0786
Domestic Market Capitalization	Procyclical	Procyclical	Counter-cyclical	Counter-cyclical	Procyclical	Countercyclical
Contemporaneous Correlation	0.032	0.070	-0.106	-0.021	0.254	-0.079
Volatility	0.8558	0.2013	0.1153	0.2431	0.2766	0.7815
Relative volatility	4.00	1.73	1.01	2.13	1.92	9.94
Phase shift	Leading	Leading	Leading	Leading	Leading	Lagging
External Market Capitalization	Procyclical	Procyclical	Procyclical	Procyclical	Procyclical	Countercyclical
Contemporaneous Correlation	0.050	0.248	0.063	0.389	0.426	-0.165
Volatility	1.3056	0.2544	0.1131	0.2922	0.3077	0.9912
Relative volatility	6.10	2.20	0.99	2.56	2.13	12.62
Phase shift	Leading	Leading	Leading	Leading	Leading	Lagging
Financial Depth	Procyclical	Procyclical	Procyclical	Procyclical	Procyclical	Countercyclical
Contemporaneous Correlation	0.085	0.111	0.314	0.152	0.153	-0.117
Volatility	0.2393	0.0648	0.1515	0.2873	0.1151	0.0654
Relative volatility	1.12	0.56	1.33	2.51	0.80	0.83
Phase shift	Leading	Lagging	Lagging	Lagging	Lagging	Lagging
Remittances Inflow	Counter-cyclical	Procyclical	Procyclical	Counter-cyclical	Procyclical	Countercyclical
Contemporaneous Correlation	-0.010	0.245	0.080	-0.013	0.007	-0.336
Volatility	2.1202	0.2533	0.2596	0.6818	1.3118	0.5345
Relative volatility	9.90	2.18	2.28	5.96	9.08	6.80
Phase shift	Leading	Lagging	Lagging	Lagging	Lagging	Lagging
ODA Inflow	Countercyclical	Procyclical	Countercyclical	Procyclical	Counter-cyclical	Procyclical
Contemporaneous Correlation	-0.0551	0.110	-0.110	0.220	-0.456	0.011
Volatility	1.3766	0.1046	2.0888	1.8388	1.7421	15.2293
Relative volatility	6.43	0.90	18.34	16.07	12.06	193.76
Phase shift	Lagging	Lagging	Leading	Lagging	Leading	Leading

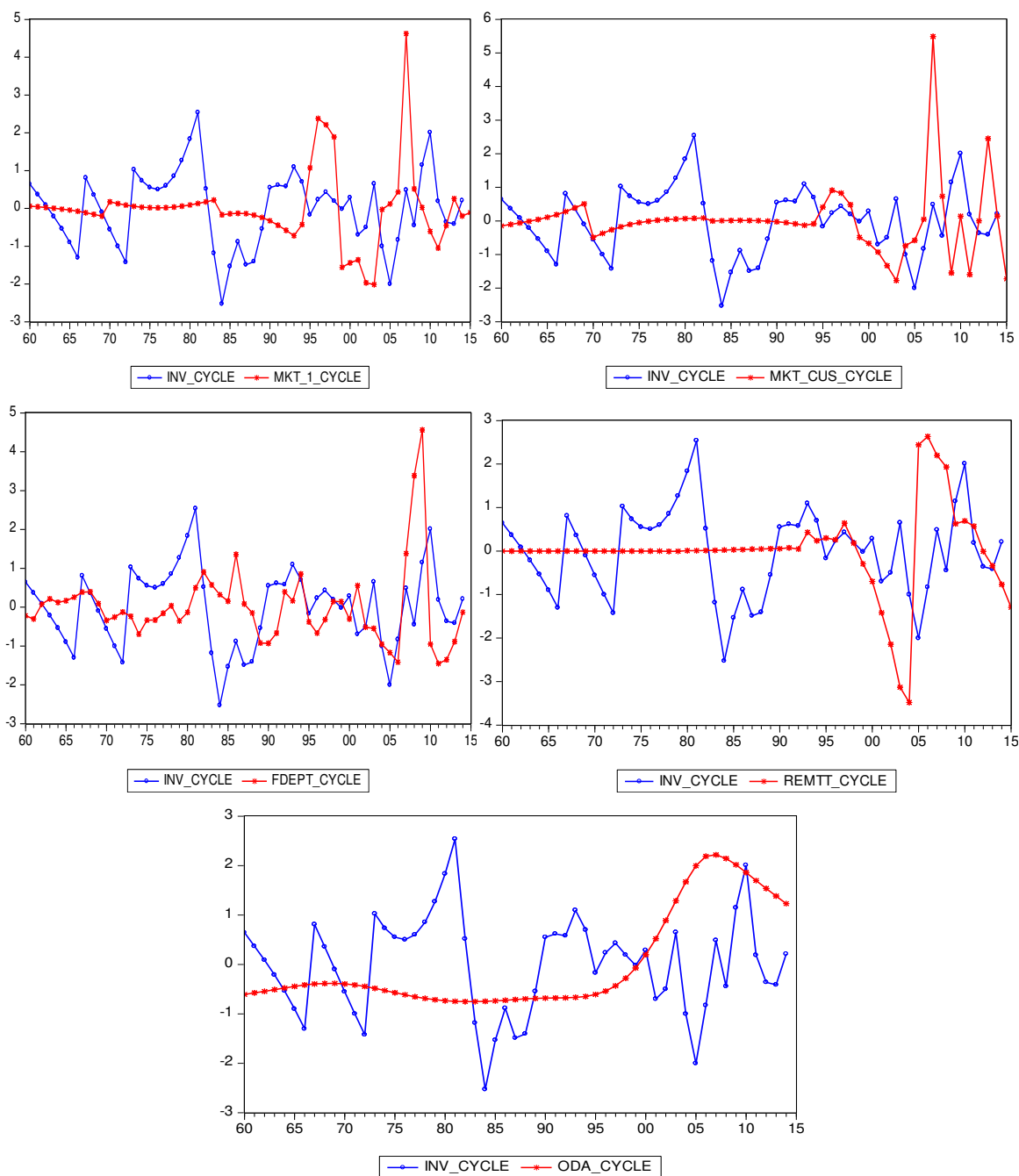**Source**: Authors' Computations using data from Worldbank data bank (2017)

Figure 3.2: Cyclical Trend of investment and Credit Variables in Nigeria

5. SUMMARY OF STYLIZED FACTS

Documenting stylized facts of business cycle can be an important part of quantitative macroeconomic models. Such models are expected to assume greater relevance within the context of an economy like Nigeria and other emerging markets, which had undergone significant economic transformations overtime. With the basic objective of investigating the transmission of external credit shocks to economic growth in Nigeria. Tables 3.1 and 3.2 attempt to situate the nature of real GDP with respect to how it responds to external credit shocks arising from the identified sources across each of the emerging markets. The novel aspect is to present a business cycle stylized facts governing Nigeria and some other emerging markets economies.

6. CONCLUSION AND RECOMMENDATIONS

This study focuses on background information of the aggregate economy and fluctuating situations in some selected emerging countries with respect to external credit shocks. In particular, the study describes the changing nature of the Nigerian business cycle from 1970-2015. Hence, the study demonstrated the cyclical properties of a large annual number of macroeconomic times series for a group of 6 (six) emerging countries, using a statistical technique on a modified version of the Hodrick-Prescott (1997; HP) filter as developed by McDermott (1997). It discussed the cross-correlation patterns between output and macroeconomic time series of the sampled countries and attempted to identify relatively robust regularities that can guide theoretical research in macroeconomics. The evidence of the study holds relevance not only for Nigeria, but for other economies that have undergone economic transition and reforms. An important finding is that emerging economies are characterized by higher output (real GDP) volatility. While Nigeria is more prone to output volatility than any of the sampled economies, external sources of credit shocks have impacted more on real economic activities of Nigeria than the domestic sources. As a result of this, any credit shock from the external economy could have adverse effect on the economy. Hence, the economies of the emerging markets will need to employ effective monetary and fiscal policies to reduce the adverse effect of external shocks to growth of the economy. Future studies can assess the relative importance of frictions in driving aggregate fluctuations in Nigeria and other emerging economies.

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