Is the effect of exchange rate volatility on export diversification symmetric or asymmetric? Evidence from Ghana

Obeng, Camara Kwasi

University of Cape Coast

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By

Camara Kwasi Obeng
Department of Economics
University of Cape Coast
Cape Coast, Ghana
Mobile: +233244841712
+233202830203
Email: cobeng@ucc.edu.gh
Alternative email: camaraobeng@yahoo.co.uk

Abstract

Exchange rate volatility has been identified as one of the drivers of export diversification. Previous studies have assumed a symmetric relationship between the two variables. However, because volatility could be positive or negative and economic agents react to these changes differently, recent studies have argued for the adoption of an asymmetric approach to the study of the relationship between the two variables. This study employed the partial sum process to create two variables to replace exchange rate volatility (Positive and negative variables) and utilized the Linear Autoregressive Distributed Lag (ARDL) and Nonlinear Autoregressive Distributed Lag (NARDL) techniques to investigate asymmetric effects of exchange rate volatility on export diversification in Ghana for the period 1983 to 2015. The results indicate that exchange rate volatility has asymmetric relationship with export diversification in Ghana. Other drivers of export diversification in Ghana are income, investment, infrastructure, openness and inflation. The paper recommends that the Central Bank should strengthen its efforts at stabilizing the exchange value of the cedi.

Key words: Export diversification, Symmetric, Asymmetric, Linear Autoregressive Distributed Lag, Nonlinear Autoregressive Distributed Lag, Ghana.

1.0 Introduction

The international community and governments of developing countries, especially the commodity-dependent ones, have for a long time identified export diversification as the way to mitigate the vulnerability of these countries to international commodity price volatility and promote economic growth and development. The need for export diversification has become more pertinent now than before, after the recent slump in international prices of major commodities, which has reversed the macroeconomic gains achieved by most of these countries over the years (Agur, 2016; IMF, 2015). Export diversification involves introducing new commodities, adding value to existing ones and notching new markets for export.

A number of studies have identified domestic investment, per capital income, governance openness, conflict, inflation, fiscal balance, infrastructure, real exchange rate, exchange rate volatility, terms of trade, share of mining in output, population, human capital, gender inequality, foreign direct investment, and financial development, as the drivers of export diversification (ECA & AU, 2007; IMF, 2014b; Kazandjian, Kolovich, Kochhar & Newiak, 2016; Arawomo, Oyelade & Tella, 2014, Tadesse & Shukralla, 2011; Kamuganga, 2012; Iwamoto & Nabeshima, 2012; Kugler, 2006).

This study contributes to the extant literature by investigating whether or not exchange rate volatility has symmetric or asymmetry effect on export diversification in Ghana. In a floating exchange rate regime, the exchange rate either depreciates or appreciates. When the local currency depreciates against the rest of the world, exports become competitive and so will promote export diversification. When the local currency appreciates, exports become uncompetitive and that could discourage export diversification. Studies have proven that exporters react to these movements in exchange rate differently due to differences in their risk appetites (De Grauwe, 1988). And yet previous studies (Kamuganga, 2012; Rose 2000) have assumed a linear relationship between export diversification and exchange rate volatility. This implies that both depreciation and appreciation will affect export diversification by the same magnitude. However, Bahmani-Oskooee and Fariditavana (2015, 2014), Bahmani-Oskooee and Mohammadian (2016), Bahmani-Oskooee, Halicioglu and Hegerty (2016) have questioned the symmetric assumption and argued for an asymmetric approach.

Ghana presents an interesting case study in that a major component of the economic reform programme that was carried out with the support of the IMF and the World Bank in the early 1980s was the realignment of the exchange rate and the diversification of the export base through non-traditional export promotion. The exchange rate was transformed from a fixed regime through auction to currently a managed-floating regime. In addition, diversification of the export base was vigorously pursued with the introduction of a wide range of non-traditional exports. International competiveness has improved as a result and exporters of non-

traditional exports have taken advantage of it to expand exports (Jebuni, Oduro, Asante and Tsikata, 1992). Total exports have since increased consistently from an average of US$829.8m in 1983-1987 to US$12442m in 2013 -2015. However, the traditional subsector continues to be highest foreign exchange earner. It is estimated that about 70% of all exports earnings are derived from traditional exports of cocoa beans, timber and gold while non-traditional exports contribute between 15% and 25% per annum (Ministry of Trade and Industry (MoTI), 2012). The narrow base of exports and fluctuations in their prices has led to instability in export earnings, and macroeconomic volatility. Interestingly, no study has been carried out to investigate the state of export diversification and what factors drive such diversification for Ghana. This study will fill this lacuna by answering the following questions: First, has exchange rate volatility a symmetric or asymmetric effect on export diversification? Second, what are the other drivers of export diversification in Ghana?

The rest of the paper is organised as follows: In section 2 the methodology is discussed. The results and discussion are presented in section 3 and in section 4 the summary, conclusions and recommendations are presented.

2.0 Methodology

Following the literature, export diversification is expressed as:

$$dindex_t = {}_o + {}_1 lGdpc_t + {}_2 lGfc_t + {}_3 Inf_t + {}_4 Tel_t + {}_5 Exvol_t + {}_6 Open_t + {}_t \quad (1)$$

where $dindex_t$ represents the export diversification index for Ghana. It was estimated using a modified Normalized-Hirschman index (N-H) and data on export shares for Ghana obtained from SITC 4 digit level. Modification was done to the normalized-Hirschman index by multiplying it by 100. The closer the value is to 100, the higher the level of export concentration. Otherwise, export concentration is low. The index was subtracted from 100 to give us the level of export diversification. The higher the value, the higher the level of export diversification, and the lower the value, the lower the level of export diversification (Arawomo, Oyelade & Tella, 2014); l is log operator; $lGdpc$ is log of GDP per capita, a proxy for the level of development and the market size of the country. It is expected that GDP per capita will have a positive effect on $dindex$ because an increase (decrease) in GDP per capita will lead to a rise (fall) in the demand and production of a large number of commodities including exports. $lGfc$ is log of gross fixed capital formation, a proxy for investment. It is expected that a rise (fall) of investment will result in an expansion (contraction) in export diversification. Inf is inflation rate, a proxy for macroeconomic instability. The expectation is that a stable macroeconomic environment will stimulate growth and export diversification. An unstable macroeconomic environment, on the other hand, discourages export diversification. *Tel* stands for the number of telephone lines per 1000 persons and it is a proxy for infrastructure. *Tel* is a proxy road, costs of doing business, costs to export, time

to export and export supporting bureaucracy. Expectations are that the higher the cost of trade related infrastructure, the lower the level of diversification and the lower the infrastructure related costs, the higher the level of export diversification (Kamuganga, 2012). *Exvol* is the measure of real effective exchange rate volatility. It was generated using GARCH (1, 1). It is the measure of the uncertainty and hence the risk associated with exchange rate variation and its effect on export diversification depends on the extent of risk aversion of exporters. A reduction or negative change in the real effective exchange rate reflects depreciation and hence increase in the profitability of exports, so it is expected to increase export diversification. An increase or a positive change represents appreciation and by extension the non-profitability of exports and so will lead to a decline in export diversification. Integration into the world economy is captured by *Open*. It is expected that more openness will encourage export diversification while less openness leads to lower level of export diversification.

Data Type and Sources

The study employed annual data for the period 1984 to 2015. The data used for the study are export diversification index as the dependent variable, the explanatory variables are real effective exchange rate volatility, gross fixed capital formation, GDP per capita, inflation, tel (proxy for infrastructure) and openness. The export diversification index was calculated using data obtained from the Standard International Trade Classification (SITC) 4-digit level and equation 4. The outcomes of equation 4 provided export concentration index. Subtracting the concentration index from 100, we obtained export diversification index. The real effective exchange rate volatility was generated using (GARCH (1,1)) equation 3. The remaining data, that is, GDP per capita, gross fixed capital formation, inflation, openness, and tel were sourced from World Bank, 2016.

Estimation Strategy

The study employed the linear and nonlinear autoregressive distributed lag (ARDL) and (NARDL) estimation techniques because of two main reasons: first, the data points used for the study is short. In particular, the data points are 33 and since ARDL has been proven to be efficient when dataset is short, it was employed in this study. Secondly and more important, the NARDL was deemed to be the appropriate methodology to investigate the symmetric and asymmetric effects of exchange rate volatility on export diversification in Ghana. In implementing the strategy, the study assessed the stationarity properties of the variables using the unit root tests, ADF and PP. The results indicated that the variables were a mixture of I(0) and I(1), justifying the use of the ARDL approach. The test for cointegration using the bounds test of Pesaran et al (2001) revealed that the variables were cointegrated. The long run and short run equations were specified and estimated using OLS.

Long-run and Short-run Error Correction Models

The short run and long run results were obtained from estimating equation 1.

$$dindex = {}_o + {}_1 dindex_{t\ 1} + {}_2 lGdpc_{t\ 1} + {}_3 lGfc_{t\ 1} + {}_4 Inf_{t\ 1} + {}_5 Tel_{t\ 1} + {}_6 Exvol_{t\ 1} + {}_7 Open_{t\ 1} + \sum_{i\ o} {}_{1i}\ dindex_{t\ i} + \sum_{i=o} {}_{2i}\ lGdpc_{t\ i} + \sum_{i=o} {}_{3i}\ lGfc_{t\ i} + \sum_{i=o} {}_{4i}\ Inf_{t\ i} + \sum_{i=o} {}_{5i} Tel_{t\ i} + \sum_{i=o} {}_{6i} Exvol_{t\ i} + \sum_{i=o} {}_{7i} Open_{t\ i} + {}_t \quad (1)$$

where p = optimal lags selection based on the AIC, SBC and HQC criteria, Δ is the difference operator, and i =0, 1,2, ...,.

To investigate the main objective of the study, that is, whether real effective exchange rate volatility has symmetric or asymmetric effects on export diversification in Ghana, the study followed Bahmani-Oskooee and Fariditavana (2015), to decompose *Exvol* into positive changes and negative changes and created two variables, *ExPos* and *ExNeg*, out of it using the partial sum process suggested by Shin et al, (2014) as follows:

$$Exvol_t = Exvol_o + Exvol_t^+ + Exvol_t \quad (2)$$

where $Exvol_t^+$ and $ExNeg_t$ are the partial sum process of positive and negative changes in *Exvol*. *ExPos* and *ExNeg* were then obtained as follows:

$$ExPos = Exvol_t^+ = \sum_{t=1} Exvol_t^+ = \sum_{t=1} \max(Exvol_t, 0) \quad (3)$$

$$ExNeg = Exvol_t = \sum_{t\ 1} Exvol_t = \sum_{t=1} \min(Exvol_t, 0) \quad (4)$$

Exvol in equation 1 was replaced with *ExPos* and *ExNeg* to obtain the nonlinear ARDL model 5.

$$dindex = {}_o + {}_1 dindex_{t\ 1} + {}_2 lGdpc_{t\ 1} + {}_3 lGfc_{t\ 1} + {}_4 Inf_{t\ 1} + {}_5 Tel_{t\ 1} + {}_6 ExPos_{t\ 1} + {}_7 ExNeg_{t\ 1} + {}_8 Open_{t\ 1} + \sum_{i\ o} {}_{1i}\ dindex_{t\ i} + \sum_{i=o} {}_{2i}\ lGdpc_{t\ i} + \sum_{i=o} {}_{3i}\ lGfc_{t\ i} + \sum_{i=o} {}_{4i}\ Inf_{t\ i} + \sum_{i=o} {}_{5i} Tel_{t\ i} + \sum_{i=o} {}_{6i} ExPos_{t\ i} + \sum_{i=o} {}_{7i} ExNeg_{t\ i} + \sum_{i=o} {}_{7i} Open_{t\ i} + {}_t \quad (5)$$

Equation 5 was estimated using the same procedure Shin et al (2001) suggested for the estimation of linear ARDL models. The coefficients and signs of *ExPos* and *ExNeg*

provided clues as to whether real effective exchange rate volatility, *Exvol*, has symmetric or asymmetric relationship with export diversification, *dindex*. When the signs and coefficients of the two newly created variables are different, exchange rate volatility has asymmetric effect on export diversification. Alternatively, if they are found to be the same, then the relationship between exchange rate volatility and export diversification is symmetric.

3.0 Results and Discussion

Long - run estimation results for Export Diversification (Linear ARDL)

The presence of cointegration among the variables led to estimation of the long run relationship among the variables of interest for both the linear ARDL and nonlinear ARDL. The results are captured in Table 2.

Table 2: Long run results for Export Diversification

Variable	Linear ARDL Model	Nonlinear ARDL Model
LGDPca	0.035003**	0.059549*
	(0.014863)	(0.018442)
LGFC	0.126228**	0.130281**
	(0.054488)	(0.063047)
Tel	0.125056**	0.126675***
	(0.061934)	(0.070905)
ExVol	-0.068557**	-
	(0.026729)	
ExPos	-	-0.050065**
		(0.021970)
ExNeg	-	0.047353*
		(0.013701)
INF	-0.011287*	-0.011570*
	(0.001749)	(0.001840)
OPEN	0.003602***	0.013497*
	(0.001784)	(0.002700)
C	0.739595	0.171233

*,**, *** represents significance at 1%, 5% 10%.
Figures in brackets are standard errors

Source: Author's own computation using EVIEWS version 9

The results from Table 2 indicate that the variable of interest, real effective rate volatility (Exvol) is significant at five per cent and it has the expected sign. Specifically, a one per cent increase in real effective exchange rate volatility will cause a decrease of 0.07 per cent in export diversification in Ghana. The effect of exchange rate volatility on export diversification in Ghana can be explained to mean

that because exchange rate volatility introduces risk and exporters are unsure of how much they will earn from exports, they will divert more of their produce to the domestic market when the exchange rate of the local currency gets volatile. This is particularly so when the exchange rate appreciates. The result obtained confirms the finding of Kamuganga (2012), Berthou and Fontagne (2008), Alvarez et al (2009) and Hericourt and Poncet (2013) and Goya (2014) who found that real effective rate volatility negatively affected export diversification. It is however, contrary to the finding of Agosin, Alvarez and Bravo-Ortega (2009) who found exchange rate volatility to have insignificant effect on export diversification for a large number of countries.

Other significant variables include GDP per capita (LGDPca), a proxy for income level or level of development. The expectation was that an increase in income should lead to the production of diversified exports. The result is in line with the findings of Imbs and Wacziarg (2003), Hammouda, Karingi, Njuguna and Sadni-Jallab (2006) and Elhiraika and Mbate (2014). Specifically, the results show that a percentage increase in per capita income causes export diversification to increase by 0.04 per cent. Gross fixed capital formation (LGFC), a proxy for investment, is also significant at the 5 per cent level of significance. This means that increase in investment will lead to the production of more diversified exports. The result confirms the finding of Hammouda et al (2006). Infrastructure (Tel) is significant at the 5 per cent level of significant and it carries the unexpected sign. This result is also in line with the findings of Hammouda et al (2006) and Elhiraika and Mbate (2014). Inflation, a measure of macroeconomic instability does not favour export diversification in Ghana. In particular, a percentage rise in inflation leads to 0.01 per cent fall in the export diversification index for Ghana. The negative effect of inflation on export diversification can be explained to mean that an increase in the former will make exports uncompetitive and therefore, discourage export diversification in Ghana. Finally, openness increases export diversification in Ghana, a corroborating the finding of Agosin et al (2009).

Short - run estimation results for Export Diversification

At this stage, the results of the short run drivers of export diversification in Ghana are presented in Table 3. The appropriate lag length as determined by the Schwarz Bayesian Criterion (SBC) was two.

Table 3: Short run results for export Diversification

Variable	Linear ARDL Model	Non-Linear ARDL (Model)
D(LGDPca)	0.142205**	0.113763**
	(0.069138)	(0.045852)
D(LGDPca(-1))	0.252310*	-
	(0.057661)	
D(LGFC)	0.113417*	0.115675*
	(0.037067)	(0.035245)
D(LGFC(-1))	-	0.165632*

		(0.030508)
D(TEL)	0.092388*	0.088900*
	(0.028239)	(0.025306)
D(ExVol)	-0.011695***	-
	(0.006417)	
D(ExVol(-1)	-0.022531	-
	(0.000588)	
D(ExPos)	-	-0.033028*
		(0.006322)
D(ExNeg)	-	0.014754*
		(0.003940)
D(ExNeg(-1))	-	0.011488*
		(0.004170)
D(INF)	-0.001541**	-0.001318**
	(0.000588)	(0.000539)
D(OPEN)	0.003049*	0.001001
	(0.000974)	(0.000720)
D(OPEN(-1))	-	0.002166*
		(0.000717)
Ecm(-1)	-0.749822*	-0.552692*
	(0.107658)	(0.097200)

*, **, ***, represent significance at 1%, 5% and 10%. Figures in brackets are standard errors.
Source: Author's own computation using EVIEWS version 9

The results, as presented in Table 3, reveal that the short run drivers of export diversification are exchange rate volatility, GDP per capita, investment, infrastructure, inflation and openness. Specifically, GDP per capital (GDPca), investment (GFC), infrastructure (TEL), and openness (OPEN) favour export diversification in Ghana in the short run at various levels of significance. However, exchange rate volatility (Exvol) and inflation (INF) depress effort at export diversification in Ghana at the 10 per cent and 5 per cent levels of significance respectively. Finally, the error term, that shows how long it takes for the system to revert to equilibrium when disturbed, is negative and significant at the 1 per cent significance level. The result indicates that about 75 per cent of the deviation from short run equilibrium is corrected in a year.

Diagnostics Test Results

Serial correlation, heteroskedasticity, normality, and functional form tests were carried out to ensure that the model and estimates were cleared of any econometric problems, and the results are presented in Table 4.

Table 4: Diagnostic test results

Test	Linear ARDL Model		Non-Linear ARDL Model	
	F-Statistic	P-Value	F-Statistic	P-Value

Serial Correlation	0.825585	0.4569	0.737009	0.4975
Heteroskedasticity	1.469171	0.2279	0.509019	0.8966
Normality	0.435987	0.8041	1.293267	0.5238
Functional Form	1.31920	0.2687	2.593605	0.1128
CUSUM	-	Stable	-	Stable
SUSUMSQ	-	Stable	-	Stable

Source: Author's computation using EVIEWS version 9.

A cursory look at Table 4 indicates that the model passes all the post estimation tests. In particular, the Breusch-Godfrey Serial Correlation LM test reveals the absence of serial correlation among the variables, as the F-statistic of 0.825585 was not statistically significant per the P-value of 0.4569. The Breusch-Pagan-Godfrey test for Heteroskedasticity also reported a statistically insignificant F-statistics of 1.469171 with a P-value of 0.2279, thus indicating the absence of heteroskedasticity among the error terms. The Ramsey-RESET stability test for the correct functional form of the model shows that the model was correctly specified since the F-statistics of 1.312920 was insignificant, with a P-value of 0.8041. Finally, based on Jacque-Bera normality test, the study found evidence that the series in the model are normally distributed, as the F-statistics of 0.435987 was insignificant given a P-value of 0.8041. The CUSUM and CUSUMSQ tests reveal that the model is stable.

Non-Linear ARDL Results

The results presented so far are based on the linear ARDL approach on the assumption that the variable of interest, exchange rate volatility relates to export diversification in linear manner. Following Bahmani-Oskooee and Fariditavana (2015) and estimating the nonlinear equation 5, employing the same estimation technique used for the linear ARDL, yields very interesting results.

The results presented in Tables 2 and 3 (Nonlinear Model), and focusing on the variables of interest, ExPos and ExNeg, suggest the presence of asymmetry in the relationship between exchange rate volatility and export diversification in Ghana. Specifically, the coefficients of ExPos and ExNeg are different and different levels of significance. In addition, while ExPos reduces export diversification in Ghana, ExNeg favours export diversification in Ghana. The nonlinear model also passes all the post-estimation tests as shown in Table 4.

4.0 Conclusions and Recommendations

The debilitating effect of fluctuations in international commodity prices is a pointer to the fact that commodity-dependent economies need to diversify their export base. Ghana's strategy to diversifying her export base has been the promotion of

non-traditional exports. One of the policies designed in pursuit of this objective, floating exchange, has introduced a huge exchange rate risk that could discourage export diversification. However, no quantitative study has been done in Ghana to determine whether exchange rate volatility has symmetric or asymmetric relationship with export diversification and investigate the other drivers of export diversification in Ghana. This study, therefore, employed both ARDL and NARDL estimation techniques to investigate the short run and long run effects of exchange rate volatility on export diversification in Ghana for the period 1984 to 2015.

The results indicate that exchange rate volatility has asymmetric effect on export diversification in Ghana. In particular, while exchange rate depreciation encourages export diversification, exchange rate appreciation discourages it. The results further indicate that the other drivers of export diversification are GDP per capita, investment, infrastructure, inflation and openness.

To aid policy, the study recommends that the Bank of Ghana should stabilize the exchange rate between the cedi and major world currencies, and keep inflation in check in order to promote export diversification in Ghana. There is also the need for government to provide more social, economic, and trade-related infrastructure to promote export diversification.

References

Agosin, M. R., Alvarez, R. and Bravo-Ortega, C. (2009). Determinants of export diversification around the world: 1962 – 2000, . Doi: 10.1111/j.1467-9701.2011.01395.x.

Agur, I. (2016). Products and Provinces: Disaggregated panel analysis of Canada's Manufacturing Exports, IMF Working Paper WP/16/193, Washington, DC. USA.

Alvarez, R., Doyle, M., and Lopez, R. A. (2009). Exchange rate volatility and export margins. Documentos de Trabajo (Banco Central de Chile), (539), 1.

Arawomo, D.F., Oyelade, A. O., & Tella, A. T. (2014). Determinants of export diversification in Nigeria: Any special role for foreign direct investment?, *Journal of economics and business research*, 2, 21 -33.

Bahmani-Oskooee, M., and Fariditavana, H. (2015). Nonlinear ARDL approach, asymmetric effects and the J-curve, *Journal of Economics Studies*, *42*(3), 519 – 530.

Bahmani-Oskooee, M., and Fariditavana, H. (2014). Do exchange rate changes have symmetric effect on the S-curve, *Economic Bulletin? 34*(1), 164-173.

Bahmani-Oskooee, M., and Mohammadian, A. (2016). Asymmetric effects of exchange rate changes on domestic production: Evidence from nonlinear ARDL approach, *Australian Economic Papers*, *55*(3), 181 -191.

Bahmani-Oskooee, M., Halicioglu, F., and Hegerty, S., W. (2016). Mexican bilateral trade and the J-curve: An application of the nonlinear ARDL model, *Economic analysis and policy, 50*, 23 -40**.**

Berthou, A., and Fontagne, L. (2008). The Euro and the intensive and extensive

margins of trade: Evidence from French firm level data. Document de travail CEPII, 6.
De Grauwe, P. (1988). Exchange rate variability and the slowdown in growth of international trade, IMF Staff Papers, 35(1), 63-84.
ECA & AU. (2007). Economic Report on Africa, 2007: Accelerating Africa's development through diversification, Addis Ababa, Ethiopia.
Elhiraika, A. B., and Mbate, M. M. (2014). Assessing the determinants of export diversification in Africa, *Applied Economics and International Development, 14*(1), 147-162.
Goya, D. (2014). The multiple impacts of the exchange rate on export diversification, Cambridge working papers in Economics, CWPE 1436, University of Cambridge.
Hammouda, H. B., Karingi, S.N., Njuguna, A. E., & Sadni-Jallab, M. (2006). Diversification: towards anew paradigm for Africa's development, ECA work in progress No. 35.
Hericourt, J., and Poncet, S. (2013). Exchange rate volatility, financial constraints and trade: Empirical evidence from Chinese firms, Tech., rep., FIW.
Imbs, J., and Wacziarg, R. (2003). Stages of diversification, *The American Economic Review, 93*(1), 63-86.

IMF(2015). Regional Economic Outlook: Sub-Saharan Africa: Dealing with the gathering clouds, World Economic and Financial surveys, Washington, DC, USA.

IMF (2014b). Sustaining long term growth and macro stability in low-income countries: the role of structural transformation and diversification – Background Notes, IMF Policy Paper.
ISSER (2013). The state of the Ghanaian economy in 2012, ISSER, Legon, Accra.
Iwamoto, M., and Nabeshima, K. (2012). Can FDI promote export diversification and sophistication of host countries? Dynamic Panel Systems GMM Analysis, IDE Discussion Paper No. 347.
Jebuni, C. D., Oduro, A., Asante, Y. & Tsikata, G. K. (1992). Diversifying exports: The supply response of non-traditional exports to Ghana's economic recovery programme, ODI Research Report, ODI, London.
Kamuganga, D. N. (2012). What drives Africa's export diversification? Graduate Institute of International and Development Studies Working Paper No. 15.
Kazandjian, R., Kolovich, L., Kochhar, K., & Newiak, M. (2016). Gender equality and economic diversification, IMF Working Paper, WP/16/140, Washington, D.C., USA.
Kugler, M. (2006). Does foreign investment facilitate exports? Evidence from Venezuelan manufacturing, Department of Economics, University of Southampton, Southampton SO17 1BJ, UK.

Ministry of Trade and Industry (MoTI). (2012). Ghana national strategy for the non-traditional sector, 2012 – 2016, MoTI, Accra. Retrieved on 4th November, 2016 from moti.gov.gh/.../ghana-national-export-strategy-for-the-non-traditional-sector-2012-20.

Pesaran, M. H., Shin, Y. & Smith, R., J. (2001). Bounds testing approaches to analysisof level relationships. *Journal of Applied Econometrics*, 16, 289 -326.

Rose, A. K. (2000). One money, one market: Estimating the effect of common currencies on trade, economic policy 15(30), 7-45. http://dx.doi.org/10.1111/1468-0327.00056.

Shin, Y., Yu, B. C., and Greenwood-Nimmo, M. (2014). Modelling asymmetric cointegration and dynamic multipliers in a nonlinear ARDL framework. In: Sickels R, Horrace W.(eds) Festschrift in honour of Peter Schmidt: econometric methods and applications. Springer, New York, pp. 281 – 314.

Tadesse, B., and Shukralla, E. (2011). The impact of foreign direct investment on horizontal export diversification: empirical evidence. *Applied Economics, 45*(2), *141 -159.*

World Bank (2016). World development indicators 2016. Retrieved on 10th September, 2016 from data.worldbank.org/data-catalog/world-development-indicators.