



International Remittances and Economic Growth in Ghana: Does the Measure Of Financial Development Matter?

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Abstract

Empirical results of the effect of international remittances on economic growth of individual countries and groups of countries have yielded mixed results. This study is intended to add to the debate on the impact of international remittances on the aggregate output of individual countries, Ghana in this case. An earlier panel data study found a negative impact of remittance on real GDP and prompted further research on the topic for individual countries and groups of countries. The papers which followed and were able to correct for endogeneity in the models, found a mild positive impact of private unrequited remittances on economic growth. The impact of remittances on economic growth of a particular country depends on the proportion of remittances invested and consumed, the level of financial development and the quality of institutions in the country. This study used time series data from 1990 to 2014 on Ghana and found a positive impact of remittances on the growth rate of real GDP. Engel and Granger Cointegration test and Error Correction Models were used. Remittances were found to be pro-cyclical. Granger causality tests which corrects for the errors of cointegrated variables found causality running from financial development to remittances and from remittances to real GDP. Remittances have been found in other studies to benefit the Ghanaian economy by reducing poverty and sustaining the current account. This study shows a positive impact of remittances on aggregate output. Thus requiring policies to increase the flows and encourage their investment.

Keywords: International Remittances, Economic Growth, Ghana, Financial Development.

1. Introduction

There is a growing attention given to international remittance flows by policy makers and academic researchers. This is due to a surge in the flow of international remittances worldwide, especially from developed countries to developing countries. A lot is being studied about remittance flows so as to increase its developmental potential. Ghana has joined the growing number of countries with high remittance receipts and currently has a high remittance GDP ratio by world standards – 13.3% in 2003 (Addison 2004). Monies sent by international migrants to their relatives (international remittances) are becoming an important source of developmental finance as they are growing in both absolute values and in relation to other sources of external finance (Kapur 2013). This study will focus on the potential impact of remittances on aggregate output, the causal relationship between remittances and financial development (measured by total deposits

and credit) and how remittances behave along the business cycle in Ghana.

There are some identifiable channels through which remittances impact on the financial sector and economic activities in individuals' countries. Results differ for different countries and groups of countries depending on the methodology and specific country characteristics. It is expected that studies on individual countries will yield insights that may be peculiar to those countries and help policy makers in their policy responses to the surge in remittance inflows.

There is evidence to suggest that Ghana's remittance receipts have been growing (Addison 2004). The impact of remittances on economic growth has been very controversial amongst researchers. While some researchers point to a positive effect of remittances on economic growth (Faini 2002, Glytos 1993 and 2002, Catrinescu et al 2006, Mundaca 2005, Giuliano and Ruiz-Arranz 2005), others point to a negative effect

(Chami et al 2003). Ghana's remittance/ GDP ratio has for some years been high by world standards. The large size of remittances relative to other external inflows and relative to GDP in Ghana suggests that the macroeconomic effects of remittance may be substantial and worthy of study. The World Bank (GEP 2014) reported the top 20 remittance recipient as a percentage of GDP in 2014, with Tonga having the highest of 31.1% and Yemen Republic having the lowest of 10%. Ghana is not reported to be one of the top 20 remittance recipient countries because the estimates of remittances by the BoG are far higher than those giving in IMP BoP statistics (Higazi 2014). It may be interesting to know how remittances have affected real GDP growth in Ghana. As most of the recorded inflows pass through the banking sector, it is interesting to know the direction of any causal relation between remittances and the depth of the financial sector. There is controversy on the relationship between GDP, remittances and financial development at the country level and at the cross-country level. The impact of remittances on real GDP growth depends on the structural characteristics of the receiving country, particularly its consumption and investment patterns and its capacity to manage large inflows (Kireyeve 2006). Enough attention must be given to the research on the determinants and impacts of remittances in Ghana so as to enhance its developmental potential and be aware of any negative and unintended effects so as to make an attempt to use policy to reduce them. Following from the surge in the flows, we can pose the following research questions: Has the remittance flows contributed positively to the growth rate of real GDP in Ghana? Have developments in the financial sector influenced the flows? How have remittance flows behaved along the business cycles in Ghana?

The purpose of the study is to use time series analysis on data for the period 1999 to 2014, to address the questions posed. The general objective is to investigate the impact of remittances on the economy. Specifically: (1) investigate the impact of remittances on the growth rate of real GDP, (2) analyse any causal relationship between international remittances and financial development in Ghana during the sample period and (3) explain the cyclical behavior of remittances.

Studies on remittances in Ghana are few and are based on micro data and survey reports. The rigorous ones are based on GLSS (Quartey 2012 and Adams 2012). There is no study based on time series data in Ghana on the impact of remittances on economic growth, thus this paper will fill this gap and contribute to the literature on the macroeconomics of remittances. Addison's (2004) paper on the

macroeconomic impact of remittances in Ghana does not include regression analysis but descriptive analysis. Panel data analysis and cross country studies have been conducted on the topic but not specifically for Ghana. Sayan (2006) cautions against generalizing econometric evidence obtained from panel data for a group of countries regarding the nature of the relationship between GDP and remittances to all members of the group. This is because panel estimates may conceal country specific characteristics. It is expected that country specific studies will yield additional knowledge.

Even though the inflow of international remittances may not fully compensate Ghana for the loss in output as a result of the brain drain, especially the exodus of health professionals and tertiary educated Ghanaians, any observed positive impact of remittances on real GDP growth will give policy makers additional information about the potential benefits of migration so as to help in formulating migration policies (Docquire and Rapoport 2004). This is important because if the majority of migrants were underemployed or unemployed when in Ghana, then there are huge potential gains from such migration. Quartey (2005b) reported that 51.8% of the respondents used remittances for consumption purposes (living expenses, funerals and other social activities). A significant percentage, 44% said the monies are for investment purposes-working capital, investment for the sender and paying school fees (which represents investment in human capital). Even though the sample size is small, the portion invested is higher. Sander et al (2005) reported 20% for investment purposes in Moldova which is smaller than that for Ghana while Glytos (1993) reported 62.6% for consumption, 30.2% for investment and 7.2% for land purchase in Greece. Similar results have been presented for Kyrgyzstan: 55% for every day expenses, 14 for large purchases (home appliance, vehicles and others) and 10% for investment purposes (setting up businesses, exporting goods, extensive repairs, education and others) (Aitymbetov 2006). Are remittances used to start small business in Ghana? The possibility is shown in a survey of 152 returnees to Ghana (mostly in Accra) in 2011. Black, Russel and Tiemoko (2013) found in the survey that 69 out of the 85 who had established small business had registered their business while 26 of them were set up before they returned from abroad. They hinted that the investments appear to represent more than investment in consumption. This means some remittance recipients use them as initial capital to set up small business in Ghana. In the USAID (2012) survey of 254 remittance recipients in Ghana, the percentages of respondents who reported to have used remittance for various purposes have been indicated.

The percentage reported for education, housing, business, savings and financial, are high enough to expect positive effect of remittances on economic activities. The respondents who reported to have used some as savings are significant enough to have an impact on the financial sector. The high percentage reported for education agrees with a study by Adams (2005) on household data for Guatemala. He reported that at the margin, households receiving international and internal remittances spend 58% and 45% more respectively on education than those not receiving remittances.

To investigate if remittances promote financial development, Aggarwal et al (2006) used a panel of 99 developing countries from 1975 to 2003. They used dynamic system GMM estimators and instrumental variable methods and found remittances to have a positive and significant impact on financial development measure by credit/GDP ratio and deposit/GDP ratio. They argued the monies sent through the banking sector may pave way for recipients to demand and gain access to other financial products and services which they might not have otherwise considered. This can increase trading in the financial sector (opening saving accounts and demanding loans). If a significant proportion of remittances are deposited, it can lead to increases in reserves of commercial banks which can be channeled to loans. Recipients can use financial products for the safe storage of remittances even if they were not initially transferred through the formal sector. Even remittances for consumption purposes can be deposited and withdrawn gradually if recipients have bank accounts. There are however serious reverse causality problems in such a model, because an improving financial system can increase recorded remittances flows by reducing transfer fees and other bottlenecks. It can also be argued that remittances receipts can lead to a lower demand for loans and thus hamper development in the financial sector. The results by Aggarwal et al (2006) were more pronounced for bank deposits than credit.

Glytos (1993, 2002) used two different methods to find a positive relationship between remittances and economic growth. The author used a disaggregated sectorial analysis of the income effect of remittances on consumption, production, imports, employment and capital formation for Greece (Glytos 1993). This method takes care of the first round effect of remittance spending and the diffused multiplier effects. He used input output tables and regional data to convert the pattern of consumer expenditure into a structure of industry final demand. He found a multiplier of 1.7 of remittance expenditure on gross output. Expenditure on housing was very productive

with a multiplier of 2.0. He conclude that remittance promote economic growth, employment and capital formation. Chami, Fullenkamp and Jahjah (2003) used a comprehensive panel of 119 countries for 29 years to model the causes of remittances and trace their effect, to examine if it were being used as a source of capital for development. They assumed that remittances are subject to significant agency and moral hazard problems because of information asymmetry, since migrants live far away from their families who receive the remittances. They ignored the possible impact of remittance on GDP through investment and found a negative relationship between remittances and growth, justifying their results on the income effect of remittances in reducing labour supply and hence output. They found remittances to be higher in low growth countries. To cater for endogeneity, they used instrumental variable techniques by finding an estimate of remittances, using income and interest rate differentials between USA and the countries as determinate in the first stage regression. They later use the estimate of remittances as a regressor in a growth equation. They found remittances to have negative effects on economic growth but found a positive effect of capital flows on economic growth. Lucas (2005) and Catrinescu et al (2006) think that the instruments used in the model do not seem to be effective in eliminating the bias because of the insignificance of the interest rate gap differential in the first stage of the regression.

Other researchers looked at conditions that will make the effect of remittances on growth positive. Following such reasoning, Giuliano and Ruiz-Arranz (2005) studied the impact of remittances on growth, controlling for financial development in a panel of 73 developing countries (1975 to 2002). They used panel system GMM regressions to test the hypotheses that remittances can substitute for financial development and promote growth through investment. They concluded that remittances have positive impact on growth and more so when remittances are pro-cyclical. Remittances were found to be used as substitutes for financial development. Another study which was conducted with the idea of finding conditions that will enable remittances to promote growth was Catrinescu et al (2006). They confirmed their hypothesis that policies which create incentives for private sector investment and household savings will enhance the developmental potentials of remittances. When there are enough incentives to use remittances to start a business, invest in education, health care or save in banks, then there will be more positive effects on aggregate output. When business regulatory environment is sound, public sector corruption is low, financial sector is secured; the investment of

remittances will be encouraged. They used dynamic data panel estimates on 91 countries (1970 to 2003) and found a weak positive impact of remittances on growth and concluded that long term developmental impact of remittances is increased in the presence of sound economic policies and institutions. This study was in response to the study by Chami et al (2003), which found a negative impact of remittances on growth, with a model which did not fully correct for endogeneity. Chami et al (2006) used a stochastic general equilibrium model to investigate the influences of counter cyclical remittance flows on the conduct of monetary and fiscal policies. They found that high remittance/GDP ratios change the underlying relationship between output and labour, by increasing the correlation between labour and output, thereby producing a more volatile business cycle and increasing risks. This can change the functioning of government policy instrument.

2. Methodology

2.1 Model Specification

Most remittance researchers will agree with Kireyev (2006, pp17) that “there is no obvious blueprint for establishing unambiguously the direction of the macroeconomic impact of remittances. Their ultimate macroeconomic impact will depend on the structural characteristics of a particular economy...”. That can also be said of the effect of remittances on growth specifically. From the Solow (1957) neo-classical production function with technical progress (organizational improvements that just shift the production function up through time), we can derive an expression for the growth of aggregate output as a function of the growth of the inputs and the rate of technical progress (Branson 1989). Most growth models specified for developing countries are based on a neo-classical framework. The model is built around a constant returns production function that allows for the possibility of substitution between capital and labour.

$$Y=AF(K,L) \dots\dots\dots(1)$$

Differentiating equation (1) with respect to time gives the following equation.

$$dY / dt = F (K, L) dA / dt + A\partial F / \partial K.dK / dt + A\partial F / \partial L.dL / dt \dots\dots\dots(2)$$

Dividing equation (2) by Y and simplifying gives

$$\frac{dY/dt}{Y} = \frac{F(K, L)}{AF(K, L)} \frac{dA}{dt} + \frac{A}{Y} \frac{\partial F}{\partial K} \frac{dK}{dt} + \frac{A}{Y} \frac{\partial F}{\partial L} \frac{dL}{dt} \dots\dots\dots(3)$$

Multiply the second and third terms on the right hand side of equation (3) respectively with K/K and L/L and simplify to get equation (4).

$$\frac{dY/dt}{Y} = \frac{dA}{A} + \frac{AK}{Y} \frac{\partial F}{\partial K} \frac{dK/dt}{K} + \frac{AL}{Y} \frac{\partial F}{\partial L} \frac{dL/dt}{L} \dots\dots\dots(4)$$

The growth in output can be expressed as follows

$$Y = A + \eta_K K + \eta_L L \dots\dots\dots(5)$$

Where $\eta_K = \frac{AK}{Y} \frac{\partial F}{\partial K}$ and $\eta_L = \frac{AL}{Y} \frac{\partial F}{\partial L}$ are output elasticities of capital and labour respectively and dot over Y, K and L represent their growth rates. Thus equation (5) shows that the growth of capital stock, labour and the rate of technical progress explain the growth of aggregate output. Therefore factors that are expected to increase capital stock, labour and the rate of technical progress will improve the growth of

output in the long run. Endogenous growth models which have been developed allow growth in per capital output to be influenced by investment in human capital, physical capital and research and development. Variables that affect accumulation or allocation of human and physical capital can be expected to affect growth. (Chen and Kee 2005). This study focuses on how remittances can affect human and physical capital

accumulation and then economic growth. The study focuses on a few variables that are believed to affect economic growth so as to conserve on degrees of freedom following the length of our time series data on remittances. Equation (6) will be the focus of the study.

$$Y = F(Y-I, R, I, FD, X, G, PCF) \dots\dots\dots(6)$$

Where Y is the growth rate of real GDP, Y -1 is the lag the growth rate of real GDP, R as remittances/GDP ratio, I as investment/GDP ratio, FD as a measure of financial development (credit/GDP ratio or deposit/GDP ratio), X is export/GDP ratio, G as total government expenditure/GDP ratio and PCF is private capital flows/GDP ratio. Similar variables and others were used by Giuliano and Riuz-Arrans (2005)). For comparison, different models will be estimated with the long of per capital GDP as the dependent variable.

Remittance flows to Ghana can be expected to increase physical and human capital accumulation and hence affect output positively, if they are assumed to be exogenous inflows (ignoring the effect of the initial labour outflow on output). The survey literature on the uses of remittance in Ghana show significant percentages devoted to investment in housing, physical capital and human capital or education (41% for investment purposes in Quartey 2005b). Remittances can loosen liquidity constraints in countries with not so much developed financial systems. Access to bank loans by the small scale enterprises (which are predominant in the private non-formal sector in Ghana) are constrained by lack of proper business plans, high lending rates and inadequate collateral. Black et al (2003) gave evidence that remittances are sometimes used as initial business capital for Ghanaian migrants. The employment potential is huge because the informal sector employs a significant percentage of the labour force in Ghana. Thus remittances support investment and capital accumulation in Ghana. Opoku-Afari (2005) reported that capital goods and intermediate goods make up 75% total imports of goods and services to Ghana.

Economic growth requires capital goods, which for developing countries must be imported. But lower savings rates and inadequate export earnings make it difficult to meet desired levels of capital goods imports (Lloyd, Morrissey and Osei 2001). This gap is mostly filled by foreign capital inflows, which can include remittances. Remittances loosen foreign exchange constraints and make such capital imports easier. It is widely known that remittances are used for consumption purposes, but the multiplier effects of such consumption should not be ignored. Consumption expenditure induced by increasing

remittances will boost production, investment and employment. This will happen when a significant proportion of the remittances are spent on domestically produced goods, especially when the economy is demand-deficient so as not to cause inflation. The percentage of remittances sent through the formal channel and some informal channel remittances that are deposited at the banks can also be expected to increase loans and hence capital accumulation.

A significant percentage of remittances are used to finance education in Ghana. Quartey's (2005b) survey reported 27.11% of response for education uses of remittances. The USAID survey reported a response of 63% for financing education. This is expected on the aggregate, to improve human capital accumulation and increase the educational attainment of the labour force, which has become a very important determinant of growth in endogenous growth models.

It has been argued by Chami et al (2003) that remittance may reduce labour supply and dampen output growth. This will happen if recipients consider remittances as non-labour income, thus leading to a fall in labour supply. That can be expected if the economy is near full employment. But in Ghana "unemployment levels are extremely high (there are no formal estimates)" (Opoku-Afari 2005), thus any fall in aggregate labour supply must be expected to be very small. Investment in this study was proxied by gross capital formation. The measures of financial development that were used are those which relate to the banking sector. The coefficient of exports in equation 6 is expected to be positive because, exports are expected to spur innovation and entrepreneurial activities. The coefficient for government expenditure is expected to be positive because it represents government's contribution to capital accumulation as well as the adequacy of basic economic and social infrastructure. Private capital flows are expected to contribute to capital accumulation and growth through investment. This can be expected if they are invested in the productive sectors of the economy. Engel and Granger Cointegration test and Error Correction Models were used.

2.2 Data Sources

Secondary data obtained from the research department of the BoG was used. Data on gross capital formation and population was taken from the Selected Statistics on African countries, 2014, volume XIXV of African Development Bank. Exchange rates used for conversions were taken from IFS. The GDP deflator was used to deflate the nominal variables to obtain their real values (20000 constant values). The variables

obtained from BoG in US dollars were converted to cedis and then deflated to their real values, using the deflator.

3. Results and Discussions

3.1 Unit Root Test

Regression analysis is carried out mainly to estimate long-term and short-term meaningful economic relationship so as to test theoretical and or empirical hypotheses. Such analysis must be preceded by an investigation of the data generating process of

variables so as not to false conclusions. A combination of variables that are non-stationary may lead to spurious regression where there is correlation between the trends of the variables and not a meaningful economic relationship (Granger and Newbold 1986). To prevent the possibility of spurious regression, stationarity of the variable is tested to know the order of integration, which is the number of time the variables will have to be differenced to make them stationary. The unit root tests used followed that of Dickey and Fuller (1981). The Augmented Dickey Fuller (ADF) test was used due to the deficiency of the Dickey Fuller (DF) test.

Table 1

Augmented Dickey Fuller Unit Root test

Variables	t-ADF (k)	Variables	t-ADF (k)
LGR	-2.632 (0)	DLGR	-4.765*** (0)
LGR	-2.898 (1)	DLGR	-2.919** (3)
LPCGDP	1.224 (0)	DLPCGDP	-1.776 (0)
LPCGDP	2.798 (1)	DLPCGDP	-3.076** (1)
LR/GDP	-1.499 (0)	DLR/GDP	-2.535 (0)
LR/GDP	-1.633 (1)	DLR/GDP	-2.919* (3)
LCR/GDP	-0.753 (0)	DLCR/GDP	-2.644 (0)
LCR/GDP	-1.299 (1)	DLCR/GDP	-4.542*** (1)
LDEP/GDP	-1.66 (1)	DLDEP/GDP	-2.815 (0)
LDEP/GDP	-0.6734 (2)	DLDEP/GDP	-5.257*** (1)
LI/GDP	-2.41 (0)	DLI/GDP	-2.559(0)
LI/GDP	-3.847** (4)	DLI/GDP	-4.08*** (3)
LX/GDP	-2 (0)	DLX/GDP	-2.186 (0)
LX/GDP	-2.477 (1)	DLX/GDP	-4.333(1)
LPCF/GDP	-2.357 (0)	DLPCF/GDP	-5.391*** (0)
LPCF/GDP	-2.494 (1)	DLPCF/GDP	-6.264*** (2)
LG/GDP	-3.235** (0)	DLG/GDP	-2.158 (0)
LG/GDP	-2.637* (4)	DLG/GDP	-3.1044** (3)

*** represent stationarity at 1%

** represents stationarity at 5%

* represents at 10%

k is number of lags in brackets

and D before a variable denotes first difference of that variable

With the D AF, lags of the difference variables are added to reduce autocorrelation in the test equation. However, adding too many lags may reduce the power of the test and result in an under-rejection of the null hypothesis of nonstationarity when it should be rejected. A trend was added to the ADF test on levels and removed logs of all the variables are presented in Table 1. The lags chosen were based on the Akaike Information Criterion (AIC) and the Schwarz Bayesian Criterion (SBC), with an eye not to include too many lags when they conflict.

From Table 1 we can see that all the variables are non-stationary on levels, except LI/GDP ratio which is stationary (at 5%) and LG/GDP, also stationary at 5% when the tests were conducted with a trend term.

All the variables are stationary at first difference and are integrated of the first order or 1(1), as can be seen from the last column of Table 1. This means differencing the variables once, make them all stationary which implies that we can use OLS with the differenced variables without worrying about spurious correlations. Initial analyses in the study were based on the real values of the variables without logging. The levels of integration ranged from zero (as in the case if I/GDP) to two. Thus attention was shifted to the logs of the variables, where most of them were found to be 1(1)

3.2 Granger Causality

Causality in this paper was tested using a modified version of causality in the Granger sense. The notion of Granger causality is based on the assumption that if past values of a variable, X_t , are able to help predict future values of another variable, Y_t , then X_t Granger-causes Y_t . Dufour and Renault (1998) explained that “causality in sense of Granger is typically defined in terms of predictability of a vector of variables one period ahead”. Causality tests require stationary variables, thus non-stationary variables must be differenced.

In addition, if the variables are co-integrated or share a common trend, then to correct for the error,

an error correction model must be used (Miller and Russek 1990). The residuals are added only if the variables are co-integrated, that is when the residuals of a first stage regression are stationary. The null hypotheses that X_t does not Granger-cause Y_t is rejected not only when the coefficients of the past values of X_t are significant but also when the coefficient of the lagged ecm term is significant. The results for Granger causality tests for some variables of interest are reported in table 2 (three lags of the variables were used. Results for ordinary Granger causality tests without correcting for the errors or ignoring any cointegration relationships are reported in the appendix for comparison with the equation used.

Table 2
Granger causality test with error correction model (ecm): results

Null Hypotheses	F stat.	P value	t-ADF (k)	ECM (-1)(t)
DLR does not Granger-cause DLC	0.5211	0.6732	-3.132* (1)	0.0332
DLC does not Granger-cause DLR	5.152	0.0089***	-2.735	-
DLR does not Granger-cause DLD	0.7132	0.5575	-3.49* (3)	0.623
LD does not Granger-cause DLR	2.8156	0.0725*	-3.188* (1)	-3.06**
DLR does not Granger-cause DLRGDP	.5256	0.0883*	-3.36* (5)	0.559
DLRGDP does not Granger-cause DLR	0.1836	0.9062	-3.76** (1)	-2.39**

***represents rejection of the null hypotheses of no Granger causality at 1%

**at 5% and * at 10%

t-ADF represents that of the residuals of a first stage regression of the variables on levels (bivariate-residual-based cointegration test).

Granger causality test were conducted with the first difference of the logs of the variables and not their ratios to real GDP. The null hypotheses that credit does not Granger-cause a remittance is rejected at 1% (table 2), however, the cointegration test between the two variables is rejected as the residual are non-stationary. Causality runs from credit to remittances using total credit as a measure of development in the financial sector. The null hypotheses that remittance do not Granger-cause credit cannot be rejected. Using deposits as a measure of development in the financial sector gives similar results. The null hypotheses that remittances do not Granger-cause deposits cannot be rejected whilst the null hypotheses that deposit do not Granger-cause remittance is rejected at 10% with a significant ecm term. These results are comparables to the ordinary Granger causality test without the ecm

term or ignoring any cointegration. The results on deposits and credit are consistent and show a unidirectional causality running from financial development to remittances. The causality analyses show that development in the financial sector Granger-cause remittance flows. Strictly the notion of Granger causality does not imply true causality but implies forecasting ability. In this case we can deduce a possibility, but it may require further research to test it formally. Actual to true causality can be expected in the sense that financial development tends to lower transfer cost and improves the infrastructure supporting remittance transfer which increases the proportion of remittances that pass through the formal financial system. The unidirectional causality implies that not enough remittances are deposited to significantly influence developments in the financial

sector. When developments in the sector help remittances to increase, the bulk of it flows out of the sector and does not significantly increase deposits or credit. It can be expected that banks will improve their services and products to induce remittances to flow through their branches as non-account holders can also receive remittances. Non-account holders who receive remittances can be induced to open accounts or banks will now find it profitable to open branches in small towns so as to get close to remittances recipients in those areas. This means as remittances increase, competition in the banking sector will improve and will positively affect outcomes in the banking sector of the financial system. The null hypothesis that remittances do not Granger-cause real GDP can be rejected at 10% but the ecm term is not significant. Ordinary Granger causality test without the ecm term shows a similar result with causality running from remittances to real GDP growth. The causality is unidirectional because the null hypotheses that real GDP does not Granger cause remittances cannot be rejected. In conducting the Granger causality test, the study focused on the relationship between remittances and financial development and between remittances and economic growth. Financial development has been found to Granger-cause remittances and not vice versa. Remittances have also been found to Granger-cause growth of real GDP (unidirectional).

3.3 Cointegration Test and Error Correction Model

Economic variables that are non-stationary, display a tendency to wander or drift with time. There is the

possibility that a set of variables may wander together or move closely over time and the difference between them will be stationary (Johnston and DiNardo 1997), this means they are cointegrated. Cointegration implies that deviations from equilibrium are stationary with finite variances even though the series themselves are non-stationary. Non-stationary time series with long run equilibrium relationships cannot drift far apart from equilibrium because economic forces will act to restore produce stationary residuals (Engel and Granger 1987). Engel and Granger (1987) have proposed a two stage residual based test of cointegration. A regression of a non-stationary variable on other non-stationary variables it is cointegrated with will produce errors that are stationary and will rarely drift from zero if it has zero mean and will often cross the zero line. The essence of testing for cointegration is to investigate the presence of long-run Stationary relationship or testing the hypotheses that what exists is a mere spurious correlation between the variables is due to co-movement of trends (Badawi 2006). In the first stage of the Engle and Granger cointegration test, the long-run equation is estimated by OLS, the residuals are calculated. If the variables in the first stage of the test are non-stationary and cointegrated, then the residuals will be stationary. The Engel and Granger cointegration test and error correction model was used in this study.

The sign of the ECM term is expected to be negative which will signifies a stable system. The results of the short run regression of the growth rate of real GDP on the independent variables are presented in Table.3

Table 3
SR Regression of growth rate of real GDP: 1990H1-2014H2

Variable	Model1	Model 2
DGR _(t)	0.567 (4.84)***	0.574 (5.65)***
DR/GDP	0.448 (3.38)***	0.401 (3.82)***
DCR/GDP	0.0068 (0.172)	-
DDPEP/GDP	-	-0.0175 (-0.48)
DI/GDP	-0.999 (-7.73)***	-0.974 (-8.1)***
DX/GDP	-0.2 (-1.85)*	-0.147 (-1.53)
DPCF/GDP	0.0129 (1.51)	0.0042 (0.532)
DGE/GDP	1.054 (3.89)***	1.26 (5.36)***
Constant	-0.028 (-2.25)**	-0.026 (-2.38)
ECM(-1)	-0.932 (-5.545)***	-1.076 (-6.26)***
R ²	0.874	0.9
DW Stats	1.37 (AR)	0.968 (AR**)
F States	16.49***	20.3**

Coefficients with t values in brackets

*** represents 1% level of significance

** represents 5% level of significance

* represents 10% level of significance

AR is the test of autocorrelation reported by PC give 10.

The results in Table 3 with the first difference of the growth rate of GDP as the dependent variable give interesting results. The coefficient of remittance/GDP ratio is positive and significant in the two models. These results indicate that remittances contribute positively to the growth a rate of GDP in Ghana in the short run. A larger percentage of remittances are used for household consumption, thus through the multiplier process, remittances have a positive impact on aggregate output in Ghana. The long run equation on levels (presented in the appendix) also showed a positive effect of remittances on real GDP growth, but concerns about spurious correlation makes it difficult to interpret such results in the long run. To check whether these results are model specific, other models are reported in the appendix with the log of per capital GDP as the dependent variable. Those models also point to a positive impact of remittances on per capital GDP even though the coefficient of remittance/GDP ratio is not significant except for the long run equations. The coefficient for credit is positive but not significant in the short run whilst that of total deposit of negative and insignificant. This mixed result cannot be easily explained but may indicate that developments in the financial sector (banking sector to be specific) have not adequately impacted on the growth rate of GDP. The models presented in the appendix give similar results. Different measures of financial development may give different results as the credit market or government security markets in Ghana are not well developed (ISSER 2014). It has also been shown that financial sector development reduces poverty but not significantly in Ghana because savings are not being channeled to the pro-poor sectors of the economy (Quartey 2005b) for Central American countries, where remittances moderately improved output but financial development variables did not. The coefficients for investment and exports are negative in the models. This is surprising because investments are supposed to increase capital formation and improve growth of output. Exports are also expected to increase the growth of as they require more efficient methods of production to face foreign competition. Another paper by Akuamoah-Boateng (2003) using VECM found Gross investments to have negative but not significant relationship with output in Ghana.

The paper also reported a positive but not significant coefficient for exports in a growth equation. However, Lloyed et al (2011) found the exports have significant positive impact on short run growth, using private consumption as a measure of output. It must

be noted that a World Bank Country Brief on Ghana (August 2014) pointed that the main driver of growth in 2013 in particular appears to have been both private and public investment. The report pointed out however that, efficiency levels of the investments are low. Asante (2012) found the growth rate of GDP to have the wrong sign (negative) in an investment equation and concluded that the GDP growth rate variable has the least influence on private investment.

The coefficients for private capital flows are positive but not significant in the short run models. Thus private capital flows may contribute to the growth of real GDP in Ghana. The coefficients of government expenditure are positive and significant in the short run, implying that total government expenditure in Ghana contributes to the growth process in Ghana. The measure of government expenditure used in the model includes those on education and health which are expected to improve productivity of the labour force and increase output. The coefficient of the ecm terms are negative as expected and significant. The negativity of the error correction parameter confirms the existence of a long run equilibrium relationship. The absolute value being less than unity in model 1, implies a stable error correction mechanism with eventual convergence to long run equilibrium. Thus it can be seen that 91% of the disequilibrium in model 1 is corrected per period. The ecm coefficient of one in model 2 implies that all of disequilibrium is corrected in model two (more than one would have implied an over-shooting equilibrium but there is no theoretical justification for that in this case) Autocorrelation is not serious in model 1 but in model 2. The sample size used for the short run regression reduced significantly because of the differencing and the number of lags of the variables and the residuals used. Thus trying to use the AR models to correct for the autocorrelation in model two gave bad results because of reduction in the degrees for the freedom and also because the method is only asymptotically efficient. So autocorrelation in model two was left uncorrected.

4. Conclusions

Using total credit and total deposits as measures of financial development, the study found that development in the financial sector Granger-cause remittances. It can be explained that improvements in the financial sector, thus increases recorded remittances. These improvements can be in the form of reduced transfer cost, more branches and better and faster transfer services. Remittances were not found to

Granger-cause financial development but rather Granger-cause. Remittances were found to have a positive and significant relationship with the growth rate of real GDP. A short run error correction model of the growth rate of real GDP showed that private remittances have contributed significantly to the recent growth experience of Ghana. A similar model of per capital GDP shows comparable results. The effect of remittances on aggregate output is mainly through the multiplier effect of the flows spent on consumption goods. The study failed to find a robust relationship between the financial development variable and the growth rate of GDP. The coefficients of private capital flows and government expenditures were positive as expected but those of exports and gross investments were unexpectedly negative.

The correlation between the cyclical components of remittances and real GDP was 0.6877, signifying pro-cyclicality of remittances in favour of the investment motive. This is consistent with remittances contributing positively to the growth of output as a significant percentage of the flows are invested and in addition to the multiplier effects of the bigger percentage on consumption expenditure. The main conclusion of the paper is that, remittances have contributed to the growth of GDP in Ghana between 1999 and 2014 even though remittances are not expected to be one of the main drivers of economic growth. Financial development influences remittances flows. It is obvious from this paper that continuous increases in remittances would be welcomed as the expected gains are more likely to offset potential side effects. The clear benefits of remittances to the Ghanaian economy are that they help sustain the current account in Ghana's BoP, reduce poverty, enable capital imports and contribute to the growth of output. Measures must be put in place not only to increase remittances, but the proportion that passes through the formal financial sector as against the informal sector. This can be done by making the formal sector more attractive. The authorities can actively participate and direct attention to the financial sector by providing a fair atmosphere for the MTO's and banks involved in the money transfer business. Entry barriers by the BoG can be reduced to increase competition in the financial sector and ease requirements for opening new payment outlets while keeping an eye on international guidelines to prevent money laundering. Increased competition will reduce implicit and explicit transfer cost, especially the charges levied on recipients by the banks even though transaction costs have been paid by the remitting party in the originating country.

References

- Adams Jr. R. H. (2003). "International Migration, Remittances and the Brain Gain: A study of 24 Labour Exporting countries". Policy Research Working Paper 3069. World Bank, Washington DC.
- Adams R. H. Jr. and Page J. (2005) "International Migration, Remittances and Poverty in Developing countries". Policy Research Working Paper. 3179. World Bank. Washington DC.
- Addison E. K. Y (2004) "The Macroeconomic Impact of Remittances in Ghana". Bank of Ghana. Accra, Ghana
- Aggarwal R., Demirgüç-Kunt A., Soledad M. and Peria M. (2006) "Do Remittances Promote Financial Development?" Policy Research Working Paper. 3957. World Bank.
- Aitymbetov S. (2006) "Emigrant Remittances: Impact on Economic Development of Kyrgyzstan". ICEG European Centre. WP, NR 31. Economic Policy Institute Network. Hungary.
- Akuamoah-Boateng A (2013) "Export Performance and Economic Growth: Application of Cointegration and Causality Analysis in Ghana". (MPhil Thesis, University of Ghana). Economics Department, University of Ghana.
- Asante Y. (2012). "Determinants of private investment behavior". AERC Research Paper 984. March 2012. Nairobi.
- Badawi A. (2006) "Private capital formation and macroeconomic policies in Sudan: Application of a simple cointegrated vector autoregressive model". Forthcoming, *Journal of African Economics*.
- Black R, Russel K. and Tiemoko R. (2003) "Migration return and Small Enterprise Development in Ghana: a route out of Poverty?" Working Paper No.9 Sussex Centre for Migration Research. University of Sussex.
- Catrinescu N, Leon-Ledesma M, Piracha M and Quillin B. (2006) "Remittances, Institutions and Economic Growth". Discussion Paper No.2139. Institute for the Study of Labour (IZA) Bonn, Germany.
- Chami R., Fullenkamp C. and Jahjah S. (2003). "Are Immigrant Remittance Flows a Source of Capital for Development?". IMF Working Paper WP/03/189.
- Chen C. D. H and Kee H. L (2005) "A Model on Knowledge and Endogenous Growth". PRWP 3539. The Knowledge for Development Program. The World Bank Institute. Washington D.C.

- Dickey D. A. and Fuller W.A (1981) “Likelihood Ratio Statistics for Autoregressive TimeSeries with a unit Root”. *Econometrica*49,1057-1072.
- Docquire F. and Rapoport H. (2004). “Skilled Migration: The perspective of Developing Countries”. PRWP 3382. World Bank.
- Engel R. F. and Granger C. W. J (1987) “Cointegration and Error Correction:Representation, Estimation and Testing”. *Econometrica* Vol.55 No.2 PP251-276
- Faini R. (2002). “Migration, Remittances and Growth” Italian Ministry of Economy and University of Brescia. Italy.
- Giuliano P. and Ruiz-Arranz M. (2005) “Remittances, Financial Development and Growth.. IMF Working Paper. WP/05/234.
- Glytos N. P. (1993) “Measuring the Income Effect of Migrant Remittances: A Methodological Approach to Greece”. *Economic Development and Cultural Change*, Vol.42 No.1, PP313-168. University of Chicago press.
- Glytos N. P. (2002). “Dynamic Effect of Migrant Remittances on Growth: An Econometric Model with an application to Mediterranean Countries”. Centre for Planning and Economic Research. Athens, Greece..
- Granger C. W. J and Newbold P (1986) *Forecasting Economic Time Series*. 2nd Edition,Academic Press, Inc., Orlando, Florida.
- Kapur D (2013). *Remittances: The New Development Mantra?* Papered for the G24 Technical group meeting.
- Kireyev A (2006). “The Macroeconomics of Remittances: The Case of Tajikistan”. IMF Working Paper. WP 06/2.
- Lloyd T., Morrissey O. and Osei R. (2001). “Aid, Exports and Growth in Ghana”.
- Mehra V. P. (1993). “The Stability of the M2 Demand Function: Evidence from an Error Correction Model”. *Journal of Money Credit and Banking*. Vol. 25 No.3 PP 455-460.
- Mundaca G. (2005). “Can Remittances Enhance Economic Growth? The Role of Financial Market Development”. *Social Science Research Network*. September6th 2005. Available at <http://ssrn.com/abstract=799484>.
- Opoku-Afari M (2005). “Capital Flows and CURRENT Account Sustainability: The Ghanaian Experience”. WP/BOG-2005/16, Bank of Ghana.
- Quartey P. (2005). “Financial Sector Development, Domestic Resource Mobilization and Poverty Reduction in Ghana”. *Wider Research Paper* 2005/711. Helsinki, Finland.
- Sander C., Doine N., Bat A., Petrov V. and Seymour V. (2005). *Migrant Remittances and the Financial Market in Moldova*. BASIS CRSP. Madison, University, Wisconsin.
- Sayan S (2006). “Business Cycles and Workers’ Remittances: how do Migrant Workers Respond to Cyclical Movement of GDP at Home?” imp Working Paper WP 06/52.
- Solow R M. (1957). “Technical Change and the Aggregate Production Function”. *Review of Econometrics and Statistics*. August 1957.
- ISSER (2013). *State of the Ghanaian Economy in 2013*. University of Ghana, Legon.
- ISSER (2014) *State of the Ghanaian Economy in 2014.*, University of Ghana, Legon. July.
- USAID (2012). *Private Remittances Flows to Ghana*. Project COUNTRY Report, Review Draft.

Appendix

Unit root equation estimated for the logs of all the variables.

$$\Delta y_t = \mu + \gamma T + \beta y_{t-1} + \sum_{i=1}^k \lambda_i \Delta y_{t-i} + \varepsilon_t \dots\dots\dots(9)$$

Where y_t is the variable in question,
 t is trend and γ is its coefficient
 k is the lag length included
 ε_t is the error term
 μ is the constant
 β is the coefficient of y_{t-1}
 and λ_i s are the coefficients of the lagged differences.
 Granger causality equation with ecm term used.

Long run regression of the growth rate real GDP: 1990h1-2014H

Variables	Model 1	Model 2
LGR ₍₋₁₎	0.132 (0.744)	0.654 (0.324)
LR/GDDP	0.0904 (1.543)	0.104 (1.68)
LCR/GDP	0.0145 (0.404)	-
LDEP/GDP	-	0.031 (0.699)
LINV/GDP	-0.628 (-4143)***	-0.582 (-3.488)***
LEXP/GDP	-0.3611 (-1.58)	-0.429 (-1.876)*
LPCF/GDP	0.0136 (1.094)	0.0164 (1.347)
LGE/GDP	0.801 (4.094)***	0.7346 (3.32)***
Constant	1.403 (4.866)***	1.431 (4.9)***
AR(1)	0.505 (4.01)***	0.547 (4.015)***
AR(2)	-0.792*** (3)	-0.805 (-6.33)***
Res. ADF (t,k)	-7.246*** (3)	-7.196*** (3)
R ₂ Adj.	0.905	0.906
F stats	28.646***	28.98***
S. C. LM Test	2.62 (0.1057)	2.414 (0.1232)
ARCH test	0.0846 (0.9191)	0.0022 (0.997)
Normality test: Jarque-Bera	0.4297 (0.8066)	0.1989 (0.9053)

Coefficients with t values in brackets
 ***represents 1% level of significance
 **represents 5% level of significance
 and * represents 10% of significance.

Res. ADF (t stat.) is the unit root test of the residuals obtained in the regression with number of lags in brackets.

Pairwise Granger Causality Tests

Date: 11/23/15 time: 14:33

Sample: 1990S1 2014S2

Lags: 3

Null Hypothesis:	Obs	F-Statistic	Probability
DLD does not Granger Cause DLC	27	2.95215	0.05740
DLC does not Granger Cause DLD		3.67469	0.02946
DLI does not Granger Cause DLC	27	0.55001	0.65394
DLC does not Granger Cause DLI		5.37390	0.30488
DLR does not Granger Cause DLC	27	0.63569	0.60072
DLC does Granger Cause DLR		5.37390	0.00705
DLRGDP does not Granger Cause DLC	27	0.92796	0.44543
DLC does not Granger Cause DLRGDP		0.91891	0.44963
DLI does not Granger Cause DLD	27	1.37834	0.27821
DLD does not Granger Cause DLI		0.72597	0.54838
DLR does not Granger Cause DLD	27	0.98805	0.41843
DLD does not Granger Cause DLR		5.37922	0.00702
DLRGDP does not Granger Cause DLD	27	1.53573	0.23611
DLD does not Granger Cause DLRGDP		0.80425	0.50619
DLR does not Granger Cause DLI	27	0.40929	0.74805
DLI does not Granger Cause DLR		0.16988	0.91546
DLRGDP does not Granger Cause DLI	27	2.12211	0.12941
DLI does not Granger Cause DLRGDP		5.71897	0.00539
DLRGDP does not Granger Cause DLR	27	0.32124	0.80992

Variables	Model 1	Model 2
LPCGD[(-1)	0.9175 (32.1)***	0.926 (33.4)***
LR/GDP	0.0066 (2.091)**	0.0057 (1.95)*
LCR/GDP	-0.0025 (-2.48)**	-
LDEP/GDP	-	-0.00031 (-2.76)**
LINV/GDP	-0.044 (-6.402)***	-0.0436 (-6.66)***
LEXP/GDP	0.0164 (3.6)**	0.0148 (3.79)
LPCF/GDP	-0.0002 (-1.3)	-0.0002 (-1.38)
LGE/GDP	0.0692 (5.325)***	0.0688 (5.52)
Constant	0.674 (3.06)***	0.610 (2.87)*
AR(1)	1.22 (4.19)***	1.199 (5.15)***
AR(2)	-1.42 (-9.913)***	-1.408 (-8.4)***
AR(3)	0.552 (2.1)*	0.545 (2.21)**
Res. ADF (t, k)	-4.192*** (3)	-4.352*** (1)
R ² Adj.	0.999	0.999
F stats	11839.34***	12734.23***
S. C. LM test	2.688 (0.105)	2.71 (0.103)

ARCH test	0.457 (0.639)	0.383 (0.686)
Normality test: Jaque. Bera	0.747 (0.688)	0.783 (0.676)
DLR does not Granger Cause DLRGDP	2.65593	0.07 629

DLR regression of per capital real GDP: 1990h1 – 2014H2

SR Regression of per capital GDP: 1990H1 – 2014H2

Variables	Model 1	Model 2
D[CGD] (-1)	0.727 (8.3)***	0.847 (6.9)***
DR/GDP	0.0075 (1.52)	0.004 (0.616)
DCR/GDP	0.00370.228)	-
DDEP/GDP	-	-0.0009 (-0.437)
DI/GDP	-0.027 (-4.92)***	-0.0239 (-3.15)***
DX/GDP	-0.01 (-2.32)**	-0.0067 (-1.09)
D[CF/GDP	0.0006 (1.75)*	-3.27e-005 (-0.07)
DGE/GDP	0.034 (3)***	0.035 (2.37)**
Constant	0.0023 (2.13)**	0.0014 (1.03)
ECM (-1)	0.906 (-7.09)***	-1.08 (-4.47)
R ²	0.904	0.839
DW stats	1.14 (AR**)	1.1 (AR**)
F stats	22.52***	11.73***

Correlation matrix for the first differences of the log of the variables used (lags two)

	R ₂	CR ₂	DEP ₋₂	INV ₋₂	EXP ₋₂	PCF ₋₂	GE ₋₂	GR ₋₁	PCG ₋₁
R ₋₂	1	0.067	-0.001	0.587	0.469	0.19	0.318	-225	-276
CR ₋₂		1	0.952	.028	0.057	-.076	-0.446	-341	-0.187
DEP ₋₂			1	.043	-.068	-.077	-0.5	-302	-.07
INV ₋₂				1	0.344	.0403	0.492	-0.12	-.188
EXP ₋₂					1	0.195	0.175	-201	-.276
PCF ₋₂						1	0.174	0.362	.136
GE ₋₂							1	.088	-0.11
GR ₋₁								1	0.486
PCG ₋₁									1

Correlation matrix for the log of the variables on levels (two lags)

	R ₂	CR ₂	DEP ₋₂	INV ₋₂	EXP ₋₂	PCF ₋₂	GE ₋₂	GR ₋₁	PCG ₋₁
R ₋₂	1	0.925	0.916	0.621	0.854	0.481	0.846	0.269	0.932
CR ₋₂		1	0.925	0.564	0.855	0.444	0.819	0.293	0.927
DEP ₋₂			1	0.545	0.916	0.424	0.819	0.349	0.938
INV ₋₂				1	0.762	0.697	0.838	0.055	0.533
EXP ₋₂					1	0.631	0.827	-0.028	0.752
PCF ₋₂						1	0.550	-0.209	0.459
GE ₋₂							1	0.293	0.860
GR ₋₁								1	0.401
PCG ₋₁									1