

The Relationship between Remittances and Economic Growth in Togo: A Vector Equilibrium Correction Mechanism

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This paper investigates the relationship between remittances and economic growth in Togo. Using time series data over a period of 42 years (1974-2015) for Togo, we apply Johansen cointegration test methods, followed by three-step vector equilibrium correction mechanism (VECM) for long-run causality and Wald test for short-run causality along with pairwise-Granger causality test. Our result confirms a long-run bi-directional Granger causality exists between remittances and economic growth in Togo. However, no short-run causal relationship exist between remittances and economic growth. The paper also discusses policy issues that comes up from the consequences of the analysis. The results of this study would help the government and policy makers to take appropriate domestic policies in the area of migration and remittances for Togo.

Keywords: Remittances; Economic growth; Causality; VECM approach

JEL Codes: C32; F24; F43

1. Introduction

In many developing countries, remittances are now a vital source of funds and inflow of remittances are also growing rapidly. In 2007, about \$300 billion remittances were sent to the developing countries through authorized channels in addition to unidentified volumes of remittances were transferred through informal channels. Moreover, In 2015, worldwide remittance flows were estimated to have exceeded \$601 billion (World Bank, 2017).

There have been some empirical studies in the literature on the relationship between remittances and economic development (Dahal, 2014; Nsiah and Fayissa, 2013; Siddique et al., 2012). However, most of the studies focus on correlation between remittances and economic growth, not causation. Moreover, a crucial question in regards to remittances and economic growth should be that of causation. Wrong signals may be provided to policymakers, government authorities by accepting the causation without knowing its direction, whether it is of short or long run nature and perhaps most importantly whether there is a correlation to start within the given regional context. The direction of causation could vary substantially across regions due to different spatial, economic, cultural and social characteristics of the geographic area under consideration (Hakim and Merkert, 2016).

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This paper is an attempt to examine the relationship between remittance income and economic growth in Togo. The country is officially known as the Togolese Republic, a Sub-Saharan country with a population about 7.5 million. Many Togolese people usually migrate to nearer countries like Ghana and Benin, but, some people migrate to the USA and European countries to get asylum. Figure 1 in the appendix depicts the GDP and remittances scenario for Togo since 1974. The economic growth started to rise sharply since 1993, and the total value of remittances received by Togo also increased from 1999 with a little decline in the total value during the global financial crisis (GFC).

Most of the studies on the relationship between remittances and economic growth used panel data analysis, but it gives a little evidence to individual countries seeking to manage domestic policy. Moreover, the existing studies give a mixed outcome (e.g. uni-directional or bi-directional) for the causal relationship between remittances and economic growth for different countries. Therefore, an independent study is essential as no study found on the relationship between economic growth and remittances for Togo. This study will fill such a gap in the existing literature. The main objective of this paper is to employ the three-step vector equilibrium correction method to examine the direction of causality between economic growth and remittances in the context of Togo.

The rest of this paper is organized as follows: Section 2 reviews the literature on remittances and economic growth in different countries/regions. Section 3 outlines the methodology of our study, and in Section 4 we discuss the empirical results. Section 5 concludes with policy recommendations.

2. Literature Review

The relationship between remittances and economic growth has been the main goal of many empirical works in the literature, but the results are contradictory for different countries (Dahal, 2014; Jouini, 2015). Due to various social, economic, cultural and ethnical differences, impacts of remittances on economic growth are diverse too. Some studies find that in Morocco, Pakistan and India, remittances have a positive impact on the economic growth (Adams, 1998; Lucas, 2005). In addition to that, Adams and Page (2005); Acosta et al. (2008) and Schiantarelli (2005) discuss that remittances have both direct and indirect impact on developing countries economy such as remittances affect positively on the balance of payments directly by saving money and investment and improve countries economic condition. On the other hand, remittances have an indirect effect through consumption. With data from more than 100 developing countries, Giuliano and Ruiz-Arranz (2005) argue that remittance mainly increases the economic growth of less developed countries.

The positive impact of remittance is focused on different areas in different literature such as the multiplier effects of consumption (Stahl & Arnold, 1986), expansion of the commercial institutions (Aggarwal et al., 2011), several uses of remittances especially as foreign exchange (Ratha, 2005) etc. Solimano (2003) finds results in favor of a positive relationship between remittances and economic growth on a panel of Andean countries. Ratha (2007) points to the fact that remittance flows develop the country access to international capital markets since they could improve its creditworthiness, which is another way to increase economic development by stimulating physical and human capital investment. Pradhan et al. (2008) find that remittances positively affect economic growth by examining a linear regression model between five variables for a group of 36 countries.

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Some studies focus on the negative influence of remittances on economic growth. In this perspective, Amuedo-Dorantes and Pozo (2004) show that remittances could reduce the international competitiveness and impose economic costs on the export sectors of receiving countries. Nsiah and Fayissa (2013) take panel data of 64 different countries of Asian, African and Latin American-Caribbean region, to examine the relationship between remittances and economic growth. They apply unit root, and panel cointegration test and they find out that there is a positive relationship between remittances and economic growth in all 64 countries. On the contrary, some researchers conclude that in a low income country remittances use as consumption purpose which is dominated by foreign products than making investment opportunities (Ahlburg, 1991; Brown and Ahlburg, 1999; Lipton, 1980). Moreover, Barajas et al. (2009) argue that if any economy is highly integrated with the global financial system and the domestic financial market is established; it is less likely that the remittances could give them the opportunity to fuel investment in that country.

Chami et al. (2005) find a negative link between remittances and economic growth for a panel of 113 countries over almost thirty years. Moreover, Parinduri and Thangavelu (2011) indicate that human capital accumulation of children can be negatively affected by the fact that one parent leaves home to work abroad and sends money. It is also important to stress that there are other empirical works supporting the view that there is no influence of remittances on economic growth or investment, such as Spatafora (2005) who shows that remittances do not impact per capita output. Bettin et al. (2012) find reverse causality links between remittances, income, consumption and savings by using data of immigrants coming to Australia from 125 countries. Ahmed and Uddin (2009) investigate the causal links between remittances, import, export and GDP for Bangladesh over the period 1976–2005 using the VAR-VECM approach and found a unidirectional causal nexus running from remittances, export and import to GDP. Furthermore, Siddique et al. (2012) find no causal links between the variables in India, a unidirectional causality running from remittances to economic growth in Bangladesh, and a bidirectional causality is found in Sri Lanka which confirms that spatial context matters for a causal relationship. The authors also discuss some policy implications of the obtained results. We also note that there are other works in the literature investigating the causal links between economic growth and its determinants. Shirazi and Abdul Manap (2005) find the evidences of bidirectional causal links between exports and GDP, and imports and GDP by applying Granger causality and cointegration tests to study the export-led growth hypothesis in the context of South Asia.

Most importantly, there is no literature on causal analysis between remittances and economic growth for Togo, which is a fundamental gap as context appears to matter to these relationships. Moreover, this study will apply the robust time series econometric techniques to find the causal direction as well as the short-run and long-run relationship between the two variables.

3. Methodology

This paper applies a series of econometric models to test cointegration and causality between remittances and economic growth. The causal relationship between remittances and economic growth could be uni-directional or bi-directional, and it is also possible that there is no interdependency (Baker et al. 2015). We consider the causal relationship in both directions between remittances and economic growth. Thus, the analysis yields a total of two causality models.

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This analysis is based on Granger causality framework which explains that, since the future cannot predict the past or the present, whereas the past could be the foundation of the present (Granger, 1969). In other words, If variable X causes variable Y, then changes in X should lead changes in Y. As a result, in a regression of Y on other variables (including its own lagged values), if we include lagged values of X and it notably develops the forecast of Y, then we can say that X

causes Y according to Granger framework. It applies to other way around, e.g. when Y Granger causes X (Gujarati, 2004).

Building on Hakim and Merkert's (2016) work, this paper follows a three-step procedure based on the Granger causality framework to avoid ambiguous conclusion from spurious results. First, a time series unit root test was applied for stationarity. Because if the data are found to be non-stationary, the results can be spurious. In a second step, both series under investigation were tested for cointegration with the same order to determine the long-run relationship. The outcome from those cointegration tests determined the type of causality tests that are then used in the next step. In this third step, if the series are cointegrated of the same order, the vector error-correction model (VECM) is applied to find the causal relationship. Respectively, if the series do not have a long-run relationship (not cointegrated based on the findings of step 2), the vector autoregression (VAR) method is applied as the standard Granger causality test (Toda and Phillips, 1993). In addition to that, short-run causality is evaluated by applying Wald tests to determine the joint significance of the lagged explanatory variables. Moreover, pairwise Granger causality tests based on F-statistics were also applied to investigate the direction of causality.

3.1 Data

For investigating the causal relation between remittances and economic growth, this paper uses annual time series data for Togo from 1974 to 2015. Data of total remittances (Remit) and gross domestic product (GDP) were used to estimate the causal relationships. Where, $Remit_t$ is the total amount of U.S. dollar received as personal remittances in year t and GDP_t is the real GDP (constant 2010 U.S. dollar) in year t . The World Bank's world development indicators (WDI) database was used as the main source of data. Table 1 shows the descriptive statistics of the variables used in our analysis. The data series covers 42 years.

Table 1: Descriptive statistics of variables

Variable	Mean	Std. Dev.	Max	Min	No. of obs. (n)
GDP (million USD)	2335.02	687.72	4045.72	1435.83	42
Remittances (million USD)	105.99	139.14	427.29	4.12	42

3.2 Unit Root Test

It is essential first to test the series for stationarity. A series is said to be nonstationary if it has a non-constant mean, variance and auto-covariance over time. If a non-stationary series has to be differenced d times to become stationary, then it is said to be integrated of order d : i.e. $I(d)$. This first step is essential because the causality tests are very sensitive to the stationarity of the series (Stock and Watson, 1989), and the majority of macroeconomic series are non-stationary (Nelson and Plosser, 1982). When both series

are integrated of the same order, we proceed to the next step by examining for the presence of cointegration. In order to verify whether this preliminary condition was fulfilled, times series of GDP and remittances for Togo were tested for a unit root by augmented Dickey–Fuller (ADF) test (Dickey and Fuller, 1979).

3.3 Time Series Cointegration Test

The data of economic growth and remittances are defined as cointegrated when all of the series are found to be integrated in the same order. The Johansen cointegration test (Johansen and Juselius, 1990) based on autoregressive representation is commonly used method. For obtaining robust cointegration results, we run this test in this paper. The test procedure can include two different likelihood ratio (LR) tests and defines the number of cointegrating equations given any normalization applied (Baker et al. 2015). Here we use both LR tests (the trace and maximum eigenvalue) to test for cointegration.

3.4 Vector Equilibrium Correction Mechanism (VECM)

To examine the causal relationship between GDP and remittances the Granger causality test is used in this paper. As the tests detailed in section 3.3 have revealed that the variables in our analysis are cointegrated, the long-run causality, based on the vector equilibrium-correction mechanism (VECM), is used to test the above relationships. The VECM can examine long-run causal relationships based on the error-correction term ECT (-1). The VECM formulas can be express as:

$$\Delta Remit_t = \alpha_t + \beta_t ECT_{t-1} + \sum_{i=1}^l \gamma_t \Delta Remit_{t-1} + \sum_{i=1}^l \delta_t \Delta GDP_{t-1} + \epsilon_t \quad (1)$$

$$\Delta GDP_t = \alpha_t + \beta_t ECT_{t-1} + \sum_{i=1}^l \gamma_t \Delta GDP_{t-1} + \sum_{i=1}^l \delta_t \Delta Remit_{t-1} + \epsilon_t \quad (2)$$

Where $\Delta Remit_t$ and ΔGDP_t denote the first difference in *Remittances* and *GDP* variables which capture their short-run disturbances over periods $t = 1, 2, \dots, T$; ϵ_{it} is the white noise error term and ECT_{t-1} is the error correction term (ECT) that is resultant from the long-run cointegration association, and evaluates the extent of the past disequilibrium. The coefficient of the ECT determines the deviation of the dependent variables from the long-run equilibrium.

3.5 Long-Run Causality

The coefficient of ECT states the long-run causality and shows the speed of adjustment. ECT is the one period lagged value of the error term. The significance of ECT suggests that the long-run equilibrium relationship is driving the dependent variable. The expected value of β_t should be significant and a negative number. The absolute value of β_t (between 0 and 1) indicates how quickly the equilibrium is restored.

3.6 Short-Run Causality

Short-run causality is tested in this paper by evaluating the combined significance of the coefficients of the independent variables γ_t and δ_t . As discussed in Baker et al. (2015), the combined significance indicates how the dependent variable is reacting to short-term impacts. Our short-run causality analysis is conducted using a standard Chi-square Wald test.

3.7 Pairwise Granger Causality

Pairwise Granger Causality is tested here to establish the direction of causality based on the F-statistics. The null hypotheses are i) GDP does not Granger cause Remittances ii) Remittances does not Granger cause GDP. Based on the value of F-statistics and corresponding p-values, we can reject or accept the null hypotheses.

4. Results

As the first step, we tested our series with time series unit root tests to check the stationarity properties of our time series datasets in terms of whether they are integrated of the same order (Granger, 1988). Table 2 reports the results of the ADF test on the integration properties of the GDP and remittances for Togo. Results of the two tests indicate that the two series are non-stationary according to their levels but stationary in first differences.

Table 2: Unit root test

Variables	Deterministic	ADF	
		Level	First difference
<i>GDP</i>	Intercept	1.76	-5.35***
	intercept and trend	-0.39	-5.79***
<i>REMIT</i>	Individual intercept	1.43	-2.81**
	Individual intercept and trend	0.12	-3.55**

Note: Lag length based on Schwarz information criterion (SIC)

*p<0.10, ** p<0.05 and *** p<0.01, these represent significant p values.

As the series were integrated of the same order for all variables, we proceeded to investigate cointegration using Johansen cointegration tests. The cointegration test results are shown in Table 3 suggest a long-run relationship between the variables. Both trace test and max-eigen test indicate 1 cointegrating equation at 5% level. As discussed in the methodology section, given that the series are confirmed to be cointegrated, we can proceed with the VECM test to evaluate the direction of the causality as well as potential time lags.

Table 3: Johansen cointegration test (Trace and Maximum Eigenvalue)

Variable Series	Hypothesized no. of CE(s)	Eigenvalue (from trace statistic)	Eigenvalue(from max-eigen statistic)
<i>Remittances_t and GDP_t</i>	None	0.27**	0.27**
	At most 1	0.02	0.02

Note: *p<0.10, ** p<0.05 and *** p<0.01, these represent significant p values.

The VECM test does show not only the long-run causal direction but also the significance of the speed of adjustment β_t (which is the coefficient of ECT in equations 1 and 2) and hence the robustness of the indication for the long-run equilibrium relationship. A significantly negative value but absolute value between 0 and 1 suggest a long-run equilibrium relationship (Baker et al. 2015). Table 4 summarize the VECM results for the Remittances-GDP relationships. It is worth noting that according to Holtz-Eakin et al. (1988), lag length selection is critical for finding the Granger causality and it should be less than 1/3 of the total time period as otherwise over identification problems may arise. A further criteria for the lag length selection has been proposed by Hurlin (2004) as $T_i > 5 + 2K$ (T_i = time span, K =Lag length). In this paper we, chose a lag length of 4 years for all models

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based on the Schwarz information criterion (SIC). Because our overall time span is 42 years the lag length selection meets both the Holtz-Eakin et al. (1988) and the Hurlin (2004) criteria.

Table 4 shows the results of long-run causality for remittances and GDP. The coefficient of ECT is negative and significant for the both models, which confirms that there is a long-run bi-directional causality running from economic growth to remittances and vice versa (significant ECT).

Table 4: Results of long-run causality for Remittances and GDP

Explanatory factors	Model 1: Δ Remit	Explanatory factors	Model 2: Δ GDP
<i>1-year lag of Δ GDP</i>	-0.0439	<i>1-year lag of Δ Remit</i>	-0.2779
<i>2-year lag of Δ GDP</i>	-0.0290	<i>2-year lag of Δ Remit</i>	-0.0811
<i>3-year lag of Δ GDP</i>	-0.0497	<i>3-year lag of Δ Remit</i>	-0.0811
<i>4-year lag of Δ GDP</i>	-0.0342	<i>4-year lag of Δ Remit</i>	-0.2455
<i>Constant</i>	23.62	<i>Constant</i>	107.94
<i>Long-run causality (ECT)</i>	-0.0187**	<i>Long-run causality (ECT)</i>	-0.0677**

Note: * $p < 0.10$, ** $p < 0.05$ and *** $p < 0.01$, these represent significant p values. Lag length based on Schwarz information criterion (SIC)

Table 5 summarizes the direction of both long-run and short-run causal relationships of all data series. Our pairwise Granger causality results reject the null hypotheses of i) *GDP* does not Granger cause *remittances* and iii) *Remittances* does not Granger cause *GDP*. Thus, the results indicate the bi-directional causality is running from economic growth to remittances and also from remittances to economic growth. The results further confirm a long-run bi-directional causal relationship between remittances and economic growth. However, no significant chi-square statistics were obtained from our application of standard Wald test, and our results do therefore not support the notion of a short-run causal relationship between the economic growth and remittances activity. The results are found analogous to Sri Lanka but it differs from other countries (e.g. Bangladesh and India) as the spatial context matters for this kind of analysis (Siddique et al. 2012)

Table 5: A summary of the causal relationships and direction of causality

Variables	Pairwise Granger causality test (F-statistic)	Long-run causality (ECT)	Short-run causality (Chi-square statistic)
<i>GDP</i> → <i>Remittances</i>	3.11*	-0.0187**	2.51
<i>Remittances</i> → <i>GDP</i>	3.29*	-0.0677**	0.42

Note: * $p < 0.10$, ** $p < 0.05$ and *** $p < 0.01$, these represent significant p values. Lag length based on Schwarz information criterion (SIC)

5. Conclusions

This paper examines the Granger causal association between remittances activity and GDP for Togo. For this analysis, we employed various time series econometric techniques such as unit root test, cointegration, vector equilibrium correction method and Wald test. The empirical results suggest that a long-run bi-directional Granger causality exists which runs from economic growth to remittances and also from remittances to economic growth. Moreover, our results also indicate that there is no short-run causal relationship between remittances and economic growth. As our results suggest an absence of short-run causality but instead a long-run bi-directional causality exists between economic growth

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and remittances activity. Thus, the responsible stakeholders in Togo have some time to implement appropriate policies and to invest in the vital assets and frameworks to accommodate the results.

Our finding also suggests that proper policy should be taken to explore more overseas employment and appropriate use of remittances would boost the economic development of Togo. The government can increase pressure to decrease the use of the informal channel of money transfer and facilitate the formal channel with low transaction cost to achieve the maximum benefit from remittances. The economic growth also enables people to migrate to develop countries and help to increase the flow of remittances which is also revealed in our results. The extension of social programs in microfinance, skills development, and the lowering of interest rates on pre-departure loan schemes (World Bank 2005) could give the significant help for struggling households not yet meeting the initial cost of migration. Further studies could seek to incorporate other time-varying covariates (e.g. robust data on foreign direct investment, industrialization) in the analysis by using the multivariate econometric framework to improve the model presented here.

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Appendix

Figure 1: Real GDP and the remittances in Togo (Source: World Bank, 2017)

