

Impact of Workers' Remittances on Import Demand in Cote d'Ivoire: An ARDL Bounds Testing Approach

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Abstract: This study investigates the relationship between workers' remittances and imports in Cote d'Ivoire during the period from 1975 to 2017. The study employs the bounds testing approach to cointegration and the Granger causality test in the examination of this relationship. The results show that in the long run, remittances and domestic income are positively and significantly related to import demand. The Granger causality test results show bidirectional causality between imports and remittances both in the long and short run. Furthermore, domestic income was found to cause imports and remittances both in the long and short run. Therefore, the role played by remittances and economic growth becomes crucial in determining the trade balance of Cote d'Ivoire.

Keywords: remittances, imports, causality, Cote d'Ivoire

JEL classification: C32, F10, F22

1. Introduction

Workers' remittances to developing countries have increased significantly in recent years, becoming an important source of external financial flows to these countries. Remittance inflows to Sub-Saharan Africa increased from 0.9 percent of GDP in 1994 to 1.6 percent in 2004 and reached 2.3 percent in 2014. This growing trend in remittances inflows has caught great interest of researchers and policymakers for their impacts on various aspects of economic development, including poverty, inequality, education, health, financial development, labor supply, real exchange rate, and economic growth (Adams and Page, 2003; Edwards and Ureta, 2003; Amuedo-Dorantes and Pozo, 2004; World Bank, 2006; Gupta *et al.*, 2009; Aggarwal *et al.*, 2011; Driffield and Jones, 2013; Nsiah and Fayissa, 2013; Beyene, 2014; Imai *et al.*, 2014; Nwaogu and Ryan, 2015; Keho, 2017; Meyer and Shera, 2017; Eggoh *et al.*, 2019). Recently, a strand of the economic research has examined the effects that remittances could have on import demand and

trade balance of the home countries. Do remittances significantly affect import demand in the home countries?

The objective of this study is to estimate the impact of remittances on import demand in Cote d'Ivoire. Our concern with this topic stems from the potential effects of remittances on the consumption of durable and non-durable imported goods. These effects are reflected in the trade balance and later in the balance of payments of the home country. Workers' remittances play a potentially important role in the import demand, particularly for low-income countries. Theoretically, the impact of remittances on import demand is ambiguous. As they can be used either for consumption or investment, they can increase the demand for goods including imported ones and thus deteriorate the trade balance of the home country. Therefore, remittances are expected to have a positive influence on import demand. On the other hand, the response of imports to remittances may be lower or insignificant if remittances go to the subsistence of low income households, which have limited taste for foreign consumption goods. The empirical regarding the remittances-imports is mixed and inconclusive. A number of studies find that remittances increase the demand for import and act as a source for financing imports (e.g., Munir *et al.*, 2007; Adel and Othman, 2013; Karan and Sanjanya, 2013; Soana and Olta, 2013; Sayed, 2014; Bashier, 2018; Dhungel, 2018), while other studies find that remittances have no significant impact on the demand for imported goods (e.g., Muktadir-Al-Mukit *et al.*, 2013; Ahmed *et al.*, 2014; Ogbonna, 2016). Using disaggregated data on imports for Pakistan, Zaman and Imrani (2005) find that remittances have no impact on the demand for imported consumer goods whereas they have a positive impact on import of capital goods and raw materials.

Despite the increasing importance of migrant workers' remittances in recent years, the relationship between remittance inflows and imports has not been extensively studied for African countries. This study attempts to fill the gap and enrich the empirical literature by investigating the case of Cote d'Ivoire. To the best of our knowledge, it is the first study of its kind for this country. Besides that, Cote d'Ivoire provides an interesting venue for research for several reasons. First of all, Cote d'Ivoire has made remarkable economic progress over the recent years, recording an annual average economic growth rate of 8.2% during the period 2012-2017. It is among the top ten reforming countries in the world and remains a preferred destination for foreign investors in West Africa. Secondly, Cote d'Ivoire envisions to become an emerging country by 2020. To achieve this vision, the government embarked on policies aimed at attracting external financial resources into the country. There is a Ministry devoted to Diaspora, which

is working to increase the contribution of the Ivorian Diaspora in financing private investment, creating jobs, reducing poverty and achieving the structural transformation of the country. Workers' remittances to Cote d'Ivoire grew from 0.31% in 1975 to 1.37% in 1995 and reached 1.56% in 2011. How do imports of goods and services react to remittance inflows in Cote d'Ivoire? Is there a causal link between remittances and imports of goods and services?

The remainder of the paper is organized as follows. Section 2 presents the empirical model, the data and the econometric methodology. Section 3 reports and discusses the empirical findings of the study. Section 4 concludes the study and provides some policy recommendations.

2. Model, data and methodology

2.1. Model and data

Our aim in this study is to examine the relationship between remittance inflows and import demand in Cote d'Ivoire. This objective is achieved by estimating the following empirical model:

$$\ln M_t = \beta_0 + \beta_1 \ln \text{REM}_t + \beta_3 \ln Y_t + \mu_t \quad (1)$$

where M_t denotes imports of goods and services, REM_t stands for inflow of workers' remittances into the country from abroad, Y_t denotes real GDP per capita, and μ_t is the error term with is normally distributed with mean zero and constant variance. The research hypothesis is that remittances have a significant positive impact on import demand. The presumption can be rationalized that in Cote d'Ivoire remittances are spent in consumption and most of the consumable goods are imported.

The study uses annual time series data spanning the period from 1975 to 2017. Variables under study are imports of goods and services as share of GDP, remittances inflows as share of GDP and real GDP per capita. The data were drawn from the World Development Indicators of the World Bank. Table 1 provides descriptive statistics and correlations of the variables. It can be observed that imports accounted for 35.041% of GDP over the sample period, while remittances averaged 0.786% of GDP. The correlation matrix shows a positive and significant relationship between imports and remittances. This positive relationship could be compatible with the imports-led remittances hypothesis, the remittances-led imports hypothesis or two-way causality between imports and remittances. Does any significant causal relationship exist between imports and remittances after controlling for income?

Table 1
Descriptive Statistics and Correlation Matrix

<i>Variables</i>	<i>Imports (% GDP)</i>	<i>Remittances (% GDP)</i>	<i>GDP</i>
<i>Panel A: Summary statistics</i>			
Mean	35.041	0.786	714172.1
Median	34.443	0.907	656537.8
Maximum	44.745	1.562	1124115.
Minimum	25.906	0.253	535130.2
Std. dev.	5.039	0.408	159666.2
Skewness	0.129	0.160	1.201724
Kurtosis	2.156	1.596	3.398082
Jarque-Bera	1.393	3.714	10.63360
Probability	0.498	0.156	0.004908
<i>Panel B: Correlation matrix</i>			
M	1.000		
REM	0.272**	1.000	
GDP	0.046	-0.724*	1.000

Note: * and ** indicate statistical significance at the 5% and 10% levels, respectively.

We plot the patterns of imports and remittances over the sample period. We can see from Figure 1 that both variables exhibit considerable fluctuations over the sample period. Imports increased from 1975 to 1981 and then decreased from 1981 up to 1994, the year of devaluation of the country's currency (CFA franc). After this date, imports have been oscillating. With regard to remittances, they increased from 1975 to 1995 and then decreased from 1995 to 2008. From 2008, they showed an increasing trend reaching a pic in 2011 and then decreased.

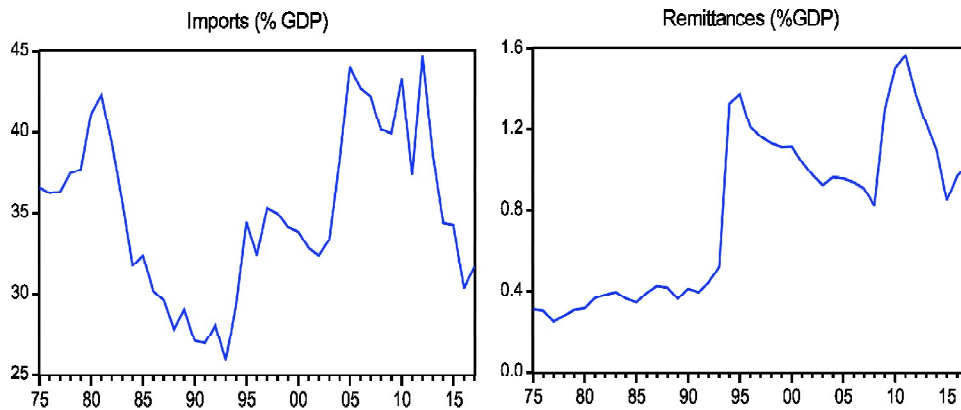


Figure 1: Imports and Remittances (% GDP) over the period 1975-2017

Table 2 presents the structure of imports over the period 2002-2017. The Table shows that consumer goods represent a substantial share of total imports. On average, 44% of total imports are consumer goods, 31% are intermediate goods, and 25% are capital goods. These figures show the heavy reliance of the Ivorian economy on imported consumer goods to meet the domestic demand of households.

Table 2
Structure of imports by commodity types (as share of total imports)

	2002	2004	2006	2008	2010	2012	2014	2016	2017
Consumer goods	46.45	35.86	35.57	39.20	39.03	39.97	39.72	48.23	50.75
Intermediate goods	36.51	35.61	43.72	48.92	35.63	41.60	38.48	29.35	25.26
Capital goods	17.04	28.52	20.70	11.88	25.34	18.43	21.80	22.42	23.99
Total	100.00	100.00	100.00	100.00	100.00	100.00	100.00	100.00	100.00

Source: General Administration of Customs, Cote d'Ivoire.

2.2. Econometric methodology

Most of the time series data are nonstationary due to the presence of unit root or time trend. In such situation regression results may be misleading. Hence, our empirical analysis involves three steps. As a first step, the PP unit root test of Phillips and Perron (1988) and the KPSS test of Kwiatkowski *et al.* (1992) are used to check the order of integration of the series. With the results from the unit root tests, we test whether there is a long run relationship among the variables. For this purpose, we employ the Autoregressive Distributed Lag (ARDL) bounds testing approach to cointegration developed by Pesaran *et al.* (2001). This approach performs well in small samples without concerning whether the regressors are stationary at level or stationary in first difference. It eliminates the uncertainty associated with pre-testing the order of integration of the series. To carry out the ARDL bounds test to cointegration, Eq.(1) is reformulated as an error correction model as follows:

$$\Delta \ln M_t = \phi_0 + \phi_1 \ln M_{t-1} + \phi_2 \ln REM_{t-1} + \phi_3 \ln Y_{t-1} + \sum_{i=1}^m \gamma_{1i} \Delta \ln M_{t-i} + \sum_{i=0}^n \gamma_{2i} \Delta \ln REM_{t-i} + \sum_{i=0}^p \gamma_{3i} \Delta \ln Y_{t-i} + e_t \quad (2)$$

where Δ is the difference operator defined as $\Delta Z_t = Z_t - Z_{t-1}$. The presence of a long run relationship between the variables is tested by restricting coefficients of lagged level variables equal to zero. That is, the null hypothesis of no long-run relationship is $H_0: \phi_1 = \phi_2 = \phi_3 = 0$. This hypothesis

is tested through an F -test. Under the null hypothesis, however, the distribution of this F -statistic is non-standard, irrespective of whether the variables are integrated of order zero or one. Pesaran *et al.* (2001) have tabulated two sets of critical values that account for integrating properties of the variables. If the calculated F -statistic is higher (lower) than the upper (lower) critical value, then the null hypothesis of no cointegration can (cannot) be rejected.

The ARDL bounds testing procedure is sensitive to the selection of the lag structure (m, n, p) . In this study, maximum lag length on each variable was set to five and the optimal lag structure was selected using the AIC criterion. The model has been tested by the diagnostic tests that are serial correlation, normality and heteroskedasticity tests. The stability of the model has also been tested using the Brown *et al.* (1975) cumulative sum of recursive residuals (CUSUM) and the cumulative sum of squares of recursive residuals (CUSUMSQ). Once a long-run relationship is identified amongst the variables, the estimated long run coefficients are obtained as the negative value of the coefficients for the lagged explanatory variables divided by the coefficient for the lagged dependent variable. The short run coefficients are simply the estimated coefficients of the first differenced variables in the unrestricted error correction model.

Once the evidence for cointegration is established, the third step of the work investigates the causal link between remittances and imports using the Granger causality test. To this end, the model to be estimated is specified as follows:

$$\Delta \ln M_t = \alpha_1 + \sum_{i=1}^p \gamma_{1i} \Delta \ln M_{t-i} + \sum_{i=1}^p \varphi_{1i} \Delta \ln REM_{t-i} + \sum_{i=1}^p \delta_{1i} \Delta \ln Y_{t-i} + \lambda_1 ect_{t-1} + e_{1t} \quad (3)$$

$$\Delta \ln REM_t = \alpha_2 + \sum_{i=1}^p \gamma_{2i} \Delta \ln M_{t-i} + \sum_{i=1}^p \varphi_{2i} \Delta \ln REM_{t-i} + \sum_{i=1}^p \delta_{2i} \Delta \ln Y_{t-i} + \lambda_2 ect_{t-1} + e_{2t} \quad (4)$$

The optimal lag length p is selected using the Akaike Information Criterion (AIC) and the Final Prediction Error (FPE). These criteria have been shown to perform better than other information criteria (Lutkepohl, 1991; Liew, 2004). The error correction specification can identify the short and long run causal relationships among the variables. The short run causality tests the significance of the coefficients of the lagged difference terms, while the long run causality can be identified by testing the significance of the coefficients on the error correction terms. In terms of short run causality, remittances do not Granger cause imports if the null hypothesis $\varphi_{11} = \varphi_{12} = \dots = \varphi_{1p} = 0$ is not rejected. Similarly, imports do not Granger cause remittances if the null hypothesis $\gamma_{21} = \gamma_{22} = \dots = \gamma_{2p} = 0$ is

rejected. With regards to the long run causality, remittances do not cause imports if the coefficient λ_1 is not significant. Similarly, imports do not cause remittances if the coefficient λ_2 is not significant.

3. Empirical results

We begin our empirical analysis by examining the stationarity of the variables. The results of the unit root tests are summarized in Table 3. As can be seen from this Table, all the variables have unit root in their level but are stationary at the first difference. Thus, we can conclude that the variables under study are integrated of order one. Based on this result, the next step of our empirical investigation is to test for the existence of long run relationship among the variables.

Table 3
Results of Unit Root Tests

Series	Level		First difference		Order of integration
	PP	KPSS	PP	KPSS	
lnM	-1.961	0.168	-6.922*	0.091	I(1)
lnREM	-1.387	0.687*	-5.281*	0.092	I(1)
lnGDP	-1.563	0.584*	-4.101*	0.356	I(1)

Note: M, REM, and GDP denote aggregate imports as share of GDP, remittances as share of GDP, and real GDP per capita, respectively. The unit root tests have been performed under the model with intercept. * indicates the rejection of the null hypothesis at 5% level of significance.

To investigate the existence of a long-run relationship between the variables, the bounds test is employed under the ARDL approach framework. The results of the bounds test are displayed in Table 4. The calculated F-statistics are compared with the critical values provided by Pesaran *et al.* (2001). The results show that a long run relationship exists among the variables when imports variable is used as dependent variable. In this case, the computed F-statistic value is greater than the upper bound critical value at 5% level of significance. All diagnostic tests do not exhibit any evidence of violation of the classical linear regression model assumptions.

The robustness of cointegration results is tested by running the Johansen and Juselius (1990) multivariate cointegration test. The results presented in Table 5 indicate that both the maximum eigenvalue and trace statistics support the existence of at least one cointegrating relationship among the variables. This leads us to conclude that a long run relationship exists between imports, remittances and income in the case of Cote d'Ivoire over the period from 1975 to 2017.

Table 4
Results of the ARDL Cointegration Test

Dependent variable	Model	F-stat.	Diagnostic tests		
			Normality	Heteroscedasticity	Correlation
lnM	ARDL(5,4,5)	4.701*	0.539	0.592	0.249
lnREM	ARDL(5,5,5)	6.665*	0.780	0.271	0.887
lnGDP	ARDL(3,2,1)	2.164	0.420	0.332	0.480
Critical values					
		Lower bounds I(0)	Upper bounds I(1)		
5%	3.10		3.87		
10%	2.63		3.35		

Note: M represents imports of goods and services as share of GDP, REM stands for remittances as share of GDP, and GDP is real GDP per capita. Lag length on each variable is selected using the AIC criterion with maximum lag set to 5. Critical values are from Pesaran *et al.* (2001). The model ARDL includes a dummy variable taking value 1 from 1994 to 2005. * indicates the rejection of the null hypothesis of no cointegration at the 5% level of significance.

Table 5
Results of the Johansen Cointegration Test

		Maximum Eigenvalue Test		Trace Test	
H_0	H_1	Statistic	Prob.	Statistic	Prob.
r=0	r=1	47.962*	0.000	62.558*	0.000
r≤1	r=2	14.547*	0.045	14.595**	0.068
r≤2	r=3	0.048	0.825	0.048	0.825

Note: r indicates the number of cointegrating vectors. The Akaike information criterion was used to select the number of lags required in the cointegrating test. The model VAR includes a dummy variable taking value 1 from 1994 to 2005. The tests have been performed under the model with a constant term in both the cointegrating equation and the VAR. * and ** indicate the rejection of the null hypothesis of no-cointegration at the 5% and 10% levels, respectively.

Given the above results, we proceed to estimating the long run relationship between the variables. For comparison purpose, we estimate the long run relationship using the ARDL approach of Pesaran *et al.* (2001), the Johansen (1988) method, the Fully Modified OLS (FMOLS) estimator proposed by Phillips and Hansen (1990), and the Dynamic OLS (DOLS) estimator suggested by Stock and Watson (1993). These estimation techniques account for the possible endogeneity of the variables. The results summarized in Table 6 indicate that imports are positively related to remittances and domestic income. The impact of income on import demand is stronger than that of remittances. Specifically, keeping other things

constant, a one percent increase in income causes imports to rise by about 1.346 percent, while a one percent change in remittances results in a 0.703 percent increase in imports. Thus, a large part of the remittances that Ivorian workers send home from abroad countries is spent in consumption of goods that are not matched with domestic production, resulting in increased imports. Our finding is consistent with theoretical expectations and empirical studies by Zaman and Imrani (2005), Sayed (2014), and Dhungel (2018), but contradicts with those of Mukit *et al.* (2013) and Ahmed *et al.* (2014) who found that remittances have no significant impact on the demand for imported goods in Bangladesh and Pakistan, respectively. The results also support the "demand as driver" view that income increases encourage people to demand more foreign goods which increases imports of goods and services. This finding confirms those of Dutta and Ahmed (2004) and Chani *et al.* (2011) who reported a positive impact of domestic income on import demand in India and Pakistan, respectively. The results of this study suggest that the trade balance of Cote d'Ivoire is likely to worsen with remittance inflows and economic growth if it is not compelled through increasing exports.

Table 6
Long-run Relationship

Regressors	Dependent variable is $\ln M$		
	ARDL	DOLS	FMOLS
$\ln \text{REM}$	0.703* (5.939)	1.428* (3.011)	0.206* (2.974)
$\ln \text{GDP}$	1.346* (4.785)	5.373* (3.131)	0.464 (1.547)
Constant	-14.186* (-3.800)	-67.847* (-2.972)	-2.628 (-0.655)

Note: M denotes imports as share of GDP, REM stands for remittances as share of GDP, and GDP represents real GDP per capita. The model ARDL includes a dummy variable taking value 1 from 1994 to 2005. The asterisk * denotes statistical significance at the 5% level.

We apply the VECM Granger causality approach to detect the directional causal relationship between import demand, remittances and income. The results are presented in Table 7. As we can see from this Table, the relationship between imports and remittances is bidirectional in the short run. Furthermore, there is one-way causality running from income to imports and remittances. This suggests that economic growth is a major driver of trade balance and remittances. With respect to the long run causality, there is bidirectional causality between imports and remittances. Also, income causes both imports and remittances in Cote d'Ivoire, confirming the leading role of economic growth in imports and remittances.

Table 7
Results of the VECM Granger Causality Tests

Variables	Direction of Granger Causality			
	Short Run			Long Run
	M	REM	GDP	ECT _{t-1}
M	-	13.084* [0.010]	9.895* [0.042]	-0.233* [-2.354]
REM	17.335* [0.001]	-	16.492* [0.002]	-1.228* [-5.082]
GDP	1.547 [0.818]	3.093 [0.542]	-	0.079 [1.152]

Note: M denotes imports as share of GDP, REM stands for remittances as share of GDP, and GDP represents real GDP per capita. χ^2 statistics for Wald tests are reported here and the p -value are indicated in brackets. Values in brackets for ECT_{t-1} are t-statistics. Significance at 5% and 10% levels are denoted with * and ** respectively.

4. Conclusion

This study has examined the impact of remittances on the import demand of Cote d'Ivoire over the period from 1975 to 2017. The study employed the bounds testing approach to cointegration and Granger causality tests. The estimation results support the existence of a long run relationship between the three variables. The long run results show positive and significant effects of remittances and income on imports. The impact of income on imports was found to be greater than that of remittances. This suggests that economic growth is playing a crucial role in explaining import demand and trade balance position in Cote d'Ivoire. Further, the Granger causality test was carried out to discover the direction of causality among the variables. The results indicate that there is bidirectional causal link between imports and remittances both in the long and short run. Domestic income also causes both imports and remittances in the long and short run. The role played by remittances and economic growth becomes crucial in determining the trade balance of Cote d'Ivoire. These findings imply that if remittances from abroad play an important role in reducing poverty, they may deteriorate the balance of payment position through trade balance. Therefore, the study suggests that policy related to diversify domestic production should be encouraged in order to reduce imports of goods and services.

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