Foreign Direct Investment and Import Demand in Cote d'Ivoire

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Abstract—**This study investigates the impact of inward foreign direct investment (FDI) on aggregate imports in Cote d'Ivoire using time series data covering the period from 1980 to 2017. The importance of this topic arises from its impact on the balance of payments. To test this nexus, we extend the traditional import demand function to include FDI and employ the bounds testing approach in the autoregressive distributed lag framework. The results reveal that there is long run relationships among imports, income, domestic price, import price and FDI, and all the four variables are significant determinants of imports in Cote d'Ivoire both in the long and short run. Domestic income and FDI were found to have positive effects on imports, while relative import price exerts a negative effect.**

Index Terms—**Imports, foreign direct investment, income, relative price, Cote d'Ivoire.**

I. Introduction

The role of international trade in economic growth has been a subject of interest among economists. Imports of capital goods in particular are regarded as vital for economic growth, especially in developing countries characterized by limited productive capacity. On the other hand, increases in imports may create external imbalances and their culmination into debt problems. For this reason, a large body of research has been designed to investigate factors that influence import demand. Most empirical studies have examined this issue within the traditional formulation of import demand function relating the volume of imports to domestic real income and relative import price [1]-[9]. In these studies the role of other relevant variables such as financial development, foreign direct investment, exchange rate and foreign reserves has been ignored.

This study enriches the existing literature by investigating the effect of foreign direct investment (FDI) inflows on import demand in the case of Cote d'Ivoire. Historically, the benefits and costs of FDI have been subject of intense debate. FDI is regarded as an important factor of economic development, particularly for African countries facing a large resource gap. FDI is not only expected to increase the stock of physical capital and the productive capacity of the economy but also a vehicule for technical progress [10]-[12]. Although the growth impact of FDI is debatable, it is still believed that foreign capital plays a vital role in promoting economic development. See [13], [14] and [15] for reviews. However, FDI can have significant effects on trade balance and the balance of payments of the host country. In this paper we are interested in the effects that FDI could have on imports of the host country. FDI can influence imports both at the initial investment and operation phases. At the initial investment phase, FDI companies import equipements and intermediate goods and services that are not readily available in the host country. This contributes to deteriorate trade balance. At the operation phase of the investment, input nature type determines the effect of FDI on imports. If FDI industries use local inputs of production, they may not have significant adverse effect on imports. On the contrary, if they rely on imported inputs, they may increase imports and deteriorate trade balance. The effect of FDI on imports also depends on the output type of FDI. If the output is complementary to other products that are imported, FDI may encourage import and adversely affect the balance of payments. On the other hand, if FDI inflows are concentrated in import substituting industries, then they reduce imports because the goods that were imported earlier would now be produced locally. In this case, FDI improves the host country's balance of payments position. Thus, at the theoretical level, the relationship between imports and FDI can be positive or negative. See [16], [17] and [18] for more discussion.

As far as empirical studies are concerned, they reveal mixed evidence on the effects of FDI on imports. There is evidence that FDI is positively related to imports [19]-[26]. Some even discovered a negative effect of FDI on imports [27], [28], while others found no evidence of any impact of FDI on imports [29], [30].

To the best of our knowledge, no study has investigated the effect of FDI on import demand in Cote d'Ivoire. In this paper, we attempt to examine the empirical relationship between FDI and imports in Cote d'Ivoire. To achieve this objective, we extend the traditional import demand function by incorporating FDI as a potential determinant of imports. In analysing the FDI–imports relationship for Cote d'Ivoire, we hope to shed some light on current debate surrounding this issue. We test some of the assumptions implied by conventional formulation of import demand function focusing on the price homogeneity hypothesis and the role of FDI inflows. 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 last seven years. It is among the top ten reforming countries in the world and remains a prefered destination for foreign investors in West Africa. The implementation of its

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National Development Plan combined with large-scaled structural reforms has helped maintain an annual average economic growth rate of 8.2% during the period 2012-2017. Secondly, Cote d'Ivoire envisionnes to become an emerging country by 2020. To achieve this vision, the goverment of Cote d'Ivoire embarked on policies aimed at attracting foreign investment into the country. It is assumed that FDI is the key to improving economic growth, creating jobs, reducing poverty and acheiving the structural transformation of the economy. In order to improve the business environment, the country put into places a number of major reforms, such as adoption of a programme of dematerialization of services and administrative acts, introduction of an online platform to pay taxes, adoption of a new investment Code, establishment of a one-stop shop for business creation and establishment of online complaints debit at the Commercial Court. On the other hand, the country enjoys diversified mining and farming resources, a network of infrastructure in the process of modernisation, and a strategic coastal location. As a developing country, Cote d'Ivoire has been successfully attracting FDI. FDI inflows are growing at the average of 16.2% per annum over the period 2012-2017. In 2017, FDI inflows reached $675 million, representing an increase of 17% compared to 2016. In the same time, FDI inflows to Sub-Saharan Africa fell by 27% in 2017 to $29.6 trillion from $40.4 trillion. Estimated at $9.475 billion, the total stock of FDI represents 25.7% of the country's GDP. Over the same period, imports also increased by 6.7% per annum. The growth in both FDI and imports opens the question about the relationship between these two macroeconomic variables. How does import demand of goods and services react to foreign direct investment inflows? Is there a causal link between foreign direct investment and imports?

The remainder of the paper is organized as follows. Section II discusses the modeling framework for empirical examination of the relationship between FDI and imports. Section III discusses the empirical results and Section IV concludes the study and provides some policy recommendations.

II. Model, Data and Methodology

A. Empirical Model

Our aim in this study is to examine the empirical relationship between foreign direct investment inflows and imports in Cote d'Ivoire. This objective is achieved by extending the traditional import demand function to include FDI as an explanatory variable. Therefore, our empirical model is specified as follows:

$$\ln M_t=\beta_0+\beta_1\ln Y_t+\beta_2\ln PD_t+\beta_3\ln PM_t+\beta_4\ln FDI_t+\mu_t \quad (1)$$

where $\ln M_t$ is the natural logarithm of real imports of goods and services, $\ln Y_t$ is the natural logarithm of nominal income, $\ln PD_t$ is the natural logarithm of the price of domestically produced goods and services, $\ln PM_t$ is the natural logarithm of the price of imported goods and services, lnFDI is the natural logarithm of real foreign direct investment inflows, and μ_t is the error term which is normally distributed with mean zero and constant variance.

In the above model, we use two separate price variables instead of the relative import price, to capture the price effects on imports. This equation refers to the absolute price formulation. Most existing empirical studies follow the standard theory of demand that assumes that import demand function is homogeneous of degree zero in prices and income, which implies the absence of money illusion [31]. Accordingly, this suggests that the import demand function can be expressed as a function of real income and relative price of imports defined as the ratio of import price to domestic price. This formulation reduces the problem of multicolinearity that may exist between import and domestic price variables. However, such a demand function implicitly imposes the restriction that $\beta_1+\beta_2+\beta_3=0$. If this restriction does not hold, it can lead to inappropriate specification and misleading estimates. Reference [32] argued that the weight assigned to some goods may differ between the import price and the domestic price level, and consumers may react differently to changes in import price and domestic price. Reference [33] also contented that modeling the dynamics of imports demand using relative prices implies identical dynamic response of imports to changes in import and domestic prices. This situation is unlikely to hold, as economic agents use different information sets to form their expectations about domestic and imports prices. In addition, domestic prices may be less variable than import prices. To ensure that the traditional version of import demand is appropriate, the restriction $\beta_1+\beta_2+\beta_3=0$ should be tested. When the income variable Y enters in Eq.(1) in real terms, then the relative price formulation (price homogeneity hypothesis) imposes the restriction that the effects of import price and domestic price are equal in magnitude but opposite in sign, that is : $\beta_2+\beta_3=0$. Under the price homogeneity hypothesis, the empirical import demand function becomes.

$$\ln M_t=\gamma_0+\gamma_1\ln Y_t+\gamma_2\ln RP_t+ +\gamma_3\ln FDI_t+\mu_t \quad (2)$$

where Y is real income and RP denotes relative price of imports, which captures the trade-off between imported and domestic goods.

Consistent with demand theory, imports are positively related to real income. An increase in domestic income will lead to a greater demand for foreign goods. Additionally, if the increase in income also leads to an increase in domestic investment, then investment goods not domestically produced are bought from abroad. However, the literature also suggests a potentially negative effect of income on imports, given that when real income grows, the productive capacity of the country increases and the country becomes more self-sufficient in terms of production, thereby relies less on foreign goods. A positive coefficient is expected on domestic price as domestic price increases, foreign goods become cheaper and import demand increases. The import price is expected to have a negative influence on demand for imports because consumers tend to substitute domestic goods for imports when the price of imports increases. Concerning the effect of FDI on imports, it depends on the substitutability or complementarity existing between imports and FDI. A positive effect is expected when the complementarity hypothesis holds, whereas a negative effect is expected when substitutability prevails.

B. Data Description

The data set used in this study comprises of real imports (M), income (Y), domestic price index (PD), import price index (PM) and foreign direct investment inflows (FDI). These data were obtained from the 2019 World Development Indicators of World Bank and the data base of the United Nations Conference on Trade and Development (UNCTAD). The sample period spans from 1980 to 2017. Import unit value index was used as a proxy for import price, GDP deflator was used as a proxy for domestic price index and GDP was used to measure the impact of income on imports. The definition of FDI used in this study is that of the IMF: '…international investment in which a resident entity in one economy (the direct investor) acquires a lasting interest in another economy (the direct investment enterprise)'. A lasting interest is implied if 10 percent or more of the ordinary shares or voting power is acquired by the investor. We used the import unit value index to convert nominal import data in constant local currency (2009=100). GDP and FDI were transformed into constant local currency using the GDP deflator (2009=100). The relative price of imports was calculated as the ratio of import price index to domestic price index. The data are then expressed in natural logarithmic form. This functional form gives elasticity coefficients directly. Moreover, loglinear form reduces the problem of heteroscedasticity of the error term. Studies by [2], [34] and [35] have shown that the log linear transformation of the variables is more effective compared to linear transformation.

The descriptive statistics of the logarithmic transformation of the variables are given in Table I. Over the sample period, real imports stood at an average of 28.905 with standard deviation of 0.410 and median of 28.999, implying that data was symmetrical. The probability values from the Jarque-Bera statistic suggest that all the variables are normally distributed. The correlation matrix indicates positive relationships among the variables. In particular, FDI and imports appear to be positively related to one another. This positive relationship could be compatible with the FDI-led imports hypothesis, the imports-led FDI hypothesis or two-way causality between imports and FDI. Does any significant relationship exist between imports and FDI after controlling for income and prices?

TABLE I: DESCRIPTIVE STATISTICS AND CORRELATION MATRIX

Variables	lnM	lnY	lnPD	lnPM	lnFDI
Panel A: Summary statistics					
Mean	28.905	29.476	4.141	4.109	25.422
Median	28.999	29.649	4.261	4.091	25.830
Maximum	29.594	30.728	4.810	4.856	26.597
Minimum	27.718	28.396	3.319	3.358	23.319
Std. dev.	0.410	0.706	0.493	0.463	0.890
Skewness	-0.618	0.061	-0.211	0.038	-0.824
Kurtosis	3.253	1.734	1.538	1.786	2.574
Jarque-Bera	2.527	2.558	3.665	2.341	4.594
Probability	0.282	0.278	0.159	0.310	0.100
Panel B: Correlation matrix					
lnM	1.000*				
lnY	0.854*	1.000*			
lnPD	0.846*	0.989*	1.000*		
lnPM	0.575*	0.889*	0.892*	1.000*	
lnFDI	0.659*	0.783*	0.794*	0.734*	1.000*

Note: M, Y, PD, PM and FDI denote real imports, nominal GDP, domestic price, import price, and real Foreign Direct Investment inflows, respectively. (*) indicates statistical significance at the 5% level.

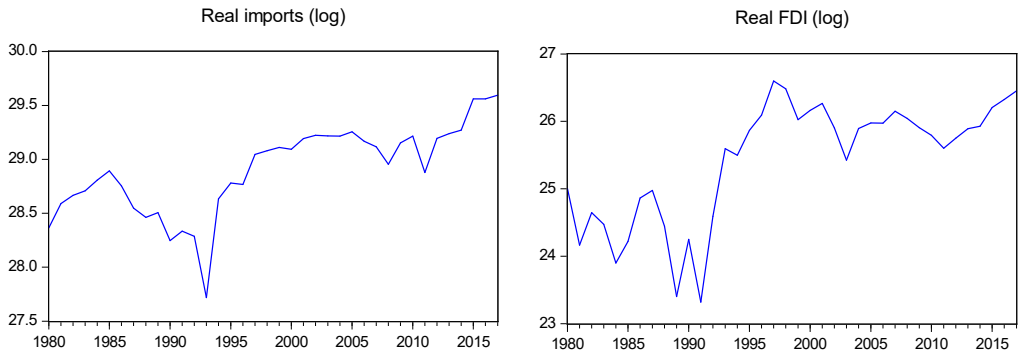

Fig. 1. Real imports and FDI inflows to Cote d'Ivoire over the period 1980-2017.

In Fig. 1, we plot the pattern of real imports and real FDI. As can be seen, the two variables have been oscillating over the sample period. Imports showed an upward sloping trend from 1980 to 1985 with an average growth rate of 9.5%. They recorded a sharp decrease from 1985 to 1993 at an annual growth rate of -11.2%. From 1994, imports exibit an upward sloping trend in line with the devaluation of the country's currency in January, 1994. As observed in Figure 1, imports remain stable over the period 1999-2011 while FDI inflows were declining. It is worthmentioning that over this period, Cote d'Ivoire experienced economic hardship and social unrest. With the end of the civil war in 2011, Cote d'Ivoire embarked on an economic recovery program which led to significant increase in both imports and foreign direct investment.

Table II presents the composition of imports by

commodity types over the recent period. Figures show that Cote d'Ivoire's import basket was dominated by consumer goods up to 2004, though their relative share declined from 46.45 percent in 2002 to 35.86 percent by 2004. During this period, the import of intermediate goods, which was next to consumer goods, averaged 36 percent, while the share of capital goods increased from 17 percent to 28.5 percent. From 2005, the import of intermediate goods dominated aggregate imports up to 2008, with an average of 44 percent, followed by consumer goods which represented 35 percent of imports. From 2010, the import of consumer goods dominated total imports with a share increasing from 39.03 percent in 2010 to 50.7 percent in 2017. On average, 44 percent of Cote d'Ivoire's imports are consumer goods, 31 percent are intermediate goods, and 25 percent are capital goods. These figures clearly show the heavy reliance of the Ivorian economy on imported consumer goods to meet the domestic demand of households.

TABLE II: 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**	**100**	**100**	**100**	**100**	**100**	**100**	**100**	**100**

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

TABLE III: FOREIGN DIRECT INVESTMENT BY SECTORS (AS SHARE OF TOTAL FDI INFLOWS)

	2012	2013	2014	2015	2016	2017	2014-2017
Primary Sector	**31.8**	**2.2**	**36.0**	**30.9**	**39.6**	**38.0**	**36.1**
Agriculture, Forestry and Fishing	0.0	2.2	0.4	0.0	0.9	0.2	0.4
Mining	31.8	0.0	35.6	30.9	38.7	37.8	35.7
Manufacturing Sector	**49.7**	**53.6**	**27.2**	**16.9**	**18.7**	**10.9**	**18.4**
Manufacturing	49.7	53.6	27.2	16.9	18.7	10.9	18.4
Services Sector	**18.4**	**44.2**	**36.8**	**52.2**	**41.6**	**51.1**	**45.5**
Electricity, Gas	0.0	6.3	5.0	6.4	1.0	2.4	3.7
Water distribution, Sanitation	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Construction	0.0	7.3	2.2	2.8	2.0	2.1	2.3
Wholesale and Retail	17.7	1.3	4.6	3.8	6.9	1.4	4.2
Transport and Storage	0.0	0.4	4.6	3.4	2.8	3.4	3.5
Hotels, Restaurants	0.0	0.8	0.3	0.3	2.8	4.0	1.8
Communication	0.0	13.7	8.3	17.9	9.9	12.9	12.2
Financing and Insurance	0.1	14.2	11.3	17.4	15.7	24.5	17.2
Real estate and business services	0.3	0.0	0.1	0.1	0.1	0.4	0.2
Others	0.4	0.2	0.5	0.1	0.5	0.0	0.3
TOTAL	**100.0**	**100.0**	**100.0**	**100.0**	**100.0**	**100.0**	**100.0**

Looking at the destination by sectors of FDI inflows into Cote d'Ivoire, it can be seen from Table III that contrary to common perception, FDI in Cote d'Ivoire is no longer concentrated in the primary sector, but also services sector has received considerable amounts of FDI in recent years. They have been primarily channelled to the primary and services sectors. For example, from 2014 to 2017, the manufacturing sector accounted for 18.4 percent of the total FDI inflows, while services sector accounted for almost 46 percent and primary sector for 36 percent. Foreign direct investments are mainly oriented towards mining, telecommunication, and financing and insurance. These three subsectors have attracted about 65 percent of the total FDI over the period 2014-2017. The allocation of FDI plays a major role in the determination of trade balance and economic growth.

C. Econometric Methodology

The empirical study involves a series of steps as described below. As a first step, we test for the order of integration of the series by using unit root tests. In a second step, we test whether there is a long run relationship among the variables. For this purpose, we rely on the Autoregressive Distributed Lag (ARDL) bounds testing approach to cointegration developed by [36]. This approach enjoys several advantages over other alternative methods such as the two step residual-based procedure of [37] and the system-based reduced rank regression approach designed by [38]. The first main advantage of the ARDL bounds test approach is that it can be used with a mixture of I(0) and I(1) regressors. Hence, it eliminates the uncertainty associated with pre-testing unit root tests in small sample sizes. Secondly, the bounds test provides unbiased estimates of the long-run statistics even in the presence of endogeneous regressors [39] [40]. Lastly, different variables can be assigned different lag-lengths as they enter the model. It is against this background that we prefer the ARDL approach over conventional cointegration techniques.

The ARDL bounds testing procedure is based on the following equation:

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

where Δ is the difference operator and Z_t=($\ln Y_t$, $\ln PD_t$, $\ln PM_t$, $\ln FDI_t$). The presence of long-run relationship 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: $\phi_1=\phi_2=0$. This hypothesis is tested through an F-test. The asymptotic critical values are provided by [36]. The ARDL bounds testing procedure is sensitive to the selection of the lag structure (m, n). In this study, maximum lag length on each variable was set to five and the optimal lag structure was selected on the basis of the AIC criterion. The model has been tested by the diagnostic tests that are serial correlation, normality test and heteroskedasticity test. The stability test of the model has also been undertaken using the [41] cumulative sum of

recursive residuals (CUSUM) and the cumulative sum of squares of recursive residuals (CUSUMSQ).

III. Empirical Results and Discussion

The presentation of our empirical results begins with an investigation of the order of integration of the series. This step is necessary because the ARDL bounds test requires the dependent variable to be integrated of order one and the explanatory variables to be I(0) or I(1). Table IV reports the results obtained from the PP test of [42] and the KPSS test of [43]. According to the test results, all the variables were found to be stationary after taking the first difference. Therefore, we can conclude that all the variables we are working with are integrated of order one. Based on this result, the next step is to test for the existence of long-run relationships among the variables.

The results of the ARDL bounds test are displayed in Table V. The calculated F-statistics are compared against the critical values given in [36]. The results show that a compelling long-run relationship exists among the variables when regression is normalised on imports, income or FDI. In each case, the computed F-statistic exceeds the upper critical value at 5% level of significance. Furthermore, at the 5% significance level, all diagnostic tests do not exhibit any evidence of violation of the classical linear regression model assumptions.

TABLE IV: Results of Unit Root Tests

Series	Level		First difference	
	PP	KPSS	PP	KPSS
lnM	-2.768	0.074	-7.635*	0.059
lnY	-2.049	0.136	-3.847*	0.107
lnPD	-1.875	0.086	-4.175*	0.084
lnPM	-3.375	0.061	-7.511*	0.100
lnFDI	-2.791	0.107	-7.138*	0.065

Note: M, Y, PD, PM and FDI denote real imports, nominal GDP, domestic price, import price, and real Foreign Direct Investment inflows, respectively. The unit root tests have been performed under the model with constant and trend. 5% critical values for PP and KPSS tests are -3.536 and 0.146, respectively. * indicates the rejection of the null hypothesis at 5% level of significance.

TABLE V: Results of the ARDL Cointegration Test

Model	F.stat.	Diagnostic tests		
		χ^2 (Normality)	χ^2 (Heteroscedasticity)	χ^2 (Correlation)
M=f(Y, PD, PM, FDI)	66.849*	0.582 [0.746]	31.480 [0.397]	1.570 [0.336]
Y=f(M, PD, PM, FDI)	13.069*	0.515 [0.772]	29.282 [0.347]	1.794 [0.401]
FDI=f(M, Y, PD, PM)	23.062*	1.189 [0.551]	31.252 [0.403]	1.141 [0.397]
	Critical values (T=38)			
	Lower bounds I(0)		Upper bounds I(1)	
5%	2.26		3.48	
10%	1.90		3.01	

Note: M, Y, PD, PM and FDI denote real imports, nominal GDP, domestic price, import price, and real Foreign Direct Investment inflows, respectively. Lag length on each variable is selected using the AIC criterion with maximum lag set to 5. Critical values are generated under the model with no intercept and trend. Figures in [.] are *p_values*. . * indicates the rejection of the null hypothesis of no cointegration at 5% level of significance.

TABLE VI: Results of the Johansen and Juselius Tests for Cointegration

		Trace Test		Max- Eigen Test	
H_0	H_1	Statistic	Prob.	Statistic	Prob.
$r=0$	$r=1$	152.523*	0.000	67.925*	0.000
$r\leq1$	$r=2$	84.597*	0.000	40.937*	0.000
$r\leq2$	$r=3$	43.659*	0.004	27.869*	0.007
$r\leq3$	$r=4$	15.790	0.184	10.549	0.286
$r\leq4$	$r=5$	5.241	0.258	5.241	0.258

Note: r indicates the number of cointegrating relations. The Akaike information criterion was used to select the number of lags required in the cointegrating test. * indicates the rejection of the null hypothesis at the 5% level.

After finding the existence of cointegration between the variables when import variable is the dependent variable, we further estimate the long run elasticities associated with each independent variable. We estimate the long run relationship using the ARDL approach, the Fully Modified OLS (FMOLS) method proposed by [44], the Dynamic OLS (DOLS) technique suggested by [45], and the multivariate approach by [38]. This is done to check the robustness of the results. These estimation methods account for the possible endogeneity among the variables in the form of simultaneity bias. The results are reported in Table V. The ARDL results show that GDP affects positively import demand, with an inelastic of about one. The coefficient on domestic price is unexpectedly negatively signed and significant. Again, the effect of import price is consistent with *a priori* expectations. The sign of FDI shows a positive association with imports in the long-run, implying that FDI increases the demand for imports.

To check whether the traditional formulation of import demand is appropriate, we test the hypothesis of homogeneity of degree zero in prices and income. In the ARDL model, the value of the *t*-statistic is 4.754 with *p-value* of 0.017, implying that the restiction is not valid. The results from the FMOLS estimation lead to a similar conclusion. However, the results from DOLS and Johansen methods suggest that the restriction cannot be rejected. Further, we estimate the import demand function using real GDP, domestic price, import price and real FDI. The results are reported in Table VIII. We test the linear restriction on price variables *i.e.* $\beta_2+\beta_3=0$. The value of the *t*-statistic from the ARDL model is 3.710 with *p-value* of 0.034, implying that the assumption of price homogeneity does not hold. On the contrary, the results from the other three models suggest that the price homogeneity hypothesis cannot be rejected.

In most cases, the long run import price elasticity is higher in absolute value than domestic price elasticity. This means that import demand is more sensitive to changes in the price of imported goods than to the price of domestic goods. This is consistent with the fact that Cote d'Ivoire does not produce goods that are subtitute to her imported goods.

In Table IX we reporte the long run estimates from import demand function using relative price specification. Relative price of imports was calculated as the ratio of import price to domestic price. The use of relative price

mitigates the problem of multicollinearity that could potentially exist between import price and domestic price. As we can see, all coefficients have correct signs and significant values.

TABLE VII: LONG RUN IMPORT DEMAND FUNCTION USING NOMINAL INCOME

Regressor	Dependent variable: LnM							
	ARDL		FMOLS		DOLS		Johansen	
	Coef.	t-stat.	Coef.	t-stat.	Coef.	t-stat.	Coef.	t-stat.
lnY	1.000*	43.022	1.061*	36.604	1.016*	11.059	0.513	1.061
lnPD	-0.503*	-4.510	-0.179**	-1.954	0.051	0.153	1.513	2.225
lnPM	-0.769	-7.408	-1.139*	-10.052	-1.371*	-3.707	-1.681	-14.167
lnFDI	0.174*	5.602	0.116*	3.104	0.167	1.418	-0.078	-1.771
$D_{05\text{-}15}$	0.278*	17.269	0.283*	4.089	0.346*	5.117	-	-
Homogeneity test								
H_0: $\beta_1+\beta_2+\beta_3=0$	4.754* [0.017]		-2.728* [0.010]		-1.507 [0.170]		2.027 [0.154]	

Note: The model estimated is: $\ln M_t=\beta_0+\beta_1\ln Y_t+\beta_2\ln PD_t+\beta_3\ln PM_t+\beta_4\ln FDI_t+\beta_5 D_{05\text{-}15}+\mu_t$. where *M*, *Y*, PD, PM and FDI denote real imports, nominal GDP, domestic price, import price, and real Foreign Direct Investment inflows, respectively. $D_{05\text{-}15}$ is a dummy variable taking the value one for years from 2005 to 2015, and zero elsewhere. The restriction $\beta_1+\beta_2+\beta_3=0$ implies that the import demand function is homogeneous of degree zero in income and price. Figures in [.] are *p_values*. The asterisks * and ** denote statistical significance at the 5% and 10% levels, respectively.

TABLE VIII: LONG RUN IMPORT DEMAND FUNCTION WITH REAL INCOME

Regressor	Dependent variable: LnM							
	ARDL		FMOLS		DOLS		Johansen	
	Coef.	t-stat.	Coef.	t-stat.	Coef.	t-stat.	Coef.	t-stat.
lnY	0.846*	48.300	0.894*	36.725	0.858*	11.518	0.970*	38.819
lnPD	0.615*	5.237	0.956*	9.748	1.154*	2.843	1.743*	13.728
lnPM	-0.810*	-8.710	-1.102*	-9.746	-1.386*	-3.889	-1.630*	-15.516
lnFDI	0.161*	5.746	0.102*	2.710	0.157	1.374	-0.038	-1.006
$D_{05\text{-}15}$	0.269*	18.617	0.261*	3.773	0.341*	5.241	0.080*	2.840
Homogeneity test								
H_0: $\beta_2+\beta_3=0$	3.710* [0.034]		-1.523 [0.137]		-1.176 [0.273]		1.742 [0.186]	

Note: The model estimated is: $\ln M_t=\beta_0+\beta_1\ln Y_t+\beta_2\ln PD_t+\beta_3\ln PM_t+\beta_4\ln FDI_t+\beta_5 D_{05\text{-}15}+\mu_t$., where *M*, *Y*, PD, PM and FDI denote real imports, real GDP, domestic price, import price, and real Foreign Direct Investment inflows, respectively. $D_{05\text{-}15}$ is a dummy variable taking the value one for years from 2005 to 2015, and zero elsewhere. The restriction $\beta_2+\beta_3=0$ implies that the import demand function is homogeneous in prices. Figures in [.] are *p_values*. The asterisks * denotes statistical significance at the 5% level.

TABLE IX: LONG RUN IMPORT DEMAND FUNCTION USING RELATIVE PRICE FORMULATION

Regressor	Dependent variable: lnM							
	ARDL		FMOLS		DOLS		Johansen	
	Coef.	t-stat.	Coef.	t-stat.	Coef.	t-stat.	Coef.	t-stat
lnY	0.882*	47.420	0.915*	39.496	0.871*	40.851	0.761*	26.984
lnRP	-1.070*	-11.906	-1.000*	-10.224	-1.125*	-8.344	-0.784*	-5.344
lnFDI	0.093*	4.223	0.055*	2.002	0.104*	4.137	0.240*	7.163
$D_{05\text{-}15}$	0.229*	8.295	0.175*	3.779	0.287*	5.492	-	-

Note: The model estimated is: $\ln M_t=\beta_0+\beta_1\ln Y_t+\beta_2\ln RP_t+\beta_3\ln FDI_t+\mu_t$, where *M*, *Y*, RP and FDI denote real imports, real GDP, relative price of imports, and real Foreign Direct Investment inflows, respectively. Relative price of imports was calculated as the ratio of import price to domestic price. $D_{05\text{-}15}$ is a dummy variable taking the value one for years from 2005 to 2015, and zero elsewhere. Figures in [.] are *p_values*. In the Johansen method the model includes a constant term and the optimal lag in the level VAR is 6 according to the AIC. The asterisks * and ** denote statistical significance at the 5% and 10% levels, respectively.

The results indicate that income is positively related to imports. The value of the long run income elasticity implies that imports are regarded as necessary goods in Cote d'Ivoire. Other things remain the same, a one percent increase in domestic income leads to about 0.8 percent increase in real imports. Thus, economic growth is playing a significant role in aggregate import demand for goods and services in Cote d'Ivoire. This finding is consistent with the Keynesian absorption theory. The relative price, which reflects a trade-off between local and imported goods, follows the conventional law of demand that imports decrease with relative import price. The long run effect of relative price is statistically significant and its magnitude shows that import demand is quite sensitive to relative price changes. The negative effect of import price on import demand in Cote d'Ivoire is consistent with the findings of [6] for India and [46] for Turkey. However it contradicts with [47]-[52] who found nonsignificant effect of relative price on imports. The long run effect of FDI on imports was found to be positive and significant in all specifications, confirming the theory view that apart from income and prices, FDI is a significant determinant of import demand in developing countries. Different explanations can be forwarded to explain this result. One reason could be that FDI inflows rather than engaging in import substitution activities, they are involved in import of inputs of production. Another explanation may be that FDI focuses on production of goods or services that are complementary to other import products.

TABLE X: SHORT RUN IMPORT DEMAND FUNCTION

Regressor	Dependent variable: ΔlnM		
	Coef.	t-stat.	Prob.
ΔlnY	1.713*	4.933	0.000
ΔlnRP	-1.075*	-16.776	0.000
ΔlnFDI	0.042**	1.781	0.087
Constant	0.023	0.905	0.373
ECT(-1)	-0.715*	-3.978	0.000
R^2	0.951		
Diagnostic tests			
Serial correlation	0.007 [0.933]		
Heteroscedasticity	8.603 [0.282]		
Normality	1.426 [0.490]		

Note: The model estimated includes a linear time trend and two dummy variables $\Delta D_{05\text{-}15}$ and $D_{03\text{-}12}$ where $D_{03\text{-}12}$ takes the value one for years from 2003 to 2012, and zero elsewhere. *Y*, RP and FDI denote real GDP, relative price of imports, and real Foreign Direct Investment inflows, respectively. Figures in [.] are *p_values*. The asterisks * denotes statistical significance at the 5% level.

The existence of cointegrating relationships between imports and its determinants provides support for the estimation of the short run dynamic model for import demand function. The short run elasticities of import demand with respect to domestic income, relative import price and FDI are reported in Table X. The coefficient on the lagged error term is highly significant with the expected negative sign, supporting the evidence of a long-run relationship among the variables. The results also show that domestic income is a major factor influencing short run import growth. The short run effects of relative price and FDI are also significant. Therefore, in the short run the growth rate of imports is affected by growth in domestic income, relative import price and FDI inflows. The results of a few diagnostic tests indicate that there is no error autocorrelation and heteroskedasticity, and that the errors are normally distributed.

IV. Conclusion

Over the last few decades a growing body of empirial literature estimated import demand functions for individual or panel of countries. Most of these studies adopted the traditional formulation of import demand, focusing on the elasticity of import demand with respect to real income and relative prices, neglecting the role of other relevant variables. The relationship between inward foreign direct investment and imports remains controversial and very little is known about the impact of FDI on imports. This study intended to contribute to the existing literature using time series data for Cote d'Ivoire covering the period from 1980 to 2017. The results suggest a number of aspects that characterize the import demand function in Cote d'Ivoire. First, the cointegration tests confirmed that import demand is cointegrated with respect to income, domestic price, import price and FDI. By normalising on import demand, we estimated the long run elasticities associated with each determinant. Second, we found that aggregate import demand is positively affected by real domestic income, suggesting that import demand in Cote d'Ivoire is growth driven. Further, we found that domestic price has positive effect on imports while import price has negatively related to import demand.

We also tested some of the assumptions implied by conventinal formulation of import demand function. Emphasis was given to the assumption of price homogeneity, which is imposed when domestic and import prices enter only as ratio in the import demand function. The results show that the assumption of price homogeneity cannot be accepted in all specifications. As expected, the relative price changes have negative effect on imports, implying that any increase in domestic prices would increase volume of imports. Furthermore, FDI was found to have significant positive effect on imports both in the long and short run. This suggests that an increase in FDI is likely to increase Cote d'Ivoire's demand for imports, thereby causing the trade balance to deteriorate.

Overall, the empirical results of this study show that although relative price and income are important in the analysis of aggregate import demand in Cote d'Ivoire, foreign direct investment also plays a critical role in determining imports. This implies that FDI could have a negative impact on the balance of payments of Cote d'Ivoire. The policy implication of this study is that while attracting FDI in Cote d'Ivoire, it is important to consider their import content in the production process and also their finish goods that might serve as substitute for imports in the country. Government policies should encourage FDI with low import content, especially resource-based industries. Tax incentives can be given to import substitution industries. In addition, gouvernment should encourage FDI in industries wherein the surge in import bill is offset by better export performance of the firms.

Our empircal analysis was conducted using a single demand variable (*i.e.* GDP) as a determinant of aggregate imports. This approach does not take into account the fact that different components of final expenditure have different import contents. Therefore, it will be informative to disaggregate GDP and estimate the effects of its components on aggregate import demand. In addition, the present study focused on the impact of FDI on imports and found that FDI may deteriorate trade balance. We did not examine the effect of FDI on exports so as to draw a final conclusion regarding the net effect of FDI on trade balance. It will be useful to evaluate the overall impact of FDI on the trade balance of Cote d'Ivoire. We intend to investigate these two interesting issues in future research.

Conflict of Interest

The author declares no conflict of interest.

Author Contributions

As sole author of the article, all the work has been done by myself.

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