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Implications of food aid and remittances for West African food import demand

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Abstract

The influence of food aid and remittances on West African food import demand is evaluated using a Central Bureau of Statistics (CBS) model. Our results show that imports of oilseeds and the rest of the agricultural products category are highly price elastic, and that fruit and vegetables and dairy products are least responsive to price changes. Food aid did not influence West African food imports, but remittances were found to be statistically significant in determining food imports. The influence of remittances was particularly prominent in oilseed import demand.

Keywords: food aid; remittances; West Africa; food import demand

1. Introduction

Food deficits in West Africa have been persistent due to frequent weather- and market-related shocks. The availability of adequate food has also been hindered by widespread conflicts and political instability in the region that often trigger the mass abandonment of arable land. According to the World Bank Migration and Remittances Fact Book (2011), developing countries are among the top recipients of official development assistance and remittances. This is also true of West Africa, whose food aid and remittances augment periodic shortfalls in food supplies and perennial regional food insecurity.

Food aid to countries in the region is generally categorised as emergency, programme and project food aid. Emergency food aid is the humanitarian nutritional response to man-made and natural disasters to alleviate hunger and malnutrition among vulnerable groups, and comes from non-governmental organisations (NGOs) and other interest groups. Not surprisingly, among the highest recipients of such aid in a single year in West Africa were former conflict countries such as Liberia, which received 173 000 metric tons in 1997, and Sierra Leone, which received 75 000 metrics tons in 2002. Due to concerns about prolonged drought and famine, Niger amassed a total of 106 000 metric tons of emergency food in 2010 alone.

Programme food aid constitutes intergovernmental transfers and is aimed at augmenting the recipient's budget or balance of payments. Programme food aid is made available either as grants or loans and is sold in the open market. Cape Verde, Cote d'Ivoire and Ghana received the highest one-time annual programme food aid, with amounts of 53 227 metric tons in 1997, 57 000 metric tons in 1990 and 123 000 metric tons in 1991 respectively. The three countries also received the highest programme aid, on average, between 1988 and 2010.

Project food aid, which is designed to alleviate poverty, consists of bulk or monetised transfers of free food to targeted populations through NGOs and multilateral groups. In the project category, the highest one-time recipients were Burkina Faso and Liberia, which collected 55 338 metric tons and 52 000 metric tons respectively in 1991, and Ghana, which received 81 000 metric tons in 2000. On average, Burkina Faso, Ghana and Niger were the highest recipients of project food aid between 1988 and 2010.

Table 1 shows the top four recipients of food aid and remittances in West Africa in 2009. Not surprisingly, one of the highest recipients of food aid was Cote d'Ivoire (which was undergoing politically instability), attracting 38 000 metric tons. Niger, which experienced severe drought during that period, received 48 000 tons in food aid.

Table 1: Top four recipients of food aid and remittances in West Africa in 2009

Remittances (billion US dollars)	
Mali	$ 0. 424
Nigeria	$18.230
Senegal	$1.254
Togo	$0.300
Rest of West Africa	$0.732
Total	**$20.939**
Food aid (thousand metric tons)	
Côte d'Ivoire	34,082
Ghana	39,142
Mauritania	30,512
Niger	48,027
Rest of West Africa	203,784
Total	**355,548**

Source: World Bank's World Development Indicators, 2011

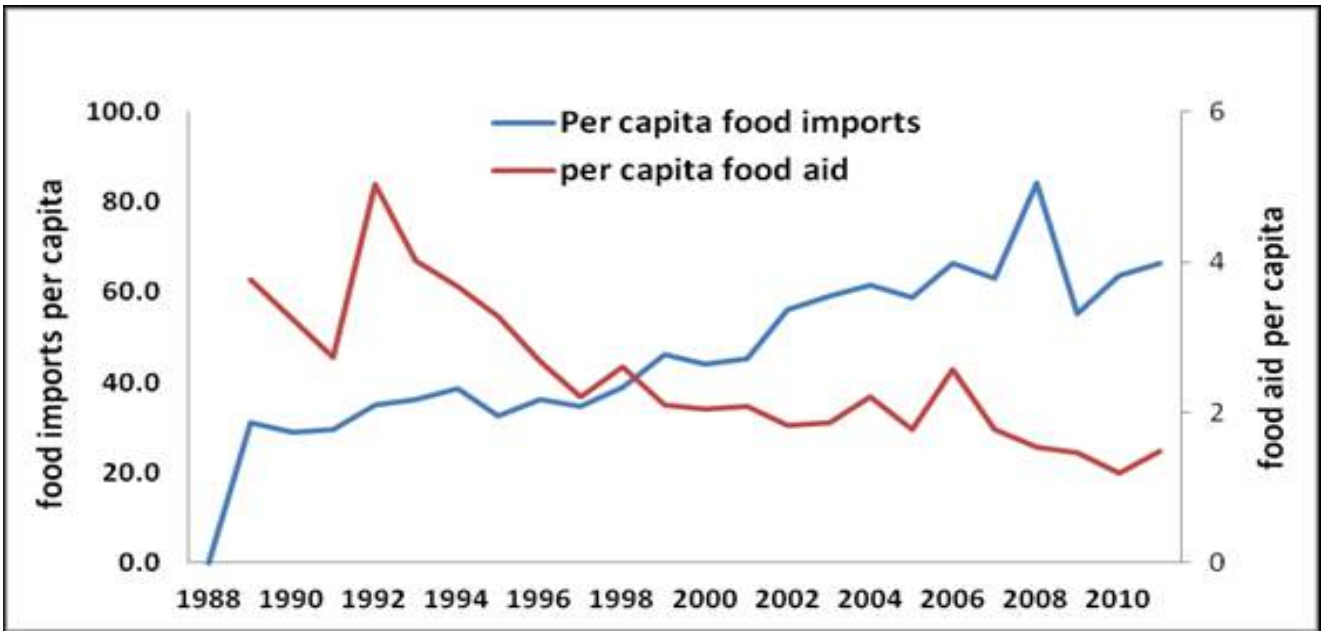
Nigeria was the top recipient of remittances in West Africa in 2009, accounting for the giant share (87%) of a total remittance of US$20.9 billion. Senegal ranked a distant second, receiving 7% of officially-recorded remittances in the same year. In 1980, the remittance share of GDP in the Gambia and Togo was 0.2% and 0.9% respectively. The World Bank's 2011 World Development Indicators show that the shares of remittances to GDP for the Gambia and Togo increased to 14% and 11% respectively in 2010.

This paper explores West African food imports and estimates the impact of food aid and remittances on the region's food import demand. Following the introduction, section two provides an overview of and related literature on the changes that have occurred in West African food imports. Section three provides the empirical methods, while section four discusses the data and summary statistics. The subsequent sections discuss the results and conclusions respectively.

2. Overview and related literature

In recent years, West Africa has faced the problems of rising food prices, high unemployment and a growing population that has outpaced agricultural productivity. These developments, combined with external factors such as trade restrictions by major global food exporters, have made the region vulnerable to supply shocks and food insecurity. In the absence of an increased growth in agricultural productivity, the food needs of West Africa are met by relying on food aid and imports. But dependence on imports has its own drawback, as was underscored by the 2008 surge in world food prices in which export restrictions by major suppliers triggered widespread food riots in the region (Childs & Kiawu 2009).

Figure 1 shows that, while overall per capita food aid in the region has declined significantly compared to the peak experienced in the late 1980s and early 1990s, per capita food imports have been rising. West Africa imports various categories of food, including animal products, dairy products, fruit and vegetables, oils and staples. Staples constitute by far the largest share of all imported food in the region, with quantities imported increasing over the years. Staples, which include cereals, maize, pulses, cassava, potatoes and other roots and tubers, accounted for more than 50% of all foods imported by West Africa in 2010. Nigeria, Senegal, Cote d'Ivoire and Ghana are among the top importers of staple food, while Guinea Bissau, Cape Verde and Sierra Leone rank among the lowest. Imports of all other food groups have also risen over the years, although, on average, animal products, dairy products, fruits and vegetables, and oils accounted for 1%, 4%, 5% and 3%, respectively of total food imported between 1961 and 2009.



Note: Units on vertical axes are metric tons
Source: Authors' calculation based on data from the FAO and the World Bank's Development Indicators.

Figure 1: Trends in food imports and food aid in West Africa

The international aid convention requires adherence to the universal marketing regulation (UMR), which states that food aid recipients must maintain a normal level of food imports to ensure that food

aid received serves as an 'additionality' to the recipient's normal commercial food imports, rather than as a displacement of the latter. The UMR was designed to prevent food aid from crowding out commercial food exports to low-income food-deficit countries. However, the fundamental question of the extent to which food aid displaces commercial food imports largely remains an unresolved empirical question.

The literature on the effect of food aid on commercial imports is varied. One strand of the literature argues that food aid creates habit formation that promotes food imports when the aid expires. Abdulai *et al*. (2004) note that the huge aid shipments of wheat and rice to West Africa in the 1970s altered the consumption patterns in the region, shifting consumers' preferences from domestically produced "inferior" cereals to superior imported grains. According to this line of argument, food aid exhibits a J-curve relationship with commercial food imports (Barrett *et al*. 1999). Food aid can also lead to increased food imports by creating price disincentives for domestic producers, forcing the recipient country to increase commercial imports (Tadesse & Shively 2009). Food aid is also thought to encourage the postponement or outright cancelation of investments and costly strategic domestic policy reforms in the recipient countries, and to stimulate increased future food imports (Hopkins 1984; Bhagwati 1986; Singer *et al*. 1987; Lavy 1990).

Another school of thought argues that, when food aid is in the form of cash or cash transfers to procure food in the recipient market, it can reduce commercial food imports through higher prices that encourage the expansion of domestic production (Abdulai *et al*. 2004). In addition, food aid releases scarce foreign exchange from displaced commercial imports, enabling authorities to import inputs for domestic production (Lavy 1990). Von Braun and Huddleston (1988) found an inverse relationship between food aid and imports, and showed that lowering food aid by one ton causes a less than proportional increase in imports. This finding provides support, albeit weak, for the results of Barrett *et al*. (1999), who found that for every one kilogram of food aid, 0.3 kilograms of commercial imports are displaced.

Remittances have been found to have positive correlations with food import demand. Since remittances generally augment personal incomes in the recipient countries (Lopez *et al*. 2007), the transmission effect on import demand results from at least two channels. First, the availability of scarce foreign exchange boosts liquidity, allowing the recipient country to offset food import bills. Second, the supply of foreign exchange leads to the appreciation of the recipient's currency (Barajas *et al*. 2011), causing food imports to become relatively cheaper.

Bussolo and Medvedev (2007) deployed a computable general equilibrium model, and their study showed that a remittance inflow shock caused the demand for imported food products to rise in Jamaica. Abdih *et al*. (2012) found that the import share of a country's GDP rises with the inflow of remittances, and noted that the relationship was statistically significant, unlike that for the effect of remittances on the investment share of GDP. The finding of a positive and statistically significant relationship between remittances and imports in the recipient country is also consistent with the results of Kandil and Mirzaie (2009).

The size of remittances depends broadly on the 'ability' and 'motivation' of the migrant. The migrants' ability is taken to be the income and savings level from which transfers are allocated. The motivation or willingness depends on the migrants' duration of stay in the host country, and on the migrant's family characteristics in both the recipient and host countries (Bollard *et al*. 2010). Lowell and De la Garza (2000) found that migrants with children left behind in the recipient country were at least 50% likely to

remit money home. Another motivation for remittances is co-insurance agreements, in which the immigration cost of the migrant (the insured) is financed by the family left behind (insurer).

Unlike food aid, which is often delivered with a time lag and donor conditionality, remittance inflows are flexible and have more direct countercyclical and smoothing effects on macroeconomic aggregates (Ratha 2007). Also, remittances are not generally exposed to risk of expropriation from bad governance, making them a more effective and flexible tool than food aid with which to respond to macroeconomic and food supply shocks in developing countries. Buch and Kuckulenz (2005) find remittances to be more stable than others sources of capital flow such as foreign direct investment (FDI) and overseas development assistance (ODA). Couharde *et al*. (2011) also note that remittances are a more significant source of capital inflow into West Africa than ODA. As a result, remittances serve to better augment domestic income and may aid in the purchase of imported commodities.

3. Empirical Methods

The CBS demand system derived by Keller and Van Driel (1985) is used to estimate West African agricultural import demand parameters. The CBS model combines the non-linear expenditure effects of the almost ideal demand system (AIDS; Deaton & Muellbauer 1980b) and the price effect of the Rotterdam model (Theil 1966; Barton 1969). The Rotterdam model meets negativity conditions on the Slutsky matrix required for a downward sloping demand curve if its price coefficients are negative and semi-definite. The CBS demand system is denoted as:

(1) $$w_i \cdot \left[\partial \ln(q_i) - \sum_j w_j \partial \ln(q_j) \right] = \sum_j c_{i,j} \partial \ln(p_j) + b_i \left[\partial \ln(x) - \sum_j w_j \partial \ln(p_j) \right]$$

where ln(.) is the natural logarithm, q_i and p_i are the quantity and price of the ith good, x is the total group expenditure, and w_i is the budget share for the ith good, defined as:

$$w_i = \frac{p_i q_i}{x}$$

The terms $c_{i,j}$ and b_i are coefficients. In order for the system of equations to be consistent with optimisation theory, the following restrictions on the coefficients must hold:

(2) $$\sum_i c_{i,j} = \sum_j c_{i,j} = \sum_i b_i = 0,$$

(3) $$c_{ij} = c_{ji}, \forall i, j$$

Homogeneity of degree 0, consistent with the budget constraint, and Slutsky symmetry conditions are satisfied by Equations 2 and 3. Demand elasticities are derived from model coefficients and the budget shares. Equations 4 and 5 show price and expenditure elasticities respectively.

(4) $$\varepsilon_{i,j} = \frac{ci, j - b_i w_j - w_i w_j}{w_i}$$

(5) $$\varepsilon_{i,x} = 1 + \frac{b_i}{w_i}$$

Equation (1) implies that the change in demand for each West African imported food category is driven by the changes in all West African imported foods. In a derived demand context, b_i is referred to as a scale coefficient rather than an expenditure coefficient.

The endogenous variables of the CBS demand system sum to 0 in every time period, thus causing the error terms to sum to 0 as well. To avoid singularity, an equation is dropped in the estimation process and retrieved at the end of the process, since the estimates will not be dependent on the dropped equation. The rest of the food products (ROAP) were used as the dropped equation.

The standard CBS model is extended to include the first difference variables representing food aid and remittances received by the West African countries. Differential demand systems offer the advantage of incorporating taste shifts into differential models much more easily than other common specifications (Alston *et al*. 2000). Also, transforming the data into period-to-period differences helps to address issues of stationarity. To capture the extent to which these variables influence overall West African food import demand, hypothesis tests based on the likelihood ratio test are used to capture the impact of these variables. The likelihood ratio (LR) test was used to determine if the model with the new variable was significantly different from the restricted model and was given as:

(6) $LR = -2[L(\tilde{\beta}, \tilde{\sigma}^2) - L(\hat{\beta}, \hat{\sigma}^2)] \sim X_m^2$

where $L(\tilde{\beta}, \tilde{\sigma}^2)$ is the maximum of the log likelihood function when the restriction is imposed, $L(\hat{\beta}, \hat{\sigma}^2)$ is the maximum of the log likelihood function when the restrictions are not imposed, and *m* is the number of restrictions.

4. Data and Summary Statistics

The data consist of West African food import volumes of and expenditure data on five broad food categories – dairy products, animal products, fruit and vegetables, oilseed products, staples, and the rest of the food products (ROAP). The ROAP category aggregates imported food items that do not fit into the previous categories, and includes beverages. Dairy products consist of all dried, condensed and evaporated milk, cheese from whole milk, butter from cow's milk and eggs from poultry. Animal products constitute all meats and sausages, fresh or frozen, from cattle, hogs, poultry, sheep and goats. The fruit and vegetables category comprise all of the major fruits and vegetable that are imported in fresh, frozen, peeled, dried or concentrate forms. The oilseed products comprise olive oils, and other boiled and hydrogenated oils from oilseeds. Finally, staples are made up of corn, potatoes, rice, wheat, cereals and pulses.

Annual import quantities and expenditures used for developing the base model for each category were obtained from the Food and Agricultural Organization (FAO) of the United Nations Trade Statistics Division. All expenditures are in US dollars, and all quantities are expressed in tons. Per-unit values ($/ton) for each food category were calculated. West African food aid and remittances were used as variables to evaluate their impact on West African food import demand.

Food aid data were obtained from the World Food Program of the United Nations. The data comprise all cereal and non-cereal food assistance to government and non-governmental organisations in a country, aggregated across emergency, programme and project food aid. The cereal component of the food aid includes over fifty commodities, ranging from bulgur wheat, maize, millet, oat, rice and sorghum to flours, corn-soya milk, and other mixed and blended food products derived from cereals. The non-cereals include more than one hundred items, ranging from fruit and vegetables, dairy products, fats and oils, fish, animal products to beverages and processed food products. The mode of food aid delivery ranges from local purchases in the recipient country market and triangular purchases from a third country, to direct transfers from the donor to the recipient.

The food aid data are expressed in metric tons and were published in annual form from 1988 to 2010. We expand the food aid data sample by backcasting to 1961, rendering the timeframe comparable and consistent with other variables in the study. Backcasting was done by regressing the more recent data against time and extrapolating those values using the coefficient to generate the missing data period. A range of functional forms was used and the one with the best fit was selected. In our case a double log functional form proved most effective.

Remittances, broadly defined to include migrant workers' remittances and employee compensation, were obtained from the World Bank's World Development Indicators. The remittance data used range from 1961 to 2010, and are expressed in current US dollars. The data constitute current transfers by migrant workers and income earned by non-resident workers. Remittances include transfers from migrant workers residing in the host country for more than a year to recipients in the migrants' country of origin. Migrants' transfers are calculated as the net worth of migrants who are likely to reside in the host country for more than one year, transmitted from one country to another at the time of migration.

Summary statistics for West African food import demand are presented in Table 2. For the period 1961 to 2009, staples accounted for the largest quantity of imports, averaging 4.9 million tons per year. West Africa imported an average of 7.2 billion tons of food at an average value of US$3.1 billion per year. West African import expenditure on dairy products ($68 million) was the least, although it has expanded rapidly from as low as $2.3 million dollars in 1966 to over $430 million in 2009.

Table 2: Descriptive statistics of West African agricultural imports, 1961-2009

Variable	Mean	Std Dev	Minimum	Maximum
Quantity (1000 Tons)				
Dairy products	213	107.5	54	580.8
Animal products	63.5	86.7	2.8	330.3
Fruit and vegetables	278.8	217.7	115	945.1
Oilseeds	340	424.7	9.2	1693.8
Staples	4908.3	3449.6	822.8	15800.4
ROAP	1381.2	1195.2	5.2	4378
Price ($1000/tonne)				
Dairy products	1.23	0.6	0.38	2.8
Animal products	1.03	0.36	0.47	1.83
Fruit and vegetables	0.49	0.17	0.2	0.77
Oilseeds	0.61	0.2	0.26	1.04
Staples	0.21	0.08	0.09	0.49
ROAP	2.35	10.18	0.41	72.08
Expenditure share (%)				
Dairy products	10.00	1.80	6.80	14.20
Animal products	1.50	0.90	0.30	4.00
Fruit and vegetables	5.30	1.50	2.70	8.90
Oilseeds	5.50	3.90	0.80	15.70
Staples	36.50	5.70	26.20	52.40
ROAP	41.10	7.50	29.10	56.10

Source: Calculated from Food and Agriculture Organization of the United Nations (FAO) Statistics Division, 2012

The ROAP category accounted for the largest share of expenditure (41.1%), followed by staples, which accounted for 36.5% of the expenditure on food imports by West African countries. Animal products accounted for the smallest share of expenditure (1.5%) on food imports. The categories dairy products, fruit and vegetables and oilseed products ranged between 5% and 10% of food expenditure share. The share of expenditure on most food groups has remained fairly stable since the 1980s. While the staple

food category had the second largest share of expenditure, it accounted for the lowest unit value ($210 per ton) of food imported by West African nations. ROAP were the most expensive products imported into West Africa, with an average unit value of $2 350 per ton. Dairy products and animal products averaged $1 230 per ton and $1 030 per ton respectively.

5. Results

We corrected for autocorrelation using the approach specified by Moschini and Moro (1994), which allows for first-order autocorrelation within and across equations. This specification ensures invariance with the deleted equation, and that the adding-up condition is maintained. Parameter estimates for the full model, which include food aid and remittance variables, are presented in Table 3. Consistent with the theory, all compensated own-price coefficients were negative and, for the most part, compensated cross-price effects were positive, although most were not significant. Based on the estimated price and share demand coefficients, along with the average budget shares for the sample period, own- and cross-price elasticities and scale or expenditure elasticities were calculated. These elasticity estimates are presented in Table 4. The standard errors are asymptotic estimates generated in SAS using the estimate procedure.

The conditional own price elasticities represent both the substitution and the income effects of price changes, and are conditional on total West African expenditure on agricultural imports. The own-price elasticities for all imported products had the expected negative sign and were all statistically significant. The own-price elasticities range between -0.412 and -1.324. Fruit and vegetables (-0.412) comprised the imported product that was least responsive to price, followed by dairy products (-0.429). These price responses imply that exporters of these products to West African countries can increase revenue by lowering the quantity supplied. It also implies that an increase in exporters' prices for these products would result in a less than proportionate decrease in the quantity demanded by West African countries. For these products, West Africa would therefore be vulnerable to food price spikes, as this would result in large expenditure increases on imported food with a minor downturn in demand, as indicated by Mendoza and Machado (2009). This was the case for many food import-oriented countries during the global food price spike of 2007/2008.

Imported animal products (-0.874) and staples (-0.904), although inelastic, were almost unitary. The elasticity of the staples category suggests that, with an own-price elasticity of -0.904, a 10% increase in the price of imported price would decrease the quantity of imported fruit and vegetables demanded by 9.04%. Although still inelastic, the magnitude of response in these categories relative to dairy products and fruit and vegetables would suggest that West African consumers may be more inclined to forego imported staples and animal products for the more inelastic fruit and vegetables and dairy products. This also suggests that they may find it easier to substitute domestic staples and animal products with imported ones and, as a result, may be more sensitive to changes in their price.

Imported oilseed products (-1.324) and the rest of the agricultural products (-1.069) were both elastic, implying that a 10% increase in the price of imported oilseeds or rest of the agricultural products would decrease the quantity of imported oilseeds or rest of the agricultural products by 13.24% and 10.69% respectively. The magnitude of response in these categories relative to the imported food products would suggest that West African consumers may be more inclined to forego these imported food products than other imported products, should prices increase. It therefore is helpful to remind readers of the composition of these two groups of products as a preface to the discussion of why this may be the case.

Table 3: Estimated parameters of West African imports of agricultural products, food aid and remittances

	Dairy	animal	fruit	oilseeds	staples	ROAP	Expenditure	Food aid	Remittances
Dairy	-0.033	-0.004	0.007	0.005	-0.007	0.038***	0.002	7.3E-09	2.2E-13
	(0.025)	(0.006)	(0.009)	(0.012)	(0.022)	(0.008)	(0.020)	(0.000)	(0.000)
Animal products		-0.013***	0.002	-0.002	0.013**	0.001	-0.003	-3.7E-09	-1.6E-14
		(0.004)	(0.005)	(0.004)	(0.005)	(0.002)	(0.005)	(0.000)	(0.000)
Fruit			-0.021**	-0.012*	-0.004	0.008*	-0.031***	-4.4E-09	9.2E-14
			(0.009)	(0.006)	(0.009)	(0.003)	(0.008)	(0.000)	(0.000)
Oilseeds				-0.068***	0.035***	0.014***	0.024**	1.7E-09	6.6E-13***
				(0.012)	(0.013)	(0.005)	(0.012)	(0.000)	(0.000)
Staples					-0.196***	0.211***	0.002	4.9E-09	-8.8E-13
					(0.044)	(0.019)	(0.049)	(0.000)	(0.000)
ROAP						-0.273***	0.006	-5.9E-09	-7.9E-14
						(0.020)	(0.050)	(0.000)	(0.000)

Note: Asymptotic standard errors are in brackets. *** < 0.01; ** < 0.05; * < 0.10

Table 4: Estimated price and scale elasticities of West African agricultural product imports

	Expenditure	**dairy**	**animal**	**fruit**	**oilseeds**	**staples**	**ROAP**
Dairy	1.019***	**-0.429***	-0.058	0.011	-0.008	-0.446*	-0.039
	(0.196)	(0.091)	(0.059)	(0.096)	(0.123)	(0.231)	(0.037)
Animal products	0.829***	-0.364	**-0.874***	0.118	-0.201	0.545	-0.275***
	(0.316)	(0.386)	(0.290)	(0.318)	(0.253)	(0.356)	(0.054)
Fruit	0.422***	0.081	0.040	**-0.412****	-0.249**	-0.222	-0.019
	(0.145)	(0.178)	(0.089)	(0.173)	(0.121)	(0.169)	(0.027)
Oilseeds	1.447***	-0.058	-0.065	-0.298**	**-1.324***	0.104	-0.331***
	(0.213)	(0.228)	(0.071)	(0.020)	(0.217)	(0.256)	(0.043)
Staples	1.004***	-0.120**	0.020	-0.064***	0.040	**-0.904***	0.165***
	(0.133)	(0.060)	(0.015)	(0.025)	(0.036)	(0.135)	(0.027)
ROAP	1.014***	-0.018	-0.004	0.014	0.051	0.028	**-1.069***
	(0.121)	(0.058)	(0.018)	(0.029)	(0.036)	(0.107)	(0.095)

Note: Asymptotic standard errors are in brackets. *** < 0.01; ** < 0.05; * < 0.10

Oilseed products comprise olive oils and other boiled and hydrogenated oils from oil crops (often considered the healthy oils), and are often used as a substitute for the higher saturated fat domestic palm oil. In addition, beverages are one of the primary components of the rest of agricultural products variable. Included in beverages are wines and other alcoholic beverages, of which the imported products are generally more expensive. However, there are domestic substitutes for all of these products and, in many cases, the imported versions are considered luxury items, thus have a more than proportional response to changes in price.

The cross-price elasticities are conditional on total expenditure on agricultural products imported by the West African countries and account for both the substitution effects and expenditure effects of price changes. The cross-price effect varied for most of the commodities but, in general, was very small and, for the most part, statistically insignificant. Positive cross-price elasticities suggest some degree of substitution between imports of the different commodities, while negative cross-price elasticities suggest that the expenditure effect of price changes outweigh the pure substitution effects.

The scale/expenditure elasticity measures the degree by which the amount of the different groups of imported agricultural products demanded changes when the overall demand for imported food products by West Africa changes. This change in overall food import demand is often due to a change in expenditure on imported food. The scale elasticities are also presented in Table 2. The scale elasticities for all commodities were positive and statistically significant. The estimated scale elasticities for all products were greater than one, except for animal products and fruit and vegetables. Oilseed products had the largest scale elasticity of demand of 1.447, which implies that, given a 10% increase in the overall food import demand by West African countries, the import demand for oilseed products would increase by 14.47%. Fruit and vegetables showed the smallest increase in demand, 4.22%, given a 10% increase in the overall West African food import demand.

Extensions to the standard CBS model included the addition of differenced variables of food aid and remittances. The aim was to capture the extent to which these variables influenced overall West African food import demand. Table 5 shows the hypothesis tests based on the likelihood ratio test. Food aid to West Africa, which has declined from $1.3 billion in 1961 to less than $360 million in 2009, was not statistically significant in determining West African food import demand, neither on any commodity nor on the entire system of imports. This is not surprising, since food aid is normally targeted at the poorer groups in society whose subsistence is on the margin. In West Africa, nearly 75% of total food assistance from 1988 to 2010 comprised emergency and project food aid, which are aimed at poverty reduction. Programme food aid, which is often monetised and extended to governments and designed to address balance-of-payments issues, makes up the remainder. Critics of food aid have long argued that it augments food supplies and provides cheap food for countries, allowing governments to maintain low price support for farmers, neglect investment in agriculture, and become increasingly dependent on imported food (Maxwell & Singer 1979). However, in this study, food aid was found to have a statistically insignificant effect on food import demand. The insignificant effect of food aid on food imports contradicts Maxwell and Singer's (1979) claim, but is consistent with the findings of Abdulai *et al* (2004), who argue that targeted food aid shipments alleviate factor market constraints, which more than offsets price disincentives resulting from food aid delivery by expanding domestic production. Gilligan and Hoddinott (2007) also argue that food aid programmes tend to benefit the poorest in the community and that these individuals are less likely to influence the consumption of imported food.

Table 5: Likelihood ratio tests for influence of food aid and remittances on West African agricultural imports

	Log-likelihood value	**LR statistics**	**P[X2< LR] = 0.95**	**P value**
Unrestricted	748.495			
Dairy food aid	749.261	1.532	3.842(1)	0.216
Animal product food aid	749.108	1.227	3.842 (1)	0.268
Fruit food aid	750.105	3.221	3.842 (1)	0.073
Oils food aid	748.671	0.352	3.842 (1)	0.553
All food aid	752.15	7.311	11.070(5)	0.199
Dairy remittances	748.556	0.1228	3.842 (1)	0.726
Animal product remittances	748.516	0.0424	3.842 (1)	0.838
Fruit remittances	749.4	1.8096	3.842 (1)	0.179
Oils remittances	752.884	8.7778	3.842 (1)	**0.003**
Staples remittances	748.518	0.0464	3.842 (1)	0.83
All remittances	754.457	11.925	11.070(5)	**0.036**
All food aid and remittances combined	757.437	17.8846	18.3(10)	**0.057**

On the other hand, remittances to West Africa increased from just over $160 million in 1961 to over $20 billion dollars in 2009. The primary sources of West African remittances are the United States and the European Union. Remittances, as a whole, were found to be statistically significant in determining West African food import demand. This finding is consistent with the literature, which states that remittances have a negative current account effect, whereby the income effect of the transfers induces demand for imports (OECD 2006). With the inclusion of the remittances variable in the individual equations, the results show that remittances largely influence oilseed product imports. As discussed earlier, oilseeds products are comprised of refined olive oils and other hydrogenated oils from oilseeds. Since oilseed products are more expensive and probably more healthful than the domestic oils, remittances may serve as a good source for getting the extra cash to purchase imported oils.

6. Conclusions

This study found compensated own-price elasticities to be negative and statistically significant, while compensated cross-price coefficients were also found mostly to be positive, consistent with the theoretical literature. The findings that dairy products and fruit and vegetables are the most price-inelastic food groups suggest that these food groups have significant trade balance implication for countries. Demand and supply shocks in the international market for these food groups will pose balance-of-payments challenges to West African countries, where foreign exchange is already scarce. International aid organisations, donor governments and the Economic Community of West African States (ECOWAS) must therefore take these food groups into consideration in their design of policy on programme food aid in order to effectively provide balance-of-payments relief, for which it is donated.

The largest scale or expenditure elasticities of oil seeds suggest that, with increases in household income (from sources such as remittances), the propensity of the average West African to demand imported oilseed products rises. This is indicative that West Africans will display an ostentatious demand for what they perceive as superior imported oilseed products, in place of locally produced alternatives.

Food aid was not found to be statistically significant in influencing West African import demand for any food group, taken individually or collectively. One reason for this is that the volume of these transfers is too small per capita to have any significant displacement effect on imports. Indeed, the data show that the per capita food aid in the region has been declining over the years. Secondly, a disproportionate size of all food aid is targeted at poverty alleviation projects and emergency relief in regions that have been burdened by civil war. In the last decade alone, several countries have been recipients of emergency food aid due to conflicts and political instability (Sierra Leone, Liberia, Ivory Coast, Guinea and Mali) or natural disasters (Niger and Senegal). It is not far-fetched that overall shipments of food aid would not have had any significant impact on food import demand. Donors who are concerned that food aid to the region will displace international trade from donors should be encouraged by the insignificant effect of food aid on West African food import demand.

The finding that remittances are more effective than food aid in stimulating import demand suggests development policy options for governments in West Africa, as well as for international development partners. Remittances, which by definition are transfers of money, provide a better alternative to boosting income, alleviating poverty and improving food security in the recipient country. While food aid transfers provide transient relief to the poor, their role as an important tool in promoting sustainable food security and economic development remains murky. However, remittances can be viewed as a two-edged development tool in the quest for improving food availability and food access. On the one hand, bulk income transfers to West Africa improve the availability of foreign exchange for investment in imported productive resources for agriculture, which will improve the recipient country's food supply. On the other hand, by augmenting incomes, remittances increase the demand for imported and domestically produced food products. In the recipient country, the attendant price incentives can trigger an expansion in food production.

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