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Analyzing Meat and Seafood Import Demand in Trinidad and Tobago Using the Linear Approximate Almost Ideal Demand System Model

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Abstract

A linear approximated almost ideal demand system model is specified to estimate imported meat and seafood demand in Trinidad and Tobago for the period 1976 to 2019 using annual data. Model parameters were estimated using seemingly unrelated regression with theoretical restrictions imposed. The results found that own-price of imported poultry and seafood negatively affected import expenditure share while own-price positively affected import expenditure share for imported beef, pork, and mutton. In addition, income negatively affected the import expenditure share of imported beef but positively affected the import expenditure share of imported pork, poultry, seafood, and mutton over the study period. Expenditure elasticity for imported meats and seafood reveals that they are all normal goods. Imported beef, pork, poultry, seafood, and mutton had expenditure elasticities of 0.57, 1.13, 1.94, 1.12, and 1.05, respectively. Imported pork, poultry, seafood, and mutton were found to be luxuries with income-elastic import demand. Own-price elasticities reveal that imported poultry was the most import elastic with an own-price elasticity of 1.40, followed by imported seafood (1.22), beef (0.65), mutton (0.54), and pork (0.48). Cross-price elasticities revealed that various complementary and substitution relationships existed among imported meats and seafood over the study period. Hicksian cross-price elasticities showed that mostly substitution relationships existed between various pairs of imported meats and seafood. The study also highlighted some policy recommendations that can be derived from the results.

Keywords

Meat and seafood imports, LA-AIDS, elasticities, food policy, Trinidad and Tobago.

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Introduction

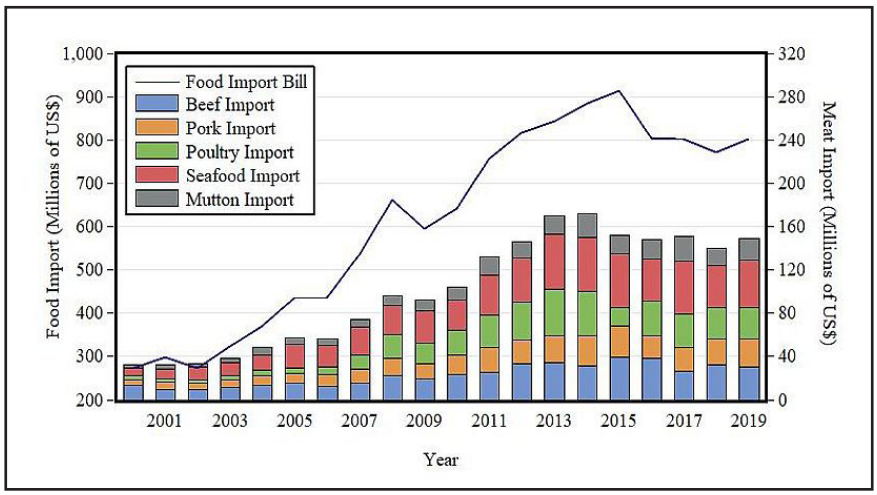
In 2010 the global consumption of animal protein was estimated to be 209.20 million tonnes but in 2019 was estimated to be 248.73 million tonnes (FAO 2022b). Between 2009 and 2019, global consumption of animal protein has seen an 18.9% increase. Global per capita consumption of animal protein between 2010 and 2019 increased by 3.9% on average (FAO 2022a). Projected increase in income and population growth is expected to positively correlate with increased animal protein consumption and production in the future (OECD/FAO, 2022). Whitton et al. (2021) also notes that there is a direct relationship between development and increased meat consumption. According to OECD/FAO (2022), the availability of protein from beef, pork, poultry and sheep meat is projected to increase by 5.9%, 13.1%, 17.8%, and 15.7% by 2030, respectively. Current consumption patterns suggest that consumers are shifting meat consumption toward poultry, especially in developing nations with low income levels (OECD/FAO, 2022). Furthermore, it is projected that by 2030 poultry meat will account for around 41% of all protein derived from animal sources globally (OECD/FAO, 2022).

Trinidad and Tobago is a small island developing state (SIDS) with an ever-growing food import bill (FIB). In 2015, the national FIB was reported to be US$915.13 million but decreased to US$801.47 million, or 12.4% in 2019 (Figure 1). Meat imports accounted for 16.6% of the 2015 FIB, however, in 2019 it accounted for 18.6%. In 2019, seafood accounted for 29.3% of meat imports while mutton accounted for only 13.2% (FAO 2022c).

Per capita animal protein consumption in Trinidad and Tobago is increasing annually. In 2010, per capita animal protein consumption was reported to be 75.69 kg, which increased to 77.71kg in 2019 (FAO, 2022a). In the future, animal protein consumption is expected to increase further as income increases.

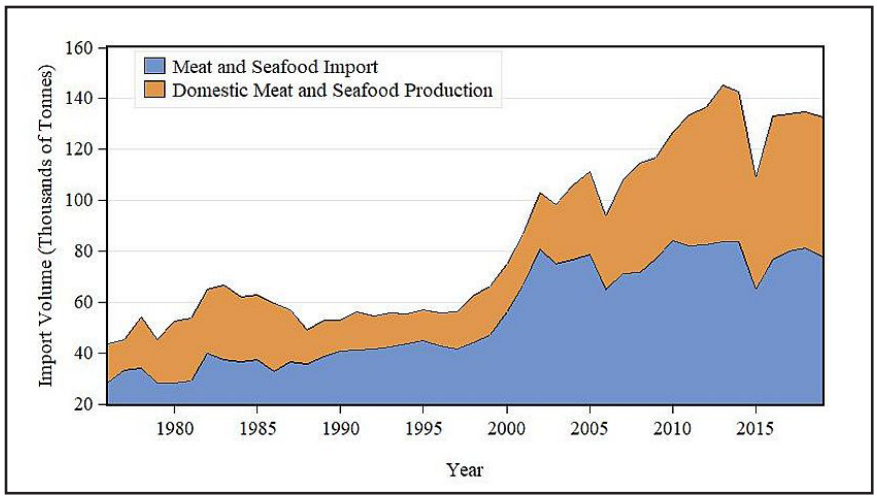
Domestic meat and seafood production for Trinidad and Tobago reached 84.06 thousand tonnes in 2010, but decreased to 77.82 thousand tonnes in 2019 (Figure 2). Meat and seafood import volume in 2010 was estimated to be 42.56 thousand tonnes, and grew to 54.93 thousand tonnes in 2019 (Figure 2). Meat and seafood production between 2010 and 2019 decreased by 7.4% on average while imports experienced increases of 29.1% to account for decreasing production volumes and increasing consumption patterns.

Studies on meat and seafood demand estimation has been carried out in various countries such as Karagiannis et al. (2000) and Nikolaou and Velentzas (2000) for Greece, Motallebi and Pendell (2013), and Pourmokhtar et al. (2018)



Source: FAO (2022c)

Figure 1: Trinidad and Tobago food import bill and meat imports.



Source: FAO (2022c)

Figure 2: Trinidad and Tobago Imports versus Domestic Production.

for Iran, Forgenie et al. (2023), Khoiriyah et al. (2020), and Anindita et al. (2020) for Indonesia, Basarir (2013) for the UAE, Jabarin (2005) for Jordan, Selvanathan et al. (2020) and Wadud (2006) for Bangladesh, Taljaard et al. (2004), and Taljaard et al. (2006) for Africa, Shibia et al. (2017) for Kenya, Singh et al. (2011) and Zhou (2015) for the United States, Verbeke and Ward (2001) for Belgium, Golan et al. (2001) and Ramírez Tinoco et al. (2011) for Mexico, Memon et al. (2015) for Pakistan, Ezedinma et al. (2006) in Nigeria, Ramírez (2013) for Colombia, Zhang et al. (2018) and Hejazi et al. (2019) for China, and Henneberry and Hwang (2007) for South Korea, using the Almost Ideal Demand System (AIDS) approach. Most of these studies examined demand at the household level were imported huge quantities of animal protein to meet domestic demands. It is widely suggested that income support policies such as government food assistance and household subsidies would be most effective in promoting household consumption of animal-sourced protein. It must be noted that most studies conducted in developing countries report that domestic consumption of animal-sourced protein is low which has serious negative implications for health and nutrition.

Import elasticities are valuable tools in policy formulation. They can help to gain a better understanding of the degree of responsiveness of quantity demanded and demand, as a result of changes in one of the determinants of import demand such as price or income. Reliable and efficient import elasticities can aid in the development of policy that can help to foster improvements in consumer welfare since consumption patterns can be better understood. Singh et al. (2011) and Lokuge and Edirisinghe (2015) notes that reliable price and income elasticities can be used to develop effective campaigns and marketing strategies. Additionally, studies that focus on import demand estimation can be extremely valuable not only for the importing country but also for their trading partners as a comprehensive understanding of how factors such as prices and income affect demand can be better understood.

Despite being net-importers of meat and seafood, Trinidad and Tobago lacks comprehensive studies on the importation of these food products. Such studies are of utmost importance as enablers of effective planning and management of domestic production, distribution, and trade. Understanding the dynamics of import demand can help to ensure that the dietary needs of the population are met, while also addressing the concerns regarding food and nutrition security. Additionally, elasticity estimates play a vital role in formulating policies that promote sustainability, reduce dependency on imports, and provide support to local producers. By considering the broader context of factors such as food and nutrition security, trade balances, and health implications, this study seeks to shed light on the significance of studying the dynamics of imported meat and seafood demand in Trinidad and Tobago.

Therefore, this article seeks to study meat and seafood import demand in Trinidad and Tobago using the linear approximate almost ideal demand system (LA-AIDS) model for the period 1976 to 2019 using annual data. We will examine the effect of price and income on the import demand for various imported meat categories and calculate price and income elasticities for these commodities. To the best of our knowledge, no study has been done for Trinidad and Tobago using the LA-AIDS model to study meat and seafood import demand. Therefore, this study will fill this gap in the literature. This article will also provide policy-relevant import price and income elasticities for Trinidad and Tobago.

Materials and methods

Model specification: the linear approximate almost ideal demand system

The almost ideal demand system (AIDS) model proposed by Deaton and Muellbauer (1980) is widely used in the empirical literature. Despite there being numerous other demand systems, the AIDS model remains one of the most preferred specification in empirical work. This is because the AIDS model possesses many desirable properties, such as it aggregates perfectly over consumers, has a functional form which is consistent with known data, satisfies the axiom of choice, is rather straight-forward to estimate, and allows for the theoretical restrictions of adding-up, homogeneity, and symmetry to be imposed on the model parameters and tested (Barnett and Seck 2008, Deaton and Muellbauer 1980, Byrne et al. 1996). These properties make the AIDS model extremely popular among scholars (Alston and Chalfant, 1993, Eales and Unnevehr, 1994). Following Deaton and Muellbauer (1980),

the AIDS demand equation is specified as follows:

$$s_i = \alpha_i + \sum_{j=1}^{n} \gamma_{ij} lnp_j + \beta_i ln\left(\frac{m}{P^*}\right) + \varepsilon_i \quad (1)$$

Where:

s_i: Budget Share for the i[th] imported commodity group calculated as $s_i = \frac{p_i q_i}{m_i}$

q_i: Import quantity of the i[th] imported commodity group.

ln: Natural logarithm

p_i: Prices of beef, pork, poultry, seafood, and mutton

m: Total expenditure on imported meat

ε_i: White noise error term

α_i: Intercept parameter

β_i : Expenditure parameters

γ_{ij}: Price parameters

The price index used to deflate total expenditure is represented by P^* and is a translog price index given as follow:

$$lnP^* = a_0 + \sum_{i=1} a_i lnp_i + \frac{1}{2}\sum_{i=1}\sum_{j=1} \gamma_{ij} ln\, p_i\, lnp_j \quad (2)$$

Substitution of equation (2) into equation (1) produces the non-linear or traditional AIDS model. However, according to Taljaard et al. (2004), using the translog price index makes the demand system non-linear which complicates the estimation process. However , to overcome the problem of non-linearity, Deaton and Muellbauer (1980) suggested using the stone price index to linearize the model. The stone price index is given as follow:

$$ln\, P^{**} = \sum_{i=1} s_i\, lnp_i \quad (3)$$

Substituting equation (3) into equation (1) produces the linear approximate almost ideal demand system (LA-AIDS) which is used to study import demand for various meats in Trinidad and Tobago. In order to ensure that the demand system is consistent with demand theory, the theoretical restrictions of adding-up, homogeneity and symmetry are imposed. Adding-up ensures that the budget shares all sum to one, homogeneity ensure that there is no "money illusion", and symmetry ensures that cross-price elasticities are symmetric. In order estimate α_i, γ_{ij}, and β_i in equation (1), adding-up, homogeneity, and symmetry restrictions are imposed as follows:

Adding-Up: $\sum a_i = 1\,;\, \sum \beta_i = 0\,;\, \sum_{i=1}^{n} \gamma_{ij} = 0$ (4)

Homogeneity: $\sum_{i=1}^{n} \gamma_{ij} = 0$ (5)

Symmetry: $\gamma_{ij} = \gamma_{ji}$ (6)

Equation (1) with the price index highlighted in equation (3) along with the theoretical restrictions in equations (4)-(6) imposed is estimated using the seemingly unrelated regression (SURE) technique by Zellner (1962) in Stata 17 software. In order to avoid singularity of the variance co-variance matrix, one of the share equation was dropped during empirical estimation and then recovered via the adding-up restriction.

Deriving price and expenditure elasticities

Now that a theoretically sound demand system is specified, price and expenditure elasticities can be derived for each imported meat group. The estimated parameters are used to derive Marshallian and Hicksian own- and cross-price elasticities along with expenditure elasticities for the various imported meats. Marshallian or uncompensated price elasticities measure the degree of responsiveness of the quantity demanded as a result of changes in prices. The Marshallian own-price elasticity measures changes in the quantity demanded of a good in question due to changes in its prices. The law of demand notes that price and quantity demanded share an inversed relationship, hence, the own-price elasticity most of the time is expected to be negative. Cross-price elasticity on the other hand measures the relationship that exist between two goods, substitution or complementary. Two goods would be considered substitutes if their cross-price elasticity is positive, however, they would be complements if cross-price elasticity is negative. Hicksian price elasticities are similar to Marshallian price elasticities, however, unlike Marshallian price elasticities that reflect changes in both price and income, Hicksian elasticities only measures the effect of a price change. Hence, Hicksian elasticities tend to be smaller in magnitude than Marshallian elasticities. Expenditure elasticities in the context of the LA-AIDS model measures the changes in demand brough about by changes in expenditure or income. Economic theory notes that for a normal good, expenditure elasticities should be positive and negative for an inferior good. Expenditure, and Marshallian, and Hicksian elasticities are calculated as follow:

Expenditure elasticity: $\eta_{ij} = 1 + \frac{\beta_i}{\bar{s}_i}$ (7)

Marshallian price elasticity: $\in_{ij}^{M} = \frac{\gamma_{ij} - \beta_i \bar{s_j}}{\bar{s_i}} - \delta_{ij}$

$\delta_{ij} = 1$ for $i = j$,0 otherwise (8)

Hicksian price elasticity: $\in_{ij}^{H} = \in_{ij}^{M} + \eta_{ij} \bar{s_j}$ (9)

Data and source

This article utilized annual import quantity and expenditure of beef (bovine meat), pork (pig meat), poultry (chicken and turkey), seafood (fish, shrimp, squid, and crustaceans), and mutton (sheep and goat) for the period 1976 to 2019 imported into Trinidad and Tobago. All quantities are given in metric tonnes and expenditure in US dollars. Data for beef, pork, poultry, and mutton was collected from the Food and Agriculture Organization online database (FAOSTAT). Seafood data was collected from FishStatJ. Since import prices for each imported meat group was not available, unit import value of import was used as a proxy for price obtained by dividing expenditure by quantity. Total expenditure on meat for each period was obtained by summing expenditures of the five imported meat groups. All empirical estimation was done in Stata 17.

Results and discussion

LA-AIDS parameters

The results of the LA-AIDS demand system for the five imported meat categories with theoretical restrictions of homogeneity and symmetry imposed are presented in Table 1. From Table 1 it is observed that the effect of the own-price parameter for each of the import share equations is statistically significant except for imported beef. For imported pork and mutton, it was found that own-price had a positive impact on import share. Ceteris paribus, it is suggested that a 1% increase in the import price of imported pork and mutton is expected to bring about a 0.074% and 0.048% increase in import expenditure share, respectively. These findings are consistent with those of Kharisma et al. (2020) who highlighted that there is usually a positive relationship between own-price and the budget share. In contrast, the own-price of poultry and seafood was found to have a negative impact on import shares. This is consistent with Nendissa et al. (2021) who found that the own-price of fish and seafood had a negative impact on the budget share equation. Ceteris paribus, it is suggested that a 1% increase in the import price of poultry and seafood is expected to bring about a 0.032% and 0.052% decrease in import share expenditure, respectively. The imported meat share equation that was found to be the most responsive to changes in import price was pork while poultry was found to be the least responsive.

The expenditure parameter is also presented in Table 1 for each import meat group. All of the estimated parameters for expenditure were found to be statistically significant. It was discovered that an increase in expenditure or income is expected to bring about an increase in the import expenditure share of pork, poultry, seafood, and mutton. In contrast, it was found that an increase in import expenditure or income will bring about a decrease in the import expenditure

Parameter	Meat import share equation				
	Beef	Pork	Poultry	Seafood	Mutton
Intercept	2.034*** (0.227)	-0.036 (0.118)	-0.979*** (0.149)	-0.077 (0.158)	0.068*** (0.014)
Beef price	0.071 (0.057)	-0.036*** (0.005)	0.055** (0.005)	0.024 (0.039)	-0.114*** (0.032)
Pork price	-0.036 (0.029)	0.074** (0.032)	-0.024 (0.016)	-0.039*** (0.006)	0.025 (0.020)
Poultry price	0.055** (0.026)	-0.024 (0.016)	-0.032* (0.019)	0.014 (0.021)	-0.013 (0.018)
Seafood price	0.024 (0.039)	-0.039** (0.017)	0.014** (0.006)	-0.052*** (0.007)	0.053* (0.029)
Mutton price	-0.114*** (0.032)	0.025 (0.020)	-0.013 (0.018)	0.053* (0.029)	0.048** (0.018)
Expenditure	-0.161*** (0.023)	0.018** (0.008)	0.105*** (0.015)	0.333** (0.016)	0.005* (0.003)

Note: *** p <0.01, ** p <0.05, * p <0.1. Standard errors in parentheses
Source: Own calculation based on data from FAOSTAT

Table 1: Estimated parameters of the LA-AIDS model for imported meats.

share of beef. In addition, the results for beef confirms Bennet's Law in Trinidad and Tobago which states that higher income levels causes a shift in consumption towards better quality food items (Kharisma et al. 2020). According to Rathnayaka et al. (2019), a negative sign attached to the expenditure parameter can also be interpreted as the good in question can be considered to be a necessity whist a positive sign would mean that the good is a luxury. Hence, the results suggest that imported beef is a necessity whilst all other imported meat categories can be considered to be luxuries.

Expenditure elasticities

Income is one of the critical determinants of demand, and by extension, import demand. Income elasticity generally measures changes in demand that is brought about by changes in income. Economic theory dictates that for a normal good, when income increases the demand for the that good will also increase, hence, income elasticity for a normal good is supposed to yield a positive sign. In contrast, an inferior good would have an inverse relationship with income. For an inferior good, when income increases, the demand for that good would decrease, hence, income elasticity would generally have a negative sign. Additionally, goods can be regarded as luxuries if the income elasticity is greater than unity. However, when income elasticity is less than unity, the good is regarded as a normal good.

Table 2 presents income or expenditure elasticities for the five imported meats categories for Trinidad and Tobago calculated using equation (7). It was found that all expenditure elasticities were statistically significant at the 1% level. This signifies that income fosters an increase in demand for all imported meat categories for the study period. All calculated expenditure elasticities were found to be positive, which suggest that all imported meats for the study period are normal goods. Expenditure elasticity for all imported meats, except beef, was found to be greater than unity which suggest that they are luxuries. With respects to imported pork, poultry, seafood, and mutton, a 1% increase in income is expected to bring about on average a 1.31%, 1.94%, 1.12%, and 1.05% increase in import consumption annually, respectively. Imported poultry meat was found to be the most luxurious imported meat item followed by seafood. In contrast, imported beef was found to have an expenditure elasticity of 0.569, which suggest that it is a necessity. A 1% increase in income is expected to bring about a 0.57% increase in demand for imported beef on average annually. Imported beef was found to be the lest responsive to changes in income compared to other imported meat categories.

Imported meat group	Expenditure elasticity
Beef	0.569 (0.062)
Pork	1.131 (0.087)
Poultry	1.938 (0.137)
Seafood	1.123 (0.059)
Mutton	1.047 (0.069)

Note: Standard errors in parentheses.
Source: Own calculation based on data from FAOSTAT.

Table 2: Expenditure elasticity for imported meats.

Marshallian price elasticities

Marshallian price elasticities have both a price and income effect. In addition, Marshallian own -price elasticities measure the responsiveness of quantity demanded as a result of changes in price. Economic theory notes that there is an inversed relationship between quantity demanded and price, hence, own-price elasticity should be negative. Additionally, although own-price elasticity is expected to yield a negative sign, economists usually interpret in absolute terms, as the negative sign is ignored, and with the ceteris paribus assumption imposed. Own-price elasticity values that are greater than unity is regarded as elastic while those that are less than unity are inelastic. Elastic goods tend to be very sensitive to changes in price, therefore, small changes in prices generally lead to more than proportionate changes in quantity demanded. Inelastic goods on the other hand are usually less responsive to price changes, hence, large changes in price results in less than proportionate changes in quantity demanded.

Table 3 presents Marshallian own- and cross-price elasticities for the various imported meats calculated using equation (8). For Trinidad and Tobago, it was found that all own-price elasticities for imported meats were statistically significant and carried a negative sign. It was found that for imported beef, pork and mutton, a 1% increase in price is expected to bring about on average 0.65%, 0.48%, and 0.54% decrease in import volumes,

Import Meat Group	Beef	Pork	Poultry	Seafood	Mutton
Beef	**-0.650 (0.157)**	-0.036 (0.078)	0.195 (0.066)	0.182 (0.105)	-0.260 (0.088)
Pork	-0.308 (0.215)	**-0.480 (0.233)**	-0.189 (0.116)	-0.324 (0.193)	0.171 (0.152)
Poultry	0.140 (0.242)	-0.345 (0.146)	**-1.395 (0.169)**	-0.129 (0.188)	-0.210 (0.169)
Seafood	0.044 (0.148)	-0.165 (0.099)	0.018 (0.074)	**-1.224 (0.177)**	0.183 (0.112)
Mutton	-1.114 (0.456)	0.238 (0.201)	-0.125 (0.109)	0.497 (0.468)	**-0.543 (0.105)**

Note: Standard errors in parentheses.
Source: Own calculation based on data from FAOSTAT

Table 3: Marshallian price elasticities for imported meats and seafoods.

respectively. Furthermore, own-price elasticities in absolute form for imported beef, pork, and own price mutton suggest that these meat categories have inelastic import demand. This means that they are not very responsive to changes in prices. Imported pork was found to be the least responsive to import price changes compared to other imported meat categories. In contrast, imported poultry and seafood was found to have elastic import demand. Both imported meat groups had own-price elasticities that were greater than unity. For imported poultry and seafood, a 1% increase in prices is expected to bring about on average a 1.39% and 1.22% decrease in import volumes, respectively. Imported poultry was found to be the most responsive to changes in import price among all other imported meats.

Table 3 also presents cross-price elasticities for imported meats. Cross-price elasticity is generally used to assess the relationship between two goods, substitution or complementary. It generally looks at how changes in the price of one good affects the demand for another good. Generally, if the cross-price elasticity between two goods is positive, then they are substitutes. This means that as the price of one of the goods in question increases the demand for the other related good would also increase as consumers would shift consumption away from the relatively more expensive good towards the one that is less expensive. However, if the cross-prices elasticity is negative, then they are complements. Two goods are complements if they are usually consumed together, therefore, an increase in the price of one will lead to a decrease in the quantity demanded for the other related good.

For Trinidad and Tobago meat imports, there were various substitution and complementary relationships that existed among pairs of imported meats. For instance, imported beef had complementary relationships with imported pork and mutton, but substitued with imported poultry and seafood. Imported poultry on the other hand had complementary relationships with all other imported meats except imported beef. In general, if imported beef prices increased by 1% on average, import demand for imported pork and mutton will fall by 0.04% and 0.26%, respectively, but will rise for imported poultry and seafood by 0.20% and 0.18%, respectively. It was also discovered that changes in the price of imported seafood leads to substitution for imported beef, poultry, and mutton. A 1% increase in the price of imported seafood is expected to result in a 0.04%, 0.02%, and 0.18% increase in import consumption of imported beef, poultry and mutton, respectively. Imported seafood was mostly substituted with imported mutton when prices change. However, imported seafood and imported pork were found to be complements. A 1% increase in the price of imported seafood is expected to bring about a 0.17% decrease in the demand for imported pork.

Hicksian elasticities

Hicksian price elasticity measures the responsiveness of quantity demanded due to changes in prices only, hence, it is usually referred to as elasticity of substitution. Additionally, Hicksian elasticities tend to be smaller in magnitude than Marshallian elasticities since Hicksian elasticities have a price effect while Marshallian elasticities have both price and income effects. Table 4 presents Hicksian price elasticities for the various import meat categories for Trinidad and Tobago derived using equation (9). It was

Import Meat Group	Beef	Pork	Poultry	Seafood	Mutton
Beef	**-0.437 (0.153)**	0.043 (0.078)	0.259 (0.068)	0.336 (0.105)	-0.200 (0.086)
Pork	0.115 (0.211)	**-0.324 (0.234)**	-0.062 (0.119)	-0.018 (0.195)	0.289 (0.148)
Poultry	0.856 (0.228)	-0.077 (0.146)	**-1.178 (0.175)**	0.396 (0.186)	-0.007 (0.163)
Seafood	0.464 (0.145)	-0.009 (0.099)	0.164 (0.077)	**-0.920 (0.179)**	0.301 (0.109)
Mutton	-0.718 (0.293)	0.382 (0.205)	-0.010 (0.111)	0.780 (0.254)	**-0.434 (0.103)**

Note: Standard errors in parentheses.
Source: Own calculation based on data from FAOSTAT

Table 4: Hicksian price elasticities for imported meats and seafoods.

found that all calculated own-price Hicksian elasticities were statistically significant, except for imported pork. In addition, all Hicksian elasticities carried the appropriate negative sign. For Trinidad and Tobago, it was found that a 1% increase in the price of imported beef, pork, poultry, seafood, and mutton is expected to bring about on average a 0.44%, 0.32%, 1.18%, 0.92%, and 0.43% decrease in import volumes, respectively. Imported beef, pork, seafood, and mutton was found to have inelastic import demand. Imported poultry on the other hand was found to be import elastic. Imported beef and mutton was found to be the least responsive to changes in their import prices while poultry was found to be the most responsive.

Table 4 also presents Hicksian cross-price elasticities for the five imported meat categories. The study found that mostly substitution relationships existed among the various imported meat categories for the study period. This is since most cross-price elasticities were found to be positive, which signifies that an increase in the price of one particular imported meat group would most likely result in reduced consumption of their group and consumers would substitute that particular meat group with another relatively cheaper one.

Imported beef was found to have substitution relationships with imported pork, poultry, and seafood but a complementary relationship with imported mutton. A 1% increase in the price of imported beef is expected to bring about a 0.04%, 0.26%, and 0.34% increase in demand for imported pork, poultry, and seafood, respectively. In contrast, a 1% increase in the price of imported beef is expected to bring about on average a 0.20% decrease in demand for imported mutton. Imported seafood was found to be the most responsive to changes in the price of imported beef. Imported pork was found to be substituted for imported beef and mutton when price changes. A 1% increase in the price of imported pork is expected to bring about a 0.12% and 0.29% increase in demand for imported beef and mutton, respectively. However, imported pork was found to have complementary relationships with imported poultry and seafood as a 1% increase in the price of imported pork is expected to bring about a 0.06% and 0.02% decrease in demand for imported poultry and seafood, respectively. Imported seafood was found to be substituted with imported beef, poultry and mutton when prices change, but complementary with imported pork.

Policy recommendations

Based on the findings of the study, several policy implications and recommendations can be made to address the import demand for meat and seafood in Trinidad and Tobago, with the aim of promoting food security and sustainability. Firstly, given that imported beef was found to be income inelastic, policymakers could focus on enhancing domestic production and reducing reliance on imported beef. This could be achieved through initiatives such as providing support to local farmers, improving breeding and rearing practices, and implementing quality assurance measures to ensure competitiveness in the domestic beef market. Additionally, since imported poultry, pork, seafood, and mutton were identified as luxury goods with income elasticities all exceeding unity, there is an opportunity for policymakers to explore strategies that balance import demands while encouraging local production. One potential approach could be to promote sustainable aquaculture practices and invest in the development of local poultry and pork industries. This could involve offering incentives to farmers, providing technical assistance, and facilitating access to financing

options to stimulate growth in these sectors. Furthermore, policymakers could consider implementing trade policies that incentivize the consumption of locally produced meat and seafood. This could include imposing tariffs or import quotas on luxury imports while simultaneously providing support and incentives for local producers. Such measures would not only enhance food security but also contribute to the overall sustainability of the agricultural sector in Trinidad and Tobago.

The own-price elasticities of imported meat and seafood provides valuable insights for policy recommendations. Beef, pork, and mutton were found to be inelastic, indicating that trade policies should be managed to ensure a stable supply of these meats at reasonable prices. Negotiating favorable trade agreements with exporting countries can help maintain a steady and affordable supply. However, the own-price elasticities of imported poultry and seafood indicate that policies should focus on encouraging local production. This can be achieved through supporting domestic farmers, investing in research and development, and implementing quality standards to ensure the safety and competitiveness of domestic poultry and seafood products. Moreover, consumer awareness and education campaigns can play a vital role in stimulating demand for locally produced meats and seafood. Promoting the benefits of consuming locally sourced products can foster a sense of food security and sustainability among the population. By implementing a combination of these policy measures, Trinidad and Tobago can strike a balance between managing trade policies, promoting local production, and ensuring a resilient and self-sufficient food system that meets the dietary needs of the population while reducing dependency on imports.

Conclusion

This article analyzed the import demand for beef, pork, poultry, seafood, and mutton in Trinidad and Tobago for the period 1976 to 2019 using a linearized almost ideal demand system model. The goal was to analyze the impact price and income on meat and seafood import demand. It was found that own-price for imported poultry and seafood negatively affected import expenditure share. In contrast, own-price positively affected the import expenditure shares of imported pork and mutton. With respects to income or expenditure, increase in income negatively affected import expenditure share of imported beef while it positively affected the import expenditure share of all other imported meats and seafood.

The study also calculated import expenditure and price elasticities for imported meat and seafood. Based on import expenditure elasticities, imported meat and seafood were found to be normal goods. Imported pork, poultry, seafood, and mutton were all found to be luxuries while imported beef was found to be import inelastic. Imported poultry was found to be the most income elastic among all imported animal proteins with an import expenditure elasticity of 1.938. Imported beef had an import expenditure elasticity of 0.569 which signified that this imported meat category was least responsive to changes in income.

The article also presents Marshallian and Hicksian own- and cross-price elasticities. Based on Marshallian own-price elasticities, imported beef, pork, and mutton were found to be price inelastic while imported poultry and seafood were found to be price elastic. Imported poultry was found to be the most price elastic with an elasticity of 1.395 followed by seafood which was 1.224. Imported pork was found to be the least responsive to price changes with an own-price elasticity of 0.480. Marshallian cross-price elasticities revealed that various complementary and substitution relationships existed among various imported meats and seafood. Hicksian cross-price elasticities revealed that mostly substitution relationships existed among imported meats and seafood during the study period. The study also suggested some policy recommendations as it relates to the results.

It is important to acknowledge the limitations of this study. One limitation is the reliance on historical data, which may not fully capture current market dynamics and consumer preferences. The study utilized annual data which makes it difficult to assess seasonal variations in import meat and seafood import demand. Additionally, the use of the LA-AIDS model has inherent limitations in capturing complex relationships between import demand, prices, and income, potentially resulting in oversimplified representations of demand behavior. Furthermore, the possibility of omitted variable bias should be acknowledged, as there may be other factors influencing import demand for meat and seafood that were not accounted for in this analysis. Despite these limitations, the study provides valuable insights into import demand elasticities and offers a foundation for further research and policy discussions on promoting food security and sustainable meat and seafood production in Trinidad and Tobago.

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