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Impact of trade policies on the chicken market in Burundi

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Abstract
This study aims to examine the impact of trade policies on the chicken market in Burundi using the WITS-SMART partial equilibrium model. The analysis uses six-digit Harmonized System trade data at the six-digit level for the years 2013, 2014, and 2015 from the TRAINS database. The study defined a scenario of partial liberalization of tariff reduction. The results show the increase in imports of frozen chicken cuts from the rest of the world and the creation of trade that hurts the less competitive domestic poultry production. Based on the results obtained, the reduction of customs duties leads to a gain in consumer welfare and a drop in customs revenue, which represents the country's budgetary resources. Taking these results into account may enable the government to propose measures to meet the poultry sector's twofold challenge: to take advantage of the opportunity of a large and expanding domestic market and to improve the performance of the public and private companies operating in it to increase their competitiveness in the face of international competition.

Keywords: Revenue, trade, welfare, partial equilibrium model, chicken, Burundi

1. Introduction
It is now recognized that trade policy plays a key role in an economic development. In that context Burundi has adopted the EAC's Common External Tariff (CET) in 2009 as regional integration policy. The results often imply new risks, threats, and challenges (WB, 2017). Some industries are very sensitive to changes in production costs and, due to strong pressure from regional and global competition. Burundi's chicken market requires many improvements in terms of the laws and regulations governing this market. In addition, developing countries complain that infant industries, such as the poultry meat industry, require at least some level of protection until they become more competitive and less vulnerable to foreign competition (Krugman *et al*. 2012) [18]. A continuous and stable supply of the domestic market with a product of acceptable quality and an affordable price to the domestic consumer must be verified and maintained (Guerrero-Legarreta *et al*. 2010) [13].
Previous research has shown that the reduction of tariff and non-tariff barriers (Kucher, 2017) [19] and the import of frozen chickens hurt the local poultry trade (Anas, 2014; Byung and Wyatt, 2019) [1, 6]. However, Burundi has undergone several trade policy reforms including the adoption of the sub-sector policy in 2009, the law on the Strategic Orientation Document (SOD) of livestock development validated in 2010 (Ndimubandi, 2011) [25], aligned with the Burundi Vision 2025 and thereby consistent with CSLP II and SDG number 1 as well as with NEPAD (CAADP) orientations (MINAGRIE, 2011) [23]. Despite these reforms and the above actions, demand for chicken meat remains very low in Burundi but the adoption of the EAC CET has opened up the market to imports of frozen chickens and the quantity imported varies from 15.446 tons to 60.159 tons per year (ISTEEBU, 2020).
The results of recent surveys show that total chicken consumption varies from 1 to 1.5 kg per capita per year and the annual production of chicken meat (6800 tons per year) is estimated at 10% of the total meat produced in Burundi (FAOSTAT, 2017). On the macro-economic level, agriculture remains the main economic sector and accounts for more than 44% of GDP of which livestock accounts for about 19% (ISTEEBU, 2017) [15]. In addition, the price of a kg of local chicken meat which was US$ 4.58 in 2008 (FAO, 2008) [11], has reached US$ 6.89 compared to US$ 8.52 for a kg of imported frozen chicken (ISTEEBU, 2017) [15]. According to economic theory, there are positive effects between market opening and the productivity of domestic firms (Lemzoudi, 2005; Ethier, 1982) [22, 9]; elimination of price distortions, better allocation of resources, and expansion of markets with economies of scale

(Helpman and Grossman 2007; Markussen, 2007) [12]. For Leibenstein (1966) [21] and Horn *et al*. (1995) [14], under pressure from foreign competition, domestic firms make managerial decisions and procedures that optimize their production costs.

The main question guiding our work is to understand whether the reduction of customs duties by adopting the EAC's Common External Tariff has positive or negative consequences on the well-being of consumers and domestic chicken producers. It is not a question of questioning the implementation of the reduction of customs duties, but of seeing what effects this trade orientation would have on the poultry industry. The general objective of this work is to analyze, using a partial equilibrium model, the impact of trade policies on the chicken market in Burundi. The first hypothesis tested is that reducing tariffs and non-tariff barriers on poultry products would reduce chicken prices, increase social welfare and government tax revenues. The second hypothesis states that the reduction of non-tariff or tariff distortions would contribute to the trade creation effect that hurts domestic poultry production. The forward-looking approach uses the single market partial equilibrium modeling tool (WITS-SMART) (Jammes and Olarreaga, 2005) [16] to quantify the impact of trade policies. The data used come from the WITS, COMTRADE, TRAINS database, on the 6-digit Harmonized System (HS) tariff line.

The contribution of this work is twofold. First, it fills the gap in the literature on the effects of trade policies on the chicken market in African countries where local production competes with products imported from Europe (Weible and Pelikan, 2016) [37]. To our knowledge, there is no study that addresses the impact of trade policies on the burundian chicken market. Second, the study will therefore analyze the burundian poultry meat sector in detail in order to identify the main factors that could improve the poultry sector by achieving: ensuring fair competition and stabilizing prices.

The rest of the paper is organized as follows: section two presents the literature review, section three the methodology, section four the results and section five concludes the work.

2. Literature Review

Several works have analyzed the impact of trade policies on goods and services such as meat especially pork and poultry (Kucher, 2017) [19], competition from imported frozen chickens (Anas, 2014; Byung and Wyatt, 2019) [1, 6], infant industries such as the poultry meat industry in the context of developing countries (Krugman and Obstfeld, 2006) [17]. However, the literature suggests that the concept of trade has two divergent views; one involves recognition of the benefits of international trade, while the other relates to concerns that some domestic industries may be harmed by foreign competition (Porter, 1990; Samuelson, 1962; Ohlin, 1933) [32, 33, 27].

However, openness increases domestic imports of goods and services that include new technologies. The country experiences technological progress and its production become more efficient and its productivity increases through technology transfer (Grossman and Helpman, 1991) [12]. According to Edwards (1998) [8], there is overwhelming evidence across countries that trade liberalization and openness to trade increase the rate of income and output growth, particularly in sub-Saharan Africa. Several studies have analyzed the impact of trade policies and found that the impact of trade barriers on trade may be much larger than reflected in price levels because economic agents are differently affected. For Ethier (1982) [9], lower tariffs allow domestic firms to obtain better quality imported inputs at lower prices than before the tariff reduction.

More recently, Onogwu and Arene (2013) [28] used a WITS-SMART partial equilibrium model to assess the likely income, trade, and welfare implications of a free trade Economic Partnership Agreement (EPA) between Cape Verde and the European Union (EU). These authors found that Cape Verde would lose about 35 percent of its total revenue as a result of tariff dismantling on Cape Verdean imports from the EU. The work of Awono *et al*. (2005) [3] provides clear evidence of economic gains to consumers from opening the Cameroonian chicken market in partial equilibrium. Moreover, these gains largely exceed the losses of producers in the sector. The country experiences technological progress and its production becomes more efficient and its productivity increases through technology transfer (Grossman and Helpman, 1991) [12]. We adopt a forward-looking approach through a single market partial equilibrium modeling (WITS-SMART) (Jammes and Olarreaga, 2005) [16] to quantify the impact of trade policies on the Burundian chicken market. The following hypotheses emerge from this literature review: tariff reductions will lead to an annual increase in poultry meat imports (Kucher, 2017) [19]; loss of revenue and increase in welfare (Guei, Mugano and Roux, 2017). Finally, increased imports of frozen chickens negatively affect less competitive domestic production (Anas, 2014; Byung and Wyatt, 2019) [1, 6].

3. Material and Methods

3.1. Current status of the chicken market in Burundi

Burundi does not yet have a direct evaluation system for poultry production, since most production is carried out by private operators - breeders, "commercial structures" whose activities are only partially monitored by the official statistical system. Poultry production by public enterprises is in the minority compared to that of private poultry farmers. In general, livestock production is mainly intended for commercialization for the cash income needed for daily expenses, but also exceptionally when the needs of life make this necessary.

In Burundi, there are three main chicken production systems, to which have been added for some years the import of frozen chicken sold mainly in the city of Bujumbura:

- The traditional production system: chickens are raised in free range, to meet unforeseen expenses at 60%, egg production at 30%, meat production and poultry manure at 5% each.
- Progressive commercial household level farmers: on progressive or commercial farms, chickens are raised for egg production at 55%, meat production at 40%, risk management at 4% and poultry manure production at 1%.
- The intensive production system: This consists of the Mutoyi cooperative supported by Italian Catholic missionaries and a few commercial farms located in the urban and peri-urban areas of the city of Bujumbura. However, day-old chicks are imported from the European Union and the EAC, because compared to the demand, local production is very low and meets less than 5% of the total demand.

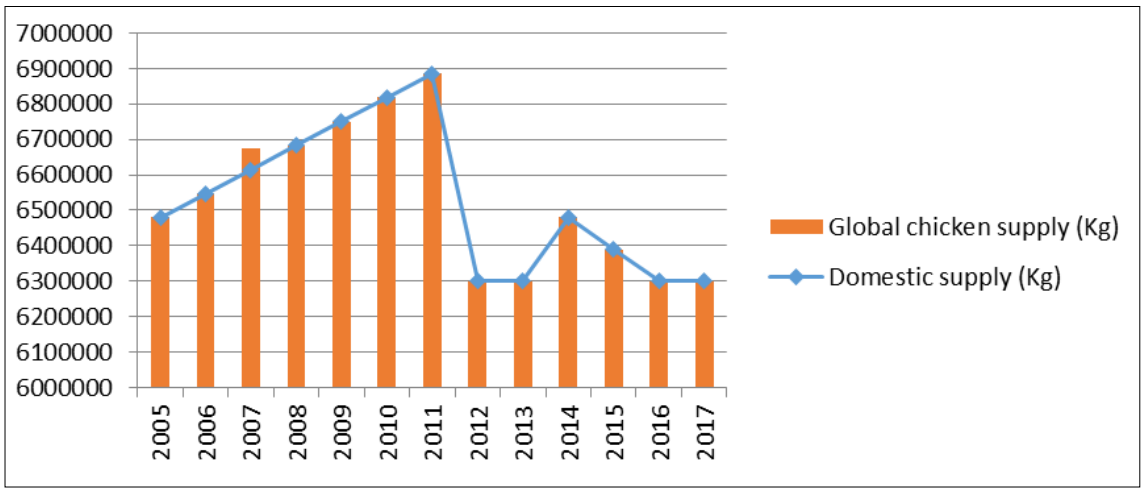
According to the FAO report (2011), indigenous chickens that are raised in rural areas represent about 90% of all poultry species in the country. Though, the annual chicken meat production is estimated at 10% of the total meat produced in Burundi. Moreover, eggs prices per ton on market had not changed to much from 2001 to 2008 and fluctuated around US$3,000 (FAO, 2011). Conversely, the price of poultry meat, which was 1601 dollars per ton in 2003, has not stopped increasing and reached 3813 dollars in 2008. Therefore, the price of a ton of chicken meat has almost doubled in 5 years. However, based on these reports of the FAO (2011), the consumption of poultry meat in Burundi is non-significant. Subsequently, efforts by policymakers and extension services must be stepped up at all levels to reverse the trend.

Economic and marketing constraints

Low productivity in poultry farming and limited outlets for livestock products strongly limit its contribution to income generation (WB, 2016). In addition, marketing problems are also notable in poultry farming and are related to the isolation of production areas. Breeders encounter difficulties in selling their animals. The prices offered by intermediaries who collect poultry at the village level are very low compared to prices in urban centers (FAO, 2011). A detailed analysis shows price differences between urban markets for local chicken on feet of 5407.30BIF for the center of BUBANZA and 9135.80BIF in the city of Bujumbura in September 2016(ISTEEBU, 2016).

3.1.1. Chicken supply and demand in Burundi since 2005

Figure 2 presents data provided by FAOstat (2017) on Burundi's poultry production between 2005 and 2017. Regarding import supply, quantities are provided by the Institute of Statistics and Economic Studies of Burundi (ISTEEBU) for the period 2005 to 2017. According to the FAO report (2011), local industrial chicken production contributes to 10% of total domestic production and the overall supply is very low and meets less than 5% of total demand.



Source: ISTEEBU, Business and Trade Service, 2020; FAOstat, 2017

Fig 1: Evolution of domestic supply and global chicken supply between 2005 and 2017

3.1.2. Evolution of consumer prices in US$ /Kg

ISTEEBU (2017) [15] provides annual averages of consumer prices for local industrial chicken and imported frozen chicken. These averages are based on monthly live chicken price records from household surveys. Figure 3 shows the price pattern of local industrial chicken and imported frozen chicken. It can be seen that the price of imported chicken is higher than that of local chicken, although both have an upward trend.

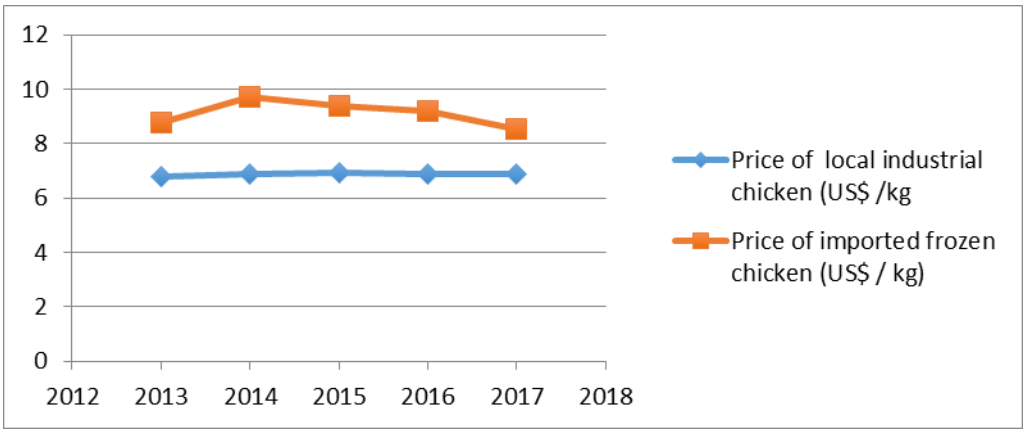


Fig 2: Consumer prices of imported industrial and frozen chickens in US$/kg.

Prices in BIF in the original sources have been converted to dollars using the annual exchange rate based on the report of ISTEEBU (2017) [15].

Overall, prices for animal products are freely determined by

the law of supply and demand. They vary from one region to another depending on whether or not it is a surplus producer, and from one market to another depending on the level of proximity to a production area (Ntahompagaze, 2009) [26].

3.2. Methodological approach: wits-smart software

3.2.1. Modeling the impact of trade policies on Burundi chicken market: the case of a small country

To assess the impact of trade policies on the chicken market in Burundi, this paper draws on the theoretical framework of Laird and Yeats (1986) [20] and Jammes and Olarreaga (2005) [16]. In particular, for Burundi, the case of a small country with no influence on world market prices is considered, implying a perfectly elastic export supply. Therefore, the specification of the WITS-SMART model is based on two assumptions: a perfect competition assumption, meaning that tariff reductions are fully reflected in the prices paid by consumers, and the Armington (1969) [2] assumption, meaning that imports from different countries are imperfect substitutes, while export supplies are perfectly elastic (Jammes and Olarreaga, 2005) [16].

Under Armington's (1969) [2] hypothesis, the representative agent maximizes her welfare through a two-stage optimization process. First, using a general price index, she chooses the level of total expenditure/consumption for a "composite good". The relationship between changes in the price index and the impact on total expenditure is determined by a given elasticity of import demand. Then, within that composite good, it allocates the chosen level of spending among the different "varieties" of the good, based on the relative price of each variety. The magnitude of the response of the allocation among varieties to the change in relative price is determined by the Armington (1969) [2] elasticity of substitution.

The SMART model incorporates three types of elasticities: export supply elasticity (99) for infinite elasticity for all products and partners; import substitution elasticity that records the rate of substitution between two goods of different origins and is taken to be 1.5 for each good; and import demand elasticity (1.47) measures the response of demand to a change in import price (WITS, 2011). However, to derive the first-round effects of the simulated policy changes, this study specifies a partial equilibrium model based on import demand (M) and export supply (X) functions (Jammes and Olarreaga (2005) [16]:

$$M_{ijk} = f\left(Y_{j,} P_{ij} P_{jk}\right) \quad (1)$$

Where: $Y_{j,}$ is Burundi's total import expenditure for product i

P_{ij} Domestic price of the product

P_{jk} : Domestic price in the partner country k i.e. the price that includes the tariff

Equation (1) implies that Burundi's import demand j for frozen cuts and chicken i exported by countries k is a function of their prices and total expenditure on the category. The export supply function of producing partner country k for product i can be specified as follows:

$$X_{ijk} = f\left(P_{ikj}\right) \quad (2)$$

Where: X_{ijk} Represents exports of frozen chickens i by partner countries k

P_{ikj} Is the price of frozen chicken i from partner country k to Burundi (country j)

The partial market equilibrium will be established by the following identity:

$$M_{ijk} = X_{ikj} \quad (3)$$

The domestic price of frozen cuts or chickens i in the Burundi import market will be equal to the exporting country's export price k plus transportation and insurance costs. It follows that this price will increase by an amount equivalent to the ad valorem impact of any tariff or non-tariff distortion applied to chicken meat.

$$P_{ijk} = P_{ikj}\left(1 + t_{ijk}\right) \quad (4)$$

Where : P_ijk is the price of frozen chickens i in Burundi from its trading partners k and t_ijk represents the tariff imposed by Burundi (country j) on its imports of frozen chicken i from partner country k.

In addition, the export revenue earned by exporting country k will be specified as follows:

$$R_{ikj} = X_{ikj}.P_{ikj} \quad (5)$$

Where, R ikj represent the export revenue of frozen chicken's i from trading country k to country j (Burundi for this study).

Thus, these five specific equations above together form the basic model from which trade creation, trade detour, total or net trade; income and welfare effects will be derived.

3.1.1. 3.2.1.1. Empirical modeling of the trade creation effect

According to Viner's (1950) [36] economic theory, trade creation normally occurs when a reduction or removal of tariffs changes the prices of imported products, such that less efficient domestic production is replaced by imports from exporting countries whose products are now inexpensive due to the removal of tariffs (Plummer *et al.*, 2011) [31]. In our context, the trade creation effect will be defined by the increased demand for frozen chicken meat i in Burundi from its trading partners k.

Empirically, the calculation of trade creation using the WITS-SMART model is influenced by import elasticity. There is a positive correlation between trade creation and import elasticity.

First, it is possible to calculate the total domestic price differential over tariffs and the foreign price from equation (4).

$$\partial P_{ijk} = P_{ikj}.\partial t_{ijk} + \left(1 + t_{ijk}\right)\partial P_{ikj} \quad (6)$$

The simplified expression for the domestic price elasticity of import demand can be rearranged as follows:

$$\frac{dM_{ijk}}{M_{ijk}} = E_m \frac{dP_{ijk}}{P_{ijk}} \quad (7)$$

Here we substitute Eq. (4) and (6) in equation (7) which leads to equation (8).

$$\frac{dM_{ijk}}{M_{ijk}} = E_m \frac{dt_{ijk}}{(1+t_{ijk})} + \frac{dP_{ijk}}{P_{ijk}} \quad (8)$$

The standard expression for the elasticity of export supply with respect to the world price can be rearranged as in equation (9).

$$\frac{dP_{ikj}}{P_{ikj}} = \left(\frac{dX_{ikj}}{X_{ikj}}\right) / E_x \quad (9)$$

It follows from equation (3) that:

$$\frac{dPM_{ijk}}{M_{ijk}} = \frac{dX_{ikj}}{X_{ikj}} \quad (10)$$

Substituting equation (10) into (9) and the result into (8) gives the expression that can be used to calculate the trade creation effect. The expression for trade creation as expressed in equation (11).

$$TC_{ijk} = M_{ijk}.E_x.\frac{dt_{ijk}}{(1+t_{ijk}).(1+E_m/E_x)} \quad (11)$$

3.1.2. Empirical modeling of the trade detour effect

For Laird and Yates (1986) [20], trade detour may occur not because of a change in the export price per se, but because of the introduction or removal of preferential treatment for goods from one (or more) source(s) while the treatment for goods from other sources remains unchanged. The higher the elasticity of substitution, the more trade detour will be felt by the country or sector concerned. The elasticity of substitution can be defined as the percentage change in relative shares associated with a one percent change in relative prices of the same product from alternative sources, as expressed in equation (12).

$$E_s = \frac{d\left(\frac{\sum M_{ijk}}{\sum M_{ijk}}\right)}{\left(\frac{\sum M_{ijk}}{\sum M_{ijk}}\right)} / d\left(\frac{P_{ijk}}{P_{ijk}}\right) / \left(P_{ijk}/P_{ijk}\right) \quad (12)$$

From this, the relative demand for frozen chicken is expected to increase as its relative price falls, so the elasticity of substitution should be less than zero.

The expression in equation (13) for relative price movement is specified in terms of tariff movements or the ad valorem impact of non-tariff distortions for the two foreign sources:

$$TD_{ijk} = \frac{M_{ijk}}{\sum_k M_{ijk}} \frac{\sum_k M_{ijk}.\sum_k M_{ijk}.E_s.\frac{d\left(\frac{P_{ijk}}{P_{ijk}}\right)}{P_{ijk}/P_{ijk}}}{\sum_k M_{ijk}+\sum_k M_{ijk}+\sum_k M_{ijk}.E_s.\frac{d\left(\frac{P_{ijk}}{P_{ijk}}\right)}{P_{ijk}/P_{ijk}}} \quad (13)$$

In other words, trade detour is limited by the level of initial imports from other countries (Laird and Yeats, 1986) [20].

3.1.3. Empirical modeling of the revenue effect

The revenue effect captures the changes in government or customs revenue resulting from either a reduction or complete elimination of import duties. Equation (13) applies directly to the estimation of the revenue effect for the importing country. This can be demonstrated by taking in equation (5) the total difference in revenue from the import price and the resulting value of imports in equation (14):

$$dR_{ijk} = P_{ijk}.dX_{ijk} + X_{ijk}.dP_{ijk} \quad (14)$$

By dividing the expression in equation (14) on the left by that in equation (5) on the left and that in equation (15) on the right by that in equation (5) on the right :

$$\frac{dR_{ijk}}{R_{ikj}} = \frac{\left(P_{ijk}.\partial X_{ijk}+X_{ijk}.\partial P_{ijk}\right)}{\left(P_{ikj}.X_{ikj}\right)} \quad (15)$$

According to Laird and Yeats (1986) [20], assuming that the elasticity of export supply is less than infinity, the percentage increase in revenue is given by adding the percentage increase in exports and the percentage increase in prices.

Therefore, reducing equation (15) and replacing it with equation (10) yields equation (16):

$$\frac{dR_{ikj}}{R_{ikj}} = \frac{dM_{ijk}}{M_{ijk}} + \frac{dP_{ikj}}{P_{ikj}} \quad (16)$$

Alternatively, the eviction for income effect can be written as follows:

$$\frac{dR_{ikj}}{R_{ikj}} = \left(\frac{dt_{ikj}}{1+t_{ikj}}\right).E_m + \left(\frac{1+E_x}{E_x-E_m}\right) \quad (17)$$

3.1.4. Empirical modeling of the consumer welfare effect

The welfare effect results from the benefits that consumers in the importing country derive from lower domestic prices after tariffs are removed or reduced (Laird and Yeats, 1986) [20]. Cline (1978) [7] noted that any price reduction for the consumer simply represents a transfer, to the detriment of the government, of tariff revenues previously collected on imports and, therefore, no net gain for the country as a whole.

Now, designating $Wijk$ as the welfare benefit of imported frozen chicken i in Burundi (j) from country k (the trading partners) and λ the weight that captures the decline and resurgence of protectionist behavior among the partner countries. Therefore, the net welfare gain is calculated by multiplying the increase in the value of imports by the average ex-ante and ex-post ad valorem impact of dismantling trade barriers. The work of Chan (1985) proved that the welfare impact lasts for one to one and a half years; the weight λ should be approximately equal to 0.5 since the dollar value of a static welfare gain should be able to offset the dollar value of a trade deficit in the short run. This welfare gain can also be viewed as the increase in consumer surplus as expressed in equation (18):

$$W_{ijk} = \lambda\left(dt_{ijk}.dM_{ijk}\right) \quad (18)$$

In the case where the elasticity of export supply is less than infinity, the supply price is higher than before. The new domestic price of imports does not fall to the full extent of the tariff change, and the expansion of imports is less than that of the infinitely elastic export supply. Welfare can still

be calculated using equation (18), but it must be interpreted as a combination of consumer surplus and producer surplus.

3.2. Sources and nature of data

Our data is derived from the WITS database which includes the following sources: COMTRADE), the Trade Analysis Information System (TRAINS) accessible through the ITC. The years 2013, 2014 and 2015, for which data are available and which provide complete statistical information on frozen chicken cuts and chickens imported by Burundi were considered. Trade flows, tariffs and elasticities are provided by the WITS- SMART software.

3.3. Fare reform simulation scenario and data analysis methodology

For this study, the simulation scenario used is based on the progressive reduction of the common external tariff (CET) on chicken imports for all of Burundi's trading partners. A 20% simulation rate will be used to observe the impact of partial liberalization through tariff reduction.

The data was analyzed using a SMART model simulation and further analysis was extended to Excel spreadsheet calculations. As a starting point, a new query was created and the data source (TRAINS) was specified in the SMART model. Burundi was selected as the importing country that applied a tariff reduction for the most recent years for which data were available at the time, i.e., 2015, 2014, and 2013. The selection of chicken meat at the 6-digit HS level was followed. Thus, the formula that determined the tariff change to be applied was selected. The three elasticities (export supply elasticity, import demand elasticity, and elasticity of substitution) used were derived from the SMART model.

4. Results and Discussions

4.1. Traffic creation and detour effects of the tariff reduction

Trade creation effects imply that more efficient or lower-cost foreign suppliers in one of Burundi's partner countries automatically crowd out less efficient or higher-cost local suppliers. As a result, not only would Burundian consumers benefit from lower prices, but real resource savings would be realized by shifting the source of supply to any country in the rest of the world on the basis of comparative advantage. In economic terms, trade creation is welfare enhancing, while trade detour is welfare reducing.

On the other hand, this may constitute competition for the Burundian poultry industry, as increased consumer welfare implies increased imports of frozen chickens (Anas, 2014; Byung and Wyatt, 2019) [1, 6]. Table 1 depicts the simulation results in WITS-SMART on trade creation and diversion.

Table 1: Creation and trade detour effects of the 5% tariff reduction

Year	Partner countries	Trade creation effect (US$ thousand)	Trade Diversion effect	Total traffic effect (US$ thousand)
2013	South Africa	0.191	0	0.191
	Rwanda	0.317	0	0.317
2014	South Africa	0.191	0	0.191
	Rwanda	0.315	0	0.315
	Belgium	0.012	0	0.012
2015	Rwanda	1.097	0	1.097
	South Africa	0.065	0	0.065
Total		2.188	0	2.188

Source: Author's calculation based on WITS-SMART simulation

From this table, we see that approximately US$2,188 thousand in trade will be created in Burundi as a result of the tariff reduction. Nevertheless, following the reduction of import duties from 25% to 20%, the trade detour effect is zero. Moreover, the significant trade creation for Burundi observed in this study justifies similar conclusions by Schiff and Winters (2003). They concluded that trade liberalization and tariff rate reductions among developing countries created trade that resulted in welfare gains for members of the customs union. The estimates in this study are similar to the results of Ousmane (2015) [30] who, after simulating the EPA trade liberalization scenarios between ECOWAS and the European Union, Niger is expected to experience a net trade creation of US$22.590 million

4.2. Effect of fare reduction on revenues 25 to 20%.

In addition to the effect on trade, the simulation shows changes in tariff revenue. Tariff reductions implemented by Burundi to comply with the EAC CET rates may result in lower tariff revenues.

Table 2: Effect of Fare Reduction on Revenue

Year	Import value (thousand)	Old tarif value (thousand)	Loss of revenue	% of total loss
2013	1.097	0.337	-0.0154	4.57
2014	1.9	0.335	-0.0153	4.56
2015	3.975	0.743	-0.146	19.65
Total	7.782	1.415	-0.1767	12.48

Source: Author's calculation based on WITS-SMART simulation

Table 2 shows a negative effect for frozen chicken imports. The total loss in tariff revenue is estimated at 12.48 percent with the implementation of the 20 percent CET. Theoretically, the tariff reduction can result in a decrease in tariff revenue or an increase in tariff revenue if imports increase. The loss of tariff revenue estimated from the results of this study is consistent with the findings of Thomy, Tularam and Siriwardana (2013) [35] and Tekere and Ndlela (2003) [34] who used the partial equilibrium method to quantify the effects of full SADC-EU trade liberalization. Their findings indicate that there is a net welfare benefit despite some losses in tariff revenue.

These results are also consistent with the empirical evidence of Othieno and Shinyekwa (2011) [29] who show that the progressive intra-tariff reductions associated with the Uganda-EU customs union generate revenue losses in the case of the Uganda-EU customs union are due to the decline in the value of imports.

4.3. Welfare effects of the tariff reduction for the 20% scenario

Table 3 shows the effect of the tariff reduction on well-being.

Table 3: Welfare Effect of Tariff Reduction (thousand US$)

Year	Value of imports (thousand US$)	Effect on welfare
2013	1.907	0.016
2014	1.9	0.016
2015	3.975	0.127
Total	7.782	0.159

Source: Author's calculation based on WITS-SMART model simulation

The estimates in Table 3 reveal that the 5% tariff reduction generates a welfare gain of US$159 for a frozen chicken import value of US$7,782. As a result of the expansion of trade as noted above, there is a surplus in the level of consumption, which in turn increases welfare. The study reveals similar results to the predictions of (Nguyen Duc, 2015) who examined the impact of the Trans-Pacific Partnership and the ASEAN Economic Community on Vietnamese firms. Nevertheless, the results estimate that the livestock sector especially poultry and pigs with low competitiveness will be sensitive as a result of consumer preferences to imported frozen meat.

4.4. Impact of the tariff reduction on frozen chicken imports

Table 4 shows the effects on imports of the partial removal of tariffs on frozen chicken imports from the rest of the world.

Table 4: Impact of the tariff reduction on imports (thousand US$)

Year	Import before	Change in import	Import after	% increase
2013	1.907	0.168	2.076	8.86
2014	1.9	0.169	2.068	8.84
2015	3.975	1.02	5.2125	25.66
Total	**7.782**	**1.357**	**9.3565**	**17.43**

Source: Author's calculation based on WITS -SMART simulation

It can be seen that the estimated reduction in the tariff from 25 to 20% results in an increase in imports of 17.43%. The increase in imports after the tariff reduction has a positive impact from a consumer perspective.

However, this increase in imports of frozen chicken cuts can be detrimental to domestic production. According to the work of (Veeramanni and Gordhan (2010), Mugano (2014), the increase in imports could hurt domestic producers. Similarly, Evious K and Josaphat P. (2007) [10], applying a partial equilibrium model, estimate that the reduction in tariffs between the EU and Malawi and Tanzania, leads to an increase in imports from the EU will amount to 3.4% and 2.2% of gross domestic product (GDP), respectively, and customs revenues of either country will fall by 26% and 52%.

5. Conclusion and Perspectives

This brief uses single market partial equilibrium modeling (WITS-SMART) to analyze the impact of trade policies on the chicken market in Burundi by using trade data from the six-digit HS classification of the TRAINS database (2013, 2014 and 2015). The results show that the increase in imports of frozen chicken cuts from the rest of the world induced by the reduction in tariffs will affect the less competitive domestic poultry production that has already undergone long periods of liberalization under the structural adjustment programs. Based on the simulation results, the reduction in tariffs leads to a welfare gain and a decrease in customs revenues, which are budgetary resources for the country. There is also a trade creation so the detour is zero since the tariff reduction is considered for the rest of the world. It should be noted that the forecasts resulting from this analysis should be taken with some caution and that they represent merely a possible scenario of future developments that may change due to various factors.

Given these results the following recommendations are made:

- For the government to put in place incentives to help less productive poultry producers become more competitive and awareness programs to educate the public on the need to support the industrial base of the economy, with particular attention to poultry farming.
- For researchers, future research can extend the scope of this study by considering the dynamic effects of trade policies on the chicken market in Burundi, on production and consumption. In addition, other analytical methods such as the ARDL model and the general equilibrium model can be used.

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