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Pass-Through Effects of the East African Community Common External Tariffs on Kenya's Domestic Prices

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Abstract This study offers an empirical microlevel analysis of the pass-through effects of the East African Community Common External Tariff on consumer prices in Kenya. Using data from the Kenya Integrated Household Budget Surveys conducted in 2005 and 2015, this research employs a fixed-effects model to estimate pass-through equations. The analysis focuses on consumer prices for agricultural and manufactured goods. It also considers household residential classifications, distinguishing between rural and urban areas, and it investigates the impact of border proximity and transportation costs on the pass-through effect. The findings show that manufactured goods have a significant pass-through effect. A 1% change in tariffs results in a 0.84% change in consumer prices for manufactured goods. However, the pass-through effects for agricultural goods were incomplete, suggesting that markets for manufactured goods are more competitive in Kenya. The study also found that pass-through effects vary depending on proximity to borders and the urban-rural divide.

Keywords: Customs Union, Tariff Pass through, East African Community, Common External Tariff, Prices

JEL Classifications: F12, F13, F14, F15, D21, R2

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I. Introduction

Import tariffs through increased protectionism policies harm a country's terms of trade and reduce its welfare (Bollen & Rojas-Romagosa, 2018). Nonetheless, several countries opt to provide at least some protection for domestic producers against foreign competition (Levell, O'Connell, & Smith, 2017). The tariff debate is not only for developing countries (Amiti & Cameron, 2012;

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Artuc, Porto, & Rijkers, 2019; Ghahremanzadeh, Khalili Malakshah, & Pishbahar, 2017; Marchand, 2012, 2019; Nicita, Olarreaga, & Porto, 2014) but also for developed nations (Amiti, Redding, & Weinstein, 2019; Borusyak & Jaravel, 2021; Carvalho, Azevedo, & Massuquetti, 2019; Fajgelbaum, Goldberg, Kennedy, & Khandelwal, 2019; Fan, Lin, & Lin, 2020; Flaaen, Hortaçsu, & Tintelnot, 2020). Most developing nations argue that high tariffs protect infant industries, spur investments, or raise government revenue (Nowbutsing, 2014). However, high tariffs could harm households by increasing domestic prices and reducing welfare (Carvalho et al., 2019). Amid these tariff debates, African countries in various regional economic blocs choose a mixed trade policy. They specifically protect some products, such as finished goods, while leaving raw materials and capital goods unprotected.

The East African Community (EAC) has emerged as one of Africa's most significant regional economic blocks (Gasiorek, Byiers, Rollo, & CUTS International, 2016). Comprised of six member states, namely Burundi, Kenya, Rwanda, South Sudan, Tanzania, and Uganda, the EAC aims to foster economic growth, enhance competitiveness, and promote regional trade integration among its member countries (Lwesya, 2022). The EAC implemented the Common External Tariff (CET) in 2005 as part of its integration efforts, establishing a unified tariff regime for goods imported from outside the community (McIntyre, 2005). The CET divided items into four bands and assigned import tariffs to each band. The first band (i.e., 0%) covered raw materials, capital goods, agricultural inputs, specific medicines, and medical equipment (Shinyekwa, Bulime, & Nattabi, 2021). Meanwhile, the second band (i.e., 10%) comprised intermediate goods and other necessary industrial inputs. The third band (i.e., 25%) was made up of finished goods, and the last band (i.e., 35%-100%) comprised sensitive goods.[1] In 2022, the EAC council reviewed the maximum EAC-CET rate and set it to 35%. This review primarily resulted in higher tariffs on a wide range of products, despite many items being classified as sensitive goods (EAC, 2022a). The rationale for imposing high tariffs was based on the assumption that, although there would be immediate welfare losses, such negative effects would fade over time. This expectation stems from the anticipated creation of employment opportunities by transitioning to local production (EAC, 2022b). However, this premise is heavily based on the assumption that domestic markets elicit significant responses from tariffs within the EAC, particularly on commodity prices. The assumption is quite strong since the literature has shown that most developing countries exhibit incomplete tariff pass-through to domestic markets Nicita (2009). This is mainly due to market imperfections caused by high transaction costs and poor infrastructure (Goldberg & Pavcnik, 2016; Han, Liu, Marchand, & Zhang, 2016; Nicita, 2009). This raises the question of whether domestic markets, specifically, prices, respond to import tariffs imposed in EAC member states. This issue is significant because the CET, as a key component of

1) Some of these products include agricultural products, building materials, plastics, wood, paper, textiles, iron and steel, and other manufactures (Khorana, Kimbugwe, & Perdikis, 2009)

the EAC's trade policy, was expected to affect local prices and consumer welfare within member countries (McIntyre, 2005). Higher tariffs on imported goods would increase consumer prices (Levell, 2018). This may, in turn, affect consumers' purchasing power and overall welfare. In contrast, if higher tariffs protect local industries, tariff effects would lead to lower prices for domestically produced goods (Furceri, Ahmed Hannan, Ostry, & Rose, 2019). This would benefit both local producers and consumers.

Despite the importance of the EAC-CET on domestic prices, there is limited research on how the EAC-CET structure affects domestic prices in the EAC member countries. Studies on EAC-CET have mainly focused on the aggregate effects of CET on welfare (Gasiorek et al., 2016; Khorana et al., 2009; McIntyre, 2005; Omolo, 2012; Onyango & Mugoya, 2009; Shepherd, Melo, & Sen, 2017; Shinyekwa et al., 2021) without distilling its disaggregated effects on consumer prices. Concerns specifically pertain to the magnitude of the effects and the implications for various sectors and stakeholders. The magnitude is related to how much tariffs on imported goods are absorbed by domestic producers or passed on to consumers (Flaaen et al., 2020). Higher tariffs may raise production costs and hence reducing competitiveness (Yang, Ou, & Chen, 2021). Using Kenya as a case study, this study attempts to fill this research gap. In particular, the study analyzes the microlevel effects of CET on domestic prices while considering the types of goods that residents consume. As one of the EAC member countries, Kenya offers a valuable perspective on EAC-CET pass-through effects. The country is not only considered the most advanced nation in the EAC states (Gasiorek et al., 2016) but has strong intermediary market powers that hamper trade policy transmission (Bergquist & Dinerstein, 2020).

Understanding the pass-through effects of the EAC-CET on domestic prices is crucial for policymakers for several reasons. First, policymakers can use this information to make informed and targeted decisions about tariff adjustments, trade negotiations, and targeted interventions. Second, by quantifying the pass-through effects, policymakers can assess whether the tariff regime effectively achieves its intended objectives and identify areas where adjustments may be needed. This evaluation ensures that trade policies support economic growth, competitiveness, and sustainable development. Third, the estimates would also provide insights into how changes in the EAC-CET impact Kenyan consumers in terms of affordability and availability of goods. This would allow policymakers to design policies that promote consumer welfare. Fourth, policymakers and industry stakeholders can use this information to identify industries needing assistance or reforms to improve their competitiveness in regional and global markets. Finally, regarding regional integration, the findings can inform discussions and policy debates about the benefits, challenges, and potential changes needed to improve the integration process within the EAC and other African regional integration initiatives.

We used data from the Kenya Integrated Household Budget Surveys (KIHBS) of 2005 and 2015 to estimate the pass-through effects. The 2005 survey coincided with the CET's creation,

and 2015 was 10 years later. The surveys divide households into two comparable categories: those living in rural areas versus those living in urban areas, and those living near the country's borders versus those living elsewhere. The first classification is to determine whether or not there are market differentials in the pass-through effect, with urban markets typically being more integrated into international markets than rural markets (Marchand, 2012). The second is to capture the effects of trade costs, with pass-through effects expected to be greater in border regions due to lower transportation costs. Agricultural or manufactured goods are the two types of products. Pass-through equations borrowed from similar studies like Kareem (2018); Marchand (2012, 2019); Nicita (2009) and Zhu, Yu, Wang, & Elleby (2016) are estimated in this study. Our innovation to the equation involves the estimation of a pass-through equation for tariffs operating under a Customs Union. Previous studies have analyzed tariffs not restricted to bands like the EAC-CET. Thus, in these studies, there is a question of the limits of the tariff values in the pass-through equations. We further contribute to the literature on three aspects. First, this study contributes to the empirical literature on the effects of regional integration on domestic prices, particularly in East Africa. There is a question of how the continuous review of the EAC trade policy affects households in the region. The price mechanism through the CET would be one of the channels. Second, since the study findings have direct policy implications for policymakers, the study provides a valuable reference point for policymakers to formulate evidence-based trade policies that promote consumer welfare and industry competitiveness. Third, by segmenting households and products, the microlevel analysis provides valuable insights into the differential impacts of the EAC CET on different sectors and goods, guiding policymakers in targeting specific interventions and policy adjustments as needed. Finally, we add to the methodology. While most empirical trade studies in Africa are ex-ante simulation studies, our post-ante approach provides insights into the actual effects of trade policies in the region rather than the simulated effects.

Our results show a significant tariff pass-through effect for manufactured goods at 80%, where a 1% change in tariffs led to a 0.8% change in consumer prices for these goods. The pass-through effects for agricultural goods were incomplete. These results suggest that the markets for manufactured goods are more competitive than the markets for agricultural goods in the country. As a result, manufacturers have less market power and are thus less able to impose tariff costs on consumers. Another intuition is that consumers are more sensitive to price changes for manufactured goods than they are for agricultural goods in the country. This means that consumers are more likely to switch to substitutes of manufactured goods when prices rise in Kenya. Generally, the study shows that EAC-CET's impact on domestic prices varies depending on the type of goods that are imported. The effects of incomplete pass-through on agricultural goods are investigated further while controlling for production costs in the form of producer prices. The study shows that domestic producers absorb some of the increased

costs caused by import tariffs rather than pass them on to consumers. In terms of the aggregate effect of EAC-CET, rural and urban prices are comparable. However, the tariff effect on urban markets was greater than rural markets. This could be explained by better access to imported goods in urban areas, especially manufactured goods. These markets are also more integrated into world markets than rural markets. Finally, the tariff effect, especially for agricultural goods, decreased as one moved away from the country's borders. This shows that the counties that border Uganda and Tanzania experienced a more significant pressure on the prices of agricultural commodities than the other counties of the country.

The paper's structure is as follows. The next section briefly reviews the literature on import tariffs and prices, providing theoretical and empirical perspectives. Section 3 discusses the sources and types of data used. Section 4 presents the empirical strategy followed, including the methodology and econometric specification. Section 5 discusses the analysis findings, and finally, Section 6 concludes and provides policy implications.

II. Literature Review

A. Theoretical literature

Import tariffs affect domestic prices through the imposition of a border tax and the prices of import-competing varieties on domestic markets (Nicita, 2009). Price transmission depends on the competitive nature of firms. Firm responses to tariffs and other market conditions determine the final consumer price of commodities (Krugman, Obstfeld, & Melitz, 2018). In perfectly competitive markets, a small[2] country like Kenya is a price taker. This means that a country must deal with a perfectly elastic supply curve for imports as well as a perfectly elastic demand curve for imports (Södersten & Reed, 1994). As such, domestic prices rise/fall by the full amount of the import tariff. Furthermore, even when foreign supply is highly elastic, the optimal tariff for a small country is zero. The majority of developing countries have significant market imperfections (Nicita, 2009). Hence, prices do not always rise or fall by the full amount of tariffs. No country is small in imperfectly competitive markets. Under these markets, firms producing and trading goods differ in strategic behavior (Gandolfo, 1998). Whenever a trade policy is introduced, such as tariffs, firms' responses to prices and quantities traded will depend on the type of market structure. Imperfect markets include monopolies, oligopolies, and competitive monopolistic markets.

Monopolistic competitive markets produce similar but differentiated products. Three conventional monopolistic competitive market models explain the relationship between tariffs

2) In international trade literature, a small country is one that has no influence over global prices (Gandolfo, 1998).

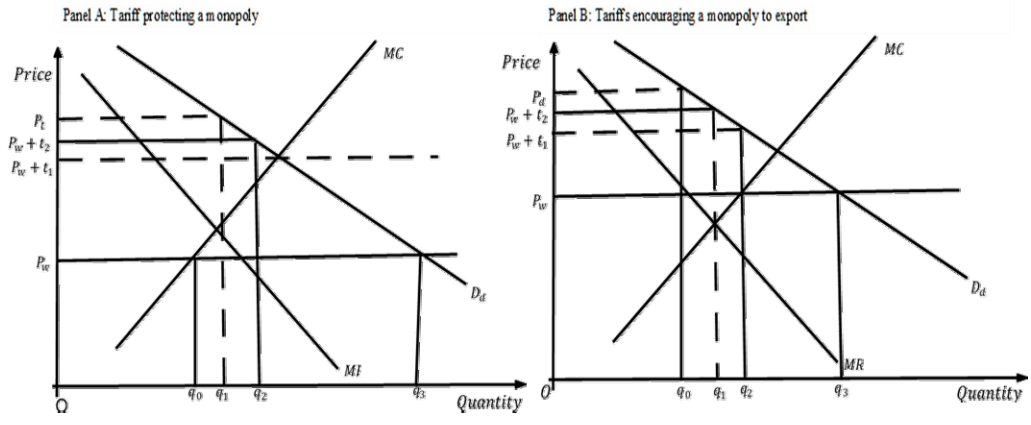
and domestic prices. The first model, the Falvey Neo-Heckscher-Ohlin (FHO), assumes vertical product differentiation. If country A, assumed to be capital-rich, imposes a tariff on country B, imports of varieties close to marginal quality may cease and be replaced by domestically sourced varieties. However, the replaced varieties in A may not be exported to B since production costs may still be low in B. The imposition of the tariff implies that some goods of varying quality would be produced in the middle of the two countries. The second model, the Krugman Neo-Chamberlinian (KC) model, assumes horizontal product differentiation. Domestic consumers reduce imports and consume locally produced goods when one country imposes a non-prohibitive tariff. However, the number of varieties and outputs produced in each country does not change. Consumers in the importing country will however be worse off because the increase in the price of imported varieties moves them away from their utility-maximizing position (Södersten & Reed, 1994). Finally, the Lancaster Neo-Hotelling model (LH) assumes horizontal differentiation by using embodied characteristics. The same companies manufacture these goods. In the case of two free trade firms, each produces half of the available varieties and imports the rest. However, the model does not specify which varieties will be manufactured domestically and which will be imported, making forecasting the impact of a tariff difficult (Södersten & Reed, 1994).

When a monopoly produces for the domestic market and cannot export, the tariff effect is determined by the tariff level. Low tariffs will cause domestic producers to increase output, whereas high levels will give producers market power. This is illustrated in Panel A of Figure 1, where P_w is the world price, MR and MC are the monopoly's marginal revenue and marginal costs, respectively, and D_d is the domestic market. If the government imposes a tariff, t_1, on its imports, the domestic producer will increase output. At price $P_w + t_1$ the monopoly is a price taker. Thus, a monopoly's attempt to raise prices above this point would encourage imports. If tariffs were raised to t_2, the monopoly would gain market power because it would be able to sell at $P_w + t_2$. However, it cannot raise its price above this level because it encourages imports (Södersten & Reed, 1994). If tariffs are raised above t_2, the domestic producer's profit will rise to the point where the domestic tariff-inclusive is P_x at this point; the tariff level enjoyed by the monopoly is the same as that under autarky (Krugman et al. 2018).

A low tariff expands local production for monopolists producing local consumption and exports. Likewise, a higher tariff gives the domestic producer monopoly power and increases profits by reducing output (Södersten & Reed, 1994). However, this scenario will hold true until the tariff(t_k), reaches a point where a further increase would induce the domestic producer to export, as shown in Panel B. If the tariff imposed raises the domestic price to p_d, the firm will produce q_1, where MC intersects with MR, but now only sells q_0 on the domestic market and the remainder is exported. Tariff increases beyond this point would raise domestic prices

even more. However, the producer continues to produce the same amount of q_1 and exports a greater proportion of its output. As a result, the tariff acts as an export stimulant in this case. In the case of snatching rents from a monopoly, tariffs increase the cost of imports for the monopoly.

Figure 1. Tariffs on a monopoly



(Source) Derived from Södersten & Reed (1994).

If the monopoly decides to maximize its profits, it sells lower quantities at higher prices (Södersten & Reed, 1994). If the demand curve is linear, the price increase will be less than the tariff value. Therefore, the compensation that a monopoly would want to obtain by increasing prices would be less than what it would have lost to the government through tariffs. Tariff imposition under an oligopoly invokes strategic behavior. One firm's profits may increase if it can produce more and persuade the other firm that this increased output will be maintained (Södersten & Reed, 1994). This could cause other firms to produce less. Tariffs may provide an alternative method of shifting profits if these firms compete in their domestic markets. If the government of one country A imposes an import tariff, the profits of its trading partners will be reduced. In this case, the tariff shifts the profits of the foreign firm. Finally, tariffs imposed in oligopolistic markets may increase domestic welfare.

B. Empirical literature

Empirical studies have shown that domestic prices respond better to tariff changes in developed countries than in developing countries. For example, during the Uruguay Round, advanced countries benefited more from trade due to tariff cuts than emerging and developing countries (Caliendo, Feenstra, Romalis, & Taylor, 2015). In 2018, the United States saw

significant increases in the prices of goods subject to tariffs imposed by the US president (Amiti et al., 2019; Cavallo, Gopinath, Neiman, & Tang, 2019; Flaaen et al., 2020). Before this, however, consumer prices had fallen significantly due to increased trade with China (Jaravel & Sager, 2019). This strong response of domestic markets in developed countries to trade policies is an attribute of low market imperfections. Market imperfections abound in developing countries, owing to high firm markups, high transaction costs, inadequate infrastructure, and powerful market intermediaries (Nicita, 2009). If transaction costs are too high, a significant increase in the price of an imported factor of production will have little effect on the marginal costs of domestic production (Nakamura & Zerom, 2010). Consumer prices may not respond to international trade policy changes due to transaction and transportation costs. Distance to the border studies have found that households in developing countries that are far from the borders benefit little from trade policies (Kareem, 2018; Nicita, 2009; Zhu et al., 2016). The long distance doubles or triples trade costs (Atkin & Donaldson, 2015).

Apart from transport costs, market imperfections that result also from anticompetitive behaviors of firms, have been attributed to the low-pass-through effect of trade policies in developing countries. In India, De Loecker, Goldberg, Khandelwal, & Pavcnik (2016) observed that domestic prices declined by approximately 10% after trade liberalization. The minor decrease was due to an incomplete pass-through of cost-cutting measures to final goods prices (Goldberg & Pavcnik, 2016). As a result, firms benefited more from lower import tariffs. Furthermore, markups varied significantly across firms and over time (De Loecker et al., 2016). Lower input tariffs broadened the range of domestic goods produced by domestic firms, whereas access to new imported varieties decreased the product's price. Producers benefited from higher markups relative to consumers. Traders with a high intermediary market power find it optimal to absorb a portion of the price effect. An experimental study by Bergquist & Dinerstein (2020) showed substantial degrees of intermediary market power in Kenya. Traders use market power to pay less than competitive prices while charging consumers more than competitive prices. Furthermore, consumers in Kenya only receive 18% of the total surplus, while intermediaries receive 72%. Similarly, high levels of intermediary market power are also found in other developing countries like Nigeria and Ethiopia (Atkin & Donaldson, 2015). Consumers in remote areas benefit minimally from falling international trade barriers. This is because high levels of intermediary market power are mostly found in distant locations (Atkin & Donaldson, 2015).

Intranational costs also prevent tariff pass-through to price (Atkin & Donaldson, 2015). Bribery is one of the intranational costs. According to Atkin and Khandelwal (2020), tariff evasion through bribery at ports of entry impedes the transmission of trade policies in developing countries. Tariff evasion may render attempts to target sectors as a form of industrial policy ineffective (Furceri et al., 2019). Furthermore, because of tariff evasion, trade elasticity in terms of changes in trade volume with tariffs is typically low (Sequeira, 2016). For example, Mozambique's

trade elasticity estimate in 2016 was 0.1, which was lower than developed-country estimates. Because firms evaded tariffs through bribes, trade volumes barely changed as the country reduced tariffs (Sequeira, 2016). The market structure, in terms of private and public ownership, is also critical for transmitting tariffs to domestic prices. A heavily regulated market would distort pass-through effects, while a competitive private sector would enhance it (Engel, Kokas, Lopez-Acevedo, & Maliszewska, 2021). In China, Han et al. (2016) used the size of the private sector to capture market structure of the market. The study showed that regions with averagely large private sectors experienced higher pass through than state-owned regions. Finally, while tariffs impact prices in developing countries, the impact is minimal. However, it varies depending on the product and region. According to some studies, manufactured goods are more sensitive to tariff changes than agricultural goods (Nicita, 2009). Others, however, believe that the response of agricultural goods prices to tariffs is higher (Kareem, 2018; Zhu et al., 2016). Marchand (2012) discovered that the pass-through effect is smaller in rural areas than in urban areas. This is due to improved access to imports in urban areas, which is aided by high-quality transportation infrastructure. Furthermore, international markets are more integrated with urban markets than rural ones (Marchand, 2012). In general, empirical studies show that a number of factors prevent import tariffs from having a perfect pass-through effect on domestic prices in developing countries. Further, the magnitude varies by country, types of products, distance to the borders, and regions of a country in terms of rural and urban areas.

III. Data

We use data from two Kenyan household budget surveys, the KIHBS (2005/2006) and the KIHBS (2015/2016). The survey datasets were merged with the World Integrated Trade Solutions (WITS) tariff data. The surveys report data for products such as milk, maize, and wheat as final goods. However, they are disaggregated into a Harmonized System (HS) in WITS. Milk, for example, is available in two varieties: milk and cream that is not concentrated or contains added sugar or other sweetening matter (HS 0401), and milk and cream that is concentrated or contains added sugar or other sweetening matter (HS 0402). Thus, the products in WITS are hand-matched and aggregated to form the final products reported in the household surveys. For example, milk is an average of HS 0401 and HS 0402. The import tariffs were computed as follows: $\tau = \frac{\sum_i t_i I_i}{\sum_i I_i}$, where t_i is the ad valorem tariff of good i in WITS, and I_i is the import volume of that good. This is to ensure a consistent weighting of tariffs on the respective imports. Some products in the KIHBS are averaged to form a single representative product; for example, maize flour in the surveys was calculated by taking the average of loose

maize flour (code 00108), sifted maize flour (code 00110), and fortified maize flour (00111). The formation of 110 products was achieved by averaging these product groups and matching them with tariff data from the WITS.[3] Of these, 50 were agricultural, while 60 were manufactured. Cereals, meat, dairy products, vegetables, fruits, beverages, and tobacco were all classified as agricultural products. The manufactured products were also subdivided into garments, footwear, food accessories, household equipment, chemicals, stationery, and furniture. Panel data needed for this study may be impractical because it is impossible to follow the same households from 2005 to 2015. This study thus, employed the Deaton's (1988) approach, in which cohorts of individuals who share time-invariant characteristics or are in the same setup are tracked over time. Thus, households were divided into rural and urban categories, these groupings formed the respective cohorts to be used in the panel data. Household expenditures and physical quantities purchased were reported in the surveys. Dividing the two, we obtain unit values that proxy the domestic price (Marchand, 2012). The unit values obtained depend on actual market prices and, as such, are indicators of spatial variation in prices across the country (Deaton, 1988). Unit values were adjusted to real values using consumer price indices for 2005 and 2015 to control for inflationary factors. Additionally, median prices were used for the analysis rather than average prices to reduce measurement errors. Outliers affect median prices less than mean prices (Deaton, 2019). The median price selection process was performed in two steps. The first step involved selecting the median price among 10 households in a group. Subsequently, the second step involved picking the median prices of the clusters in each of the 47 counties. The segregation of households in rural or urban areas was carried out after the prices were selected. This was mainly done to minimize sample selection bias. Foreign prices were calculated by dividing the amount of imports by the import value of the products. The International Trade Statistics (ITC) trade map and COMTRADE were used to obtain import values and amounts. Meanwhile, the annual average exchange rates for 2005 and 2015 were obtained from Central Bank of Kenya statistics. The study included all 47 counties in the country. Population, a proxy for domestic demand, was divided into rural and urban areas; thus, there were 92 population data values because Mombasa and Nairobi are fully urban. Kenya Statistical Abstracts 2005 and 2015 were used to obtain population data. Finally, the producer prices used to control the production cost were obtained from the Food and Agricultural Organization and the Statistical abstracts of Kenya (2005 and 2015).

3) Data from KIHBS can be found from https://statistics.knbs.or.ke/nada/index.php/catalog/13 and that for WITS can be found at: https://wits.worldbank.org/

IV. Empirical Strategy

Firms are involved in most of the trade between countries. In Kenya, firms obtain government-issued import licenses. How a tariff affects the domestic prices that consumers face, depends on how these firms respond to the tariffs. The firms can either absorb the tariffs in their markups or transmit them to prices faced by consumers. Imperfect markets characterize developing countries. Therefore, to analyze the effect of tariffs on Kenya's domestic prices, this study considers pricing in an imperfectly competitive market. The theoretical framework borrows from the exchange rate pass-through (ERPT) theory. The reliance on ERPT theory is due to the asymmetrical relationship between exchange rates and import tariff pass-through (Feenstra, 1989). This study takes a unique approach by examining the effects of both exchange and tariff rates on domestic prices. According to Pompelli & Pick (1990), the tariff pass-through effect may be expected to be positive after the exchange rate pass-through, but the two effects on prices are not required to be equal. The pass-through framework used in this study to demonstrate how market imperfections are captured is based on Pompelli and Pick (1990) and Feenstra (1989, 1995). A foreign firm exporting to a domestic country (Kenya) is assumed to face the following import demand function:

$$D = q(p^*, x) \tag{1}$$

where q is the amount of commodity consumed domestically, p^* is the price of imports, and x are other variables assumed to be exogenous to the foreign firm. Some of the exogenous variables include the price of the domestic variety and the income of consumers in the importing country. The same firm is assumed to have a cost function that is homogenous to degree one in factor prices highlighted in Equation (2):

$$C = f(q), m \tag{2}$$

where m denotes a vector of aggregate factor prices in foreign currency. In an imperfectly competitive industry, the firm's profits maximization problem in the domestic currency is specified using Equations (1) and (2) as follows:

$$Max\left[sp^*q(p^*,x) - f(q), m\right] \tag{3}$$

where s is the Kenya/USA[4] dollar exchange rate, and the first term is the total revenue, obtained

4) Other currencies are possible because Kenya imports from a variety of countries. However, for the sake of simplicity,

by multiplying the quantity q and demand $q(p^*, x)$. Under maximum profit conditions, marginal revenue is equal to the marginal cost. Thus,

$$sp^* = \frac{f'(q)m}{k} \qquad where\ k = \left[1 - \frac{1}{|\epsilon(q)|}\right] \quad \text{and} \quad \epsilon(q) = -\left(\frac{dq}{dp^*}\right)\left(\frac{p^*}{q}\right) \tag{4}$$

Equation (4) shows that the optimal import price is a function of the marginal cost faced by the foreign firm and the import demand in the domestic country. The import demand is implicitly assumed to be a function of x. Imposing an ad valorem tariff τ on imports implies that the import price changes by the amount of the tariff such that;

$$p^d = \gamma sp^*(1+\tau) = \gamma \frac{f'(q)m}{k}(1+\tau) \tag{5}$$

p^d is the domestic price of imports after the import tariff is imposed, γ is the markup $(\gamma = 1+\phi)$ imposed by foreign firms, ϕ and is the profit margin (Nicita, 2009). The tariff can be internalized by the markup or passed through domestic prices. The markup is given by the ratio between the prices of an import-competing good p^c and foreign cost of the import. In this case, it is the import price at the border times the tariff. Thus, the markup is specified as;

$$\gamma = \left[\frac{p^c}{sp^*(1+\tau)}\right]^{\theta}, \text{and } 0 \le \theta \le 1 \tag{6}$$

θ is a parameter that indicates the level of competition between the varieties of imported and domestic products. For example, if $\theta = 0$ then the price of the imported variety and the price of the domestic variety are equal; thus, the imported variety will not be sold on the domestic market. Substituting Equation (6) into Equation (5) yields.

$$p^d = \left[\frac{kp^c}{f'(q)m \quad (1+\tau)}\right]^{\theta} f'(q)m(1+\tau) \tag{7}$$

From Equation (7), if there are no import-competing varieties and foreign marginal costs are constant, the tariff is fully passed on to the domestic price of the good in question. Household surveys make no distinction between the types of goods consumed by households. In particular, whether goods are manufactured locally or imported. As a result, the price is a balanced mix

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we assume that Kenya only trades with foreign firms using the US dollar as the benchmark foreign currency.

of the two. Empirically, the approach taken focuses on the aggregate effect of a tariff change on the price of a good rather than a variety of goods (Deaton, 1989; Marchand, 2012; Nicita, 2009; Porto, 2015). Since Kenya is a small country, its import demand is assumed to be perfectly elastic $\epsilon(q) \geq 1$. Working with the extreme case where $\epsilon(q)=1$, implies that $sp^{*}=f^{'}(q)m$. Therefore, assuming the case where $\epsilon(q)=1$ and taking the logarithm of both sides of Equation (7) results in Equation (8):

$$\ln p^{d}=\theta ln p^{c}+(1-\theta)\ln s+(1-\theta)\ln p^{*}+(1-\theta)\ln(1+\tau) \tag{8}$$

The term $(1-\theta)$ is the indicator for pass-through (Nicita, 2009), which shows the extent to which a percentage change in exchange rates and import tariffs passes to domestic prices. The term $(1-\theta)$ may differ in magnitude and sign. Thus, including subscripts for products, time, and industries in Equation (8) and econometrically including an error term yields the following empirical model:

$$\ln p_{ict}^{d}=\delta_0+\delta_1\ln p^{c}+\delta_2\ln p_{it}^{*}+\delta_3\ln s_{it}+\delta_4\ln(1+\tau_{it})+\gamma_{jt}+\phi_{c}+\mu_{t}+\epsilon_{ict} \tag{9}$$

where p_{ict}^{d} is the domestic price of good i in county c at time t, p_{it}^{*} is the foreign price, s_t is the exchange rate at time t, τ_{it} is the ad valorem tariff rate; p^{c} is the domestic price of an import-competing good, which can be understood as the demand for domestically produced commodities. Income would have been an ideal control variable for demand; however, in the model it is an endogenous variable since variables to the left of the error term, likely influence income. As a result, the study used population as a demand control variable. The term γ_{jt} represents industry-specific trends, ϕ_{c} represents county fixed effects, μ_{t} represents time-fixed effects, and ϵ_{ict} is an independent and identically distributed error term. Time-fixed effects are used to control for time-specific effects that are shared by all 47 counties in the country. Changes in producer costs caused by changes in input costs or production technology are governed by industry-specific trends. Equation (9) is calculated independently for rural and urban areas. To explore the effects of import tariffs on agricultural products versus manufactured products, we rewrote Equation (9) as:

$$\ln p_{ict}^{d}=\delta_0+\delta_1\ln p^{c}+\delta_2\ln p_{it}^{*}+\delta_3\ln s_{it}+\delta_4\ln(1+\tau_{it})+\vartheta_{rt}+\theta_{c}+\mu_{t}+\epsilon_{ict} \tag{10}$$

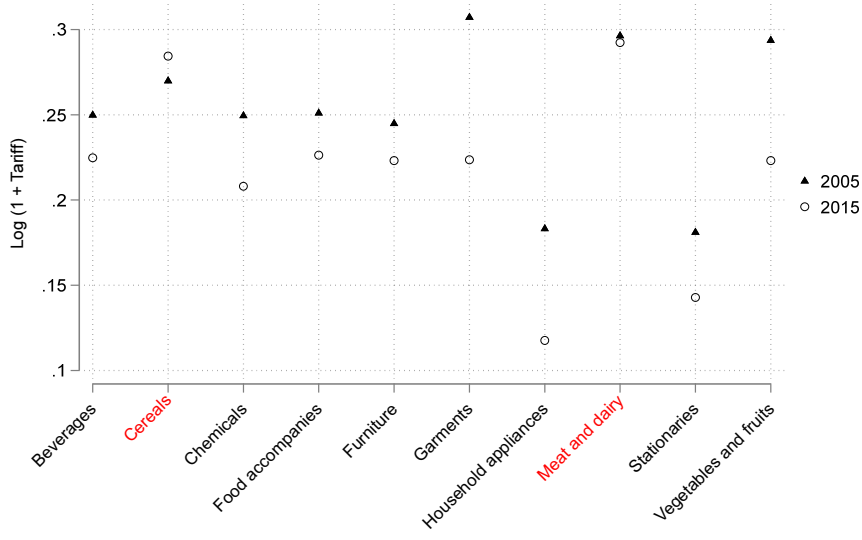
The variables are the same, except the term ϑ_{rt}, which represents the residence-specific trends and θ_{c} represent product category fixed effects. Residence implies rural versus urban areas. Therefore, trends could range from migration patterns to market segregation effects. Fixed effects

are included to capture the effects arising from the product group specification.

V. Results and Discussion

As expected, high import tariffs are observed on agricultural products compared to manufactured products, as shown in Figure 2. However, tariffs declined for the two periods for almost all product categories. An exception was cereals, meat, dairy products, furniture, and other food ingredients. Tariffs declined for garments, footwear, vegetables, and fruits. Figure 2 shows that although the EAC-CET saw a reduction in import tariffs on many products, the magnitude of the reduction was not very large on average. However, many products remain highly protected. In terms of industries, manufactured goods experienced a higher reduction in import tariffs than agricultural goods.

Figure 2. Average changes in import tariffs between 2005 and 2015



(Source) Authors' computation using data from WITS

Kenya's agricultural sector is highly protected. Several agricultural products, such as rice, sorghum, millet, fish, coconut, coffee, and tea, saw their tariffs increase by more than 50% for the two periods. In particular, rice experienced an increase in import tariffs of 114%, which reflects how protected the product is. This is expected since Kenya is a developing country. It tends to bolster its agricultural sector to promote domestic production and cushion local farmers against cheaper imports and fluctuations in domestic prices.

A. Pass-through effects on agricultural and manufactured goods

Hausman and Breusch-Pagan's LM tests indicated the need to estimate a fixed-effects model. In each model, robust standard errors were used to control heteroskedasticity. Table 1 shows the results of the regression of manufactured and agricultural goods' prices. In each model, the pass-through elasticity indicates the extent to which prices are reduced by a 1% reduction in tariff rates (Marchand, 2017). The definition of the pass-through effect requires the coefficient of the term in Equations (9) and (10) to be between 0 and 1, where 1 is a complete pass-through, and 0 is no pass-through (Marchand, 2012; Nicita, 2009). The coefficient for this study, 0.839, implies an 83.9% pass-through rate for manufactured goods. This high pass-through coefficient can be attributed to three factors. First, before the EAC-CET, average tariffs for manufactured goods were lower than for agricultural goods, and they decreased by a slightly larger margin, as shown in Figure 2. This demonstrates that the openness of manufactured goods is relatively high. As a result, tariff reductions under the EAC-CET significantly decreased the country's average domestic prices of manufactured goods. The second most likely explanation for the high pass-through effect is that the EAC-CET saw an increase in the percentage of duty-free manufactured product imports, as shown in Appendix 2. This is due to the EAC-implementation of zero tariffs on raw materials and inputs. Most of these products constitute the largest percentage of imports under manufactured goods. Finally, the significant pass through of manufactured goods could also be attributed to the fact that most manufactured goods are consumed and produced in urban areas. Urban markets are more integrated with international markets, thus increasing the likelihood that trade policies pass through to domestic markets (Marchand, 2012; Nicita, 2009).

Because of the unexpected sign and magnitude of the import tariff coefficient, the pass-through effect of import tariffs on consumer prices of agricultural goods is insignificant. The negative coefficient implies several factors. For starters, it implies that agricultural goods are more competitive and have lower profit margins than manufactured goods. As a result, firms are more likely to absorb tariff costs on agricultural imports rather than pass them on to customers at higher prices. Second, the negative sign indicates that the production and distribution channels of agricultural goods in Kenya are more complex and fragmented than those for manufactured goods. This complication may make it difficult for businesses to pass on tariff costs to consumers fully. The existence of numerous market intermediaries who take a significant portion of profits may contribute to the complexity (Atkin & Khandelwal, 2020; Bergquist & Dinerstein, 2020; De Loecker et al., 2016). Profit margins or markups would absorb any trade policy change due to these market intermediaries (Campa & Goldberg, 2005). Bergquist & Dinerstein (2020) experimentally confirm Kenya's high degree of intermediary market power, affecting how consumers gain from trade policies. Market power may also affect trade facilitation

measures. For example, market power in downstream sectors of the production value chain can allow some firms to retain trade facilitation benefits as rents without influencing prices (Hoekman & Shepherd, 2019). Ultimately, trade policies would not benefit the consumers (Atkin & Donaldson, 2015). Additionally, the negative sign suggests that agricultural goods are more

Table 1. *Effects of the East African Community Common External Tariff on Prices of Agricultural and Manufactured Goods*

	(1)	(2)	(3)	(4)	(5)
Dependent variable: log (Manufactured goods' domestic prices)					
Log (foreign price)	0.185***	0.183***	0.185***	0.341***	0.185***
	(0.021)	(0.021)	(0.021)	(0.024)	(0.022)
Log (1+tariff)	0.839**	0.855**	0.839**	-0.716*	0.810**
	(0.343)	(0.344)	(0.343)	(0.386)	(0.353)
Log population	0.359***	0.508*	0.359***	0.307***	0.342***
	(0.064)	(0.288)	(0.064)	(0.060)	(0.066)
Log exchange rate	2.019***	1.963***	0.502***	2.033***	1.886***
	(0.276)	(0.328)	(0.068)	(0.240)	(0.265)
Constant	-8.665***	-9.671***	0.163	-8.086***	-7.834***
	(1.257)	(1.961)	(0.571)	(0.994)	(1.239)
Observations	3,106	3,106	3,106	3,106	3,106
R-Squared	0.062	0.063	0.062	0.307	0.076
Dependent variable: log (Agricultural goods' domestic prices)					
Log (foreign price)	0.336***	0.336***	0.336***	0.094***	0.337***
	(0.009)	(0.009)	(0.009)	(0.011)	(0.008)
Log (1+tariff)	-2.209***	-2.204***	-2.209***	-1.890***	-2.231***
	(0.167)	(0.167)	(0.167)	(0.176)	(0.163)
Log population	0.176***	0.093	0.176***	0.203***	0.138***
	(0.031)	(0.079)	(0.031)	(0.032)	(0.024)
Log exchange rates	1.050***	1.091***	0.261***	1.513***	1.042***
	(0.129)	(0.136)	(0.032)	(0.126)	(0.126)
Constant	-2.921***	-2.394***	1.669***	-3.844***	-2.257***
	(0.631)	(0.752)	(0.281)	(0.619)	(0.639)
Observations	6,621	6,621	6,621	6,621	6,621
R-Squared	0.155	0.156	0.155	0.479	0.167
Residence FE	No	Yes	No	No	No
Year FE	No	No	Yes	No	No
Category FE	No	No	No	Yes	No
County FE	No	No	No	No	Yes

Note. *** $p < 0.01$, ** $p < 0.05$, * $p < 0.1$ indicate statistical significance at 1%, 5%, and 10%, respectively. Standard errors are indicated by parentheses. There is no control for any fixed effects in the first column. Meanwhile, the second, third, fourth, and fifth columns control for residence, year, product categories, and county fixed effects, respectively.

price sensitive to consumers than manufactured goods. Consequently, if firms were to fully pass on tariff costs to consumers, agricultural goods demand could decrease significantly. This could lead to lower sales and profits for companies. Firms may choose to absorb a portion of tariff costs themselves to maintain profitability, resulting in lower or no pass-through effects.

To investigate some of the producer-led factors influencing agricultural goods pass-through effects, the agricultural goods pass-through equation was re-estimated by incorporating producer prices into the model. The use of producer prices as a proxy for production costs provides insight into the impact of production costs and domestic market power on the pass-through effects of agricultural goods. Import tariffs continue to be negative as seen in Table 2. The magnitude of the coefficient, however, changed from -2.2 to -1.78. This shift implies that domestic producers bear a portion of the increased costs resulting from import tariffs rather than passing them on to consumers. Several factors could contribute to this phenomenon, including competitive pressures, profit margins, and supply chain dynamics. Although, producers can absorb a portion of tariff costs to maintain domestic competitiveness (Goldberg & Pavcnik, 2016).

Table 2. *Effects of the EAC-CET on Agricultural Prices (Controlling for Producer Prices)*

	(1)	(2)	(3)	(4)	(5)
Log (foreign price)	0.293***	0.293***	0.293***	0.090***	0.294***
	(0.008)	(0.008)	(0.008)	(0.011)	(0.008)
Log (1+tariff)	-1.777***	-1.769***	-1.777***	-1.863***	-1.790***
	(0.170)	(0.170)	(0.170)	(0.178)	(0.165)
Log population	0.202***	0.113	0.202***	0.208***	0.160***
	(0.033)	(0.076)	(0.033)	(0.032)	(0.025)
Log exchange rates	0.675***	0.717***	0.168***	1.409***	0.670***
	(0.127)	(0.134)	(0.031)	(0.121)	(0.123)
Log producer prices	0.211***	0.212***	0.211***	0.049***	0.212***
	(0.009)	(0.009)	(0.009)	(0.009)	(0.009)
Constant	-2.565***	-2.002***	0.383	-3.583***	-1.856***
	(0.620)	(0.717)	(0.294)	(0.607)	(0.629)
Observations	6,621	6,621	6,621	6,621	6,621
R-Squared	0.211	0.213	0.211	0.481	0.224
Residence FE	No	Yes	No	No	No
Year FE	No	No	Yes	No	No
Category FE	No	No	No	Yes	No
County FE	No	No	No	No	Yes

Note. *** $p < 0.01$, ** $p < 0.05$, * $p < 0.1$ indicate statistical significance at 1%, 5%, and 10%, respectively. Standard errors are indicated by parentheses. There is no control for any fixed effects in the first column. Meanwhile, the second, third, fourth, and fifth columns control for residence, year, product categories, and county fixed effects, respectively.

The impact of tariffs on the consumer prices of agricultural goods is affected by the inclusion of producer prices. However, the sign of the coefficients indicates that import tariffs are not

fully passed through to domestic prices. This implies that, while producers bear some of the burden of tariffs, other factors impede tariff transmission to consumers. This could be due to a variety of factors. First, the levels of protection for agricultural products before and after the implementation of the EAC-CET remain significantly high, as demonstrated in both Figure 2 and Appendix 1. Furthermore, most products maintained the same tariff rates or experienced an increase following the introduction of EAC-CET. This implies that the initial high levels of protection were sustained or amplified, further hindering the pass-through to domestic consumers. Second, the limited share of agricultural imports in the country, as indicated in columns 4 to 6 of Appendix 1, impedes tariff transmission. These low import shares imply that the majority of agricultural commodities consumed in Kenya are produced in Kenya. Tariff pass-through on domestic prices is hampered by the preference for domestic varieties and reduced reliance on imports (Nicita, 2009). Additionally, the high transportation costs, typical in developing countries make local production more economically viable, resulting in a lower share of agricultural imports (Nicita, 2009). Tariff effects would be reduced if imported varieties made up a small portion of the market (Han et al. 2016).

Lastly, incomplete transmission could be attributed to various derogations within the EAC-CET framework by the member countries. Member countries request exemptions from tariff applications if they provide substantial justifications. This avenue has significantly destabilized the CET due to unilateral exemptions granted by countries on a wide range of heavily traded goods (Bünder, 2018). For example, Kenya has extensively utilized this approach through lobbying, interest group influence, and under-duty remission schemes (Bünder, 2018). The country has sought derogations for rice, wheat, paper, iron, and steel. Appendix 1 shows an example of a derogation for dairy products. While the EAC-CET initially resulted in a tariff increase from 28.3% to 35.4%, subsequent tariff revisions by Kenya resulted in an average tariff rate of 42.5% in 2015. Cereals and sugar underwent similar revisions. These exemptions, while limited to specific products, account for some of the highest import shares. Import tariffs affect manufactured goods more than agricultural goods in the country. One possibility is that markets for manufactured goods face more competition than markets for agricultural goods. As a result, manufacturers have less market power and are thus less able to pass on tariff costs to consumers. Another possibility is that consumers are more price sensitive for manufactured goods than for agricultural goods. They are more likely to switch to substitutes when prices for manufactured goods increase.

Control variables, including foreign prices, exchange rates, and the population, positively and significantly affect domestic prices. When foreign prices rise by 10%, domestic agricultural and manufactured goods prices rise by 3.4% and 1.9%, respectively. This demonstrates that an increase in global prices has a greater positive effect on domestic agricultural prices in the country than on manufactured goods. For manufactured goods, the magnitude of the exchange

rate effect is greater than for agricultural goods. A 1% increase in exchange rates, implying an increase in the depreciation of the Kenyan shilling, raises domestic prices of manufactured goods by 0.5% and agricultural goods by 0.3%. Finally, the population coefficient is higher for manufactured goods than for agricultural goods. This shows that an increase in commodity demand exerts more pressure on the prices of manufactured goods than agricultural goods.

B. Pass-through effects in rural and urban areas

Almost no differences are observed between rural and urban prices in terms of the aggregate effect of the EAC-CET as seen in Table 3. The correct model specification is Model 3, which controls year-fixed effects. It reports a nonnegative autonomous price value represented by a constant coefficient. The magnitude of the effect of the tariff on rural prices was lower than on urban prices. This demonstrates that the EAC-CET effect was stronger in cities than in rural areas. This could be explained by increased access to imported goods, particularly manufactured goods, in urban areas. Transportation infrastructure and roads contribute to this (Marchand, 2012). Because urban markets have a high demand for imported manufactured goods, they are more integrated with global markets than rural markets, which primarily trade agricultural products. Furthermore, urban markets compete more fiercely than rural markets (Marchand 2012). All of these factors contribute to urban prices responding to the EAC-CET more than rural prices. Because the EAC-CET strongly protects the agricultural industry, urban households benefit from higher price reductions than rural households. Most people in rural areas work as farmers who produce agricultural commodities. Therefore, the fact that the EAC-CET protects the agricultural sector and sees prices in rural areas decrease by a small margin implies that the EAC-CET is pro-poor[5] in terms of household income (Marchand, 2019).

Generally, the differences in the magnitudes of the tariff coefficients between rural and urban areas are not very high. This suggests that Kenyan markets are not highly segregated between rural and urban areas. Rural and urban prices, in particular, were comparable. This is also reflected in the constant term, which is roughly four for all prices. Finally, for all prices, the foreign price coefficient is statistically significant. However, in strictly urban areas, a significant effect was observed. This confirms that most manufactured goods are imported and purchased in urban areas, where they are thus influenced by external factors.

5) A policy is considered pro-poor if the implemented protection structure benefits poor households more than rich households (Nicita et al., 2014).

Table 3. *Effects of the EAC-CET on Rural and Urban Prices*

	(1)	(2)	(3)	(4)	(5)
Dependent variable: log (Rural prices)					
Log (foreign price)	-0.268***	0.260***	0.282***	0.279***	0.129***
	(0.019)	(0.012)	(0.012)	(0.012)	(0.015)
Log (1+tariff)	-1.324***	-1.565***	-1.826***	-1.797***	-1.923***
	(0.279)	(0.187)	(0.175)	(0.175)	(0.198)
Log population	1.753***	1.272***		1.201***	1.479***
	(0.099)	(0.109)		(0.107)	(0.096)
Constant	-9.088***	-7.154***	3.283***	-6.346***	-7.676***
	(0.827)	(0.932)	(0.078)	(0.904)	(0.811)
R-squared	4,526	4,526	4,526	4,526	4,526
Observations	0.155	0.116	0.112	0.125	0.370
Dependent variable: log (urban prices)					
Log (foreign price)	-0.200***	0.293***	0.327***	0.328***	0.183***
	(0.020)	(0.011)	(0.012)	(0.012)	(0.011)
Log (1+tariff)	-1.204***	-1.510***	-1.855***	-1.870***	-2.136***
	(0.289)	(0.194)	(0.185)	(0.185)	(0.187)
Log population	1.787***	1.211***		1.117***	1.497***
	(0.101)	(0.146)		(0.142)	(0.114)
Constant	-2.387***	-1.723**	3.297***	-1.509**	-1.946***
	(0.453)	(0.688)	(0.073)	(0.648)	(0.522)
Observations	4,868	4,868	4,868	4,868	4,868
R-Squared	0.119	0.141	0.131	0.139	0.387
Dependent variable: log (Strictly urban prices)					
Log (foreign price)	-0.098	0.390**	0.403***	0.404***	0.339**
	(0.038)	(0.011)	(0.002)	(0.002)	(0.017)
Log (1+tariff)	0.334	-0.973	-1.080	-1.081	-2.386**
	(1.105)	(0.183)	(0.273)	(0.274)	(0.149)
Log population	1.026*	0.415		0.395	0.216
	(0.113)	(0.239)		(0.288)	(0.173)
Constant	0.628	1.404	3.129**	1.369	3.369
	(0.416)	(1.246)	(0.117)	(1.355)	(0.842)
Observations	333	333	333	333	333
R-Squared	0.026	0.143	0.142	0.142	0.327
Industry FE	No	Yes	No	No	No
Year FE	No	No	Yes	No	No
Category FE	No	No	No	Yes	No
County FE	No	No	No	No	Yes

Note. *** $p < 0.01$, ** $p < 0.05$, * $p < 0.1$ indicate statistical significance at 1%, 5%, and 10%, respectively. Standard errors are indicated by parentheses. There is no control for any fixed effects in the first column. Meanwhile, the second, third, fourth, and fifth columns control for industry fixed effects (agricultural or manufactured), year-fixed effects, product categories fixed effects, and county fixed effects, respectively.

C. Pass-through effects on borders of EAC and major cities

The EAC-CET eliminated tariffs on goods traded within EAC member states. In addition to promoting trade among partner states, the elimination of tariffs was intended to lower the commodity prices faced by households within partner states. To observe whether this provision affected commodity prices, the effect of tariff prices was observed while demarcating the country according to its borders with the EAC partner states. As shown in Appendix 3, the classification resulted in four regions. The first region consists of EAC-border counties, the second of non-EAC-border counties, the third of nonborder counties, and the fourth of major cities. The magnitude of the price effect was anticipated to be greater in counties/regions adjacent to the EAC. This is due to the low transportation and transaction costs made possible by the proximity of clearing agencies at the country's borders. Because of the low transport costs for air goods, the effect was also expected to be significant in the capital city. This is because the capital city is the hub for the country's largest international airport. The same phenomenon was predicted for Mombasa County, where the majority of commodities enter the country through the port. Table 4 depicts the tariff price effect on counties adjacent to borders. Tariff pass-through rates were highest in major cities, as expected. The coefficient for nonborder counties is relatively high because these counties are close to the country's major cities or border the EAC. Although the tariff coefficients for EAC-border counties and counties without an EAC border are close to -1.5, product categories show that the magnitude of the domestic price reduction was greater in EAC-border counties. The tariff effect, especially for agricultural goods, decreased as one moved away from these counties. This is because agricultural product categories' tariff magnitudes for nonborder counties were higher than those for non-EAC borders. The effect was high for cereals, vegetables, fruits, meat, and dairy products. This shows that the counties that border Uganda and Tanzania experienced a large pressure on the prices of agricultural commodities compared to the other counties of the country. This was after the EAC was formed. An implication of this is that the EAC saw increased agricultural imports from Uganda and Tanzania. These cheaper imports lowered the prices of agricultural goods in Kenya's domestic market. For manufactured goods, there is no significant pattern of the effect of the CET in terms of borders. In cases where the effect was significant, the coefficients were approximately equal in all regions. This finding confirms that Uganda and Tanzania's manufactured goods imports did not exert substantial pressure on the domestic prices of manufactured goods in the country.

Table 4. *EAC-border Effect of Tariffs*

	EAC borders	Non-EAC borders	Nonborder	Major cities
Log (foreign price)	0.151***	0.148***	0.157***	0.339**
	(0.018)	(0.033)	(0.014)	(0.017)
Log (1+tariff)	-1.479***	-1.516***	-2.443***	-2.391**
	(0.350)	(0.281)	(0.167)	(0.148)
Log population	0.208***	0.086	0.213***	
	(0.053)	(0.084)	(0.024)	
Log exchange rate	1.632***	1.730***	1.493***	0.242
	(0.130)	(0.449)	(0.114)	(0.188)
Beverages	0.131*	-0.014	0.159**	0.029*
	(0.063)	(0.074)	(0.068)	(0.003)
Vegetables & fruits	-1.739***	-1.156***	-1.665***	-1.294
	(0.080)	(0.130)	(0.049)	(0.249)
Meat & Dairy	-0.450***	-0.141	-0.300***	-0.197
	(0.063)	(0.161)	(0.054)	(0.037)
Cereals	-0.786***	-0.762***	-0.648***	-0.425**
	(0.070)	(0.090)	(0.042)	(0.020)
Garments	0.226	0.370	0.252**	0.200
	(0.172)	(0.200)	(0.092)	(0.338)
Stationeries	-1.499***	-1.165*	-1.628***	-0.993
	(0.196)	(0.531)	(0.095)	(0.384)
Household appliances	-1.249***	-1.418***	-1.262***	-1.102
	(0.226)	(0.314)	(0.235)	(1.424)
Furniture & furnishings	0.736*	0.894***	1.250***	1.051
	(0.353)	(0.193)	(0.221)	(0.506)
Chemical products	-2.117***	-1.617***	-2.448***	-1.895
	(0.148)	(0.307)	(0.167)	(0.698)
Constant	-4.490***	-3.644	-3.649***	3.215
	(0.882)	(2.394)	(0.539)	(0.896)
Observations	2,802	1,244	5,348	333
R-squared	0.393	0.306	0.408	0.327

Note. *** $p < 0.01$, ** $p < 0.05$, and * $p < 0.1$ indicate statistical significance at 1%, 5%, and 10%, respectively. Standard errors are in parentheses. One of the product categories, food accompaniments, was dropped due to a dummy variable trap.

VI. Conclusion and Policy Recommendation

This study investigated the effect of EAC-CET pass-through on domestic prices in Kenya. The study analyzed the prices between 2005 and 2015. Two household surveys KIHBS

2005/2006 and KIHBS 2015/2016) coincided with the period when the EAC-CET came into being (2005) and 10 years after (2015). We use a panel fixed-effect model in the analysis. Domestic prices are classified as rural or urban. Furthermore, industry classifications divide prices into agriculture and manufactured goods. Manufacturing goods have a significant pass-through effect of 0.84%. However, agricultural goods have an incomplete pass-through effect. Market imperfections caused by excessive market intermediary power, prohibitive transaction costs, anticompetitive business practices, and direct government intervention in markets are some of the causes of incomplete tariff pass-through to domestic agricultural prices..

The study's imperfect pass-through effect suggests that policymakers should consider various policy options to facilitate the tariff's pass-through effects on consumers. First, the country's policymakers need to monitor the levels of market power in the country. They need to ensure that market intermediaries do not absorb trade benefits without transferring them to consumers. They could implement policies that increase competition while decreasing market power. Second, there is a need to continuously monitor the agricultural market to identify and address any potential distortions or anticompetitive practices that impede the pass-through of trade policies to domestic prices. Measures to discourage monopolistic behavior, price manipulation, or unfair trade practices that prevent import tariff pass-through benefits from reaching consumers are encouraged. Moreover, policymakers must recognize farmers' challenges and provide them with the necessary support. This includes access to credit, technical assistance, and training. This assistance can improve agricultural productivity, reduce costs, and enable farmers to cope with the negative impacts of import tariffs. The same measures can be achieved by enhancing agricultural infrastructure and promoting modern technology. Finally, this study shows that the complete tariff pass-through to domestic prices assumption is not always true. The intended effects may not be realized if import tariffs are not fully passed on to domestic prices. Tariffs may need to be carefully evaluated by policymakers to achieve their goals. The government may consider alternative revenue sources if it relies heavily on tariff revenue on some specific products.

Statements and Declarations

All authors certify that they have no affiliations with or involvement in any organization or entity with any financial interest or non-financial interest in the subject matter or materials discussed in this manuscript.

Competing interests

The authors have no competing interests to declare that are relevant to the content of this article.

References

Amiti, M., & Cameron, L. (2012). Trade liberalization and the wage skill premium: Evidence from Indonesia. *Journal of International Economics, 87*(2), 277-287. https://doi.org/10.1016/j.jinteco.2012.01.009

Amiti, M., Redding, S. J., & Weinstein, D. E. (2019). The impact of the 2018 tariffs on prices and welfare. *Journal of Economic Perspectives, 33*(4), 187-210. https://doi.org/10.1257/jep.33.4.187

Artuc, E., Porto, G., & Rijkers, B. (2019). Trading off the income gains and the inequality costs of trade policy. *Journal of International Economics, 120*(April), 1-45. https://doi.org/10.1016/j.jinteco.2019.05.001

Atkin, D., & Donaldson, D. (2015). *Who's getting globalized? The size and implications of Intra-National Trade Costs* (Working Paper 21439). NBER.

Atkin, D., & Khandelwal, A. K. (2020). How distortions alter the impacts of international trade in developing countries. *Annual Review of Economics, 12*(1), 213-238. https://doi.org/10.1146/annurev-economics-081919-041554

Bergquist, L. F., & Dinerstein, M. (2020). Competition and entry in agricultural markets: Experimental evidence from Kenya. *American Economic Review, 110*(12), 3705-3747. https://doi.org/10.1257/AER.20171397

Bollen, J., & Rojas-Romagosa, H. (2018). *Trade Wars: Economic impacts of US tariff increases and retaliations an international perspective*. CPB Background Document. Retrieved from https://www.cpb.nl/sites/default/files/omnidownload/CPB-Background-Document-November2018-Trade-Wars-update.pdf, 1-44

Borusyak, K., & Jaravel, X. (2021). The distributional effects of trade: Theory and evidence from the United States (Working Papers 28957). NBER. https://doi.org/10.3386/w28957

Bünder, T. (2018). How common is the East African community's common external tariff really? The influence of interest groups on the EAC's tariff negotiations. *SAGE Open, 8*(1). https://doi.org/10.1177/2158244017748235

Caliendo, L., Feenstra, R. C., Romalis, J., & Taylor, A. M. (2015). Tariff reductions, entry, and welfare: Theory and evidence for the last two decades. *Journal of Chemical Information and Modeling, 53*(November), 1689-1699.

Campa, J. M., & Goldberg, L. S. (2005). Exchange rate pass-through into import prices. *Review of Economics and Statistics, 87*(4), 679-690

Carvalho, M., Azevedo, A., & Massuquetti, A. (2019). Emerging countries and the effects of the trade war between US and China. *Economies, 7*(2), 1-21. https://doi.org/10.3390/economies7020045

Cavallo, A., Gopinath, G., Neiman, B., & Tang, G. (2019). Tariff passthrough at the border and at the store: Evidence from US trade policy. *SSRN Electronic Journal, 3*(1), 19-24. https://doi.org/10.2139/ssrn.3470793

De Loecker, J., Goldberg, P. K., Khandelwal, A. K., & Pavcnik, N. (2016). Prices, markups, and trade reform. *Econometrica, 84*(2), 445-510. https://doi.org/10.3982/ECTA11042

Deaton, A. (1988). Quality, quantity, and spatial variation of price. *The American Economic Review, 78*(3), 418-430. Retrieved from https://pdfs.semanticscholar.org/f88c/33eadd1b197a02b9a1c1505e656738ef72af.pdf

Deaton, A. (1989). Rice prices and income distribution in Thailand: A non-parametric analysis. *Economic Journal, 99*(395), 1-37. https://doi.org/10.2307/2234068

Deaton, A. (2019). The analysis of household surveys (reissue edition with a new preface): A microeconometric approach to development policy. In *The Analysis of Household Surveys (Reissue Edition with a New Preface): A Microeconometric Approach to Development Policy*. https://doi.org/10.1596/978-1-4648-1331-3

EAC (2022a). *EAC Customs Union Common External Tariff 2022 version*. Retrieved from https://www.eac.int/documents/category/eac-common-external-tariff

EAC (2022b). *EAC Ministers adopt 35% as the EAC CET 4th Band*. Retrieved from East African Community website. Retrieved from https://www.eac.int/press-releases/157-trade/2424-eac-ministers-adopt-35-as-the-eac-cet-4th-band

Engel, J., Kokas, D., Lopez-Acevedo, G., & Maliszewska, M. (2021). The distributional impacts of trade. In *The Distributional Impacts of Trade*. https://doi.org/10.1596/978-1-4648-1704-5

Fajgelbaum, P. D., Goldberg, P. K., Kennedy, P. J., & Khandelwal, A. K. (2019). *The return to protectionism* (Working Papers 25638), 1-55. NBER. Retrieved from http://www.nber.org/papers/w25638

Fan, H., Lin, F., & Lin, S. (2020). The hidden cost of trade liberalization: Input tariff shocks and worker health in China. *Journal of International Economics, 126*, 103349. https://doi.org/10.1016/j.jinteco.2020.103349

Feenstra, R. C. (1989). Symmetric pass-through of tariffs and exchange rates under imperfect competition: An empirical test. *Journal of International Economics, 27*, 25-45

Feenstra, R. C. (1995). Estimating the effects of trade policy. *Handbook of International Economics, 3*, 1553-1595. https://doi.org/10.1016/S1573-4404(05)80010-3

Flaaen, A., Hortaçsu, A., & Tintelnot, F. (2020). The production relocation and price effects of US trade policy: The case of washing machines. *American Economic Review, 110*(7), 2103-2127. https://doi.org/10.1257/aer.20190611

Furceri, D., Ahmed Hannan, S., Ostry, J., & Rose, A. (2019). Macroeconomic Consequences of Tariffs. *IMF Working Papers, 19*(9), 1. https://doi.org/10.5089/9781484390061.001

Gandolfo, G. (1998). International trade theory and policy. In *International Trade Theory and Policy*. https://doi.org/10.1007/978-3-642-61680-8

Gasiorek, M., Byiers, B., Rollo, J., & International, C. (2016). Regional integration, poverty and the East African Community: What do we know and what have we learnt? *European Centre for Development Policy Management, 202*, 1-52. Retrieved from http://ecdpm.acc.vpsearch.nl/wp-content/uploads/DP20

2-Regional-Integration-Poverty-East-African-Community-November-2016.pdf

Ghahremanzadeh, M., Khalili Malakshah, S., & Pishbahar, E. (2017). The extent of tariff pass-through to agricultural prices and wage in Urban and rural regions in Iran. *European Online Journal of Natural and Social Sciences, 6*(3), 447-458.

Goldberg, P. K., & Pavcnik, N. (2016). The effects of trade policy. In *Handbook of Commercial Policy* (1st ed., Vol. 1), 161-206. https://doi.org/10.1016/bs.hescop.2016.04.002

Han, J., Liu, R., Marchand, U. B., & Zhang, J. (2016). Market structure, imperfect tariff pass-through, and household welfare in Urban China. *Journal of International Economics, 100*, 220-232. https://doi.org/10.1016/j.jinteco.2016.02.006

Hoekman, B., & Shepherd, B. (2019). Who profits from trade facilitation initiatives? Implications for African countries☆. Journal of African Trade, 2(1-2), 51-70. https://doi.org/10.1016/j.joat.2015.08.001

Jaravel, X., & Sager, E. (2019). What are the price effects of trade? Evidence from the U.S. and implications for quantitative trade models. (CEP Discussion Paper No. 1642), 1-110. Finance and Economics. https://doi.org/10.17016/feds.2019.068

Kareem, O. I. (2018). The impact of common external tariffs on Household's welfare in a rich African country with poor people. *Advances in Economics and Business, 6*(2), 114-124. https://doi.org/10.13189/aeb.2018.060204

Khorana, S., Kimbugwe, K., & Perdikis, N. (2009). Assessing the welfare effects of the East African Community Customs Union's transition arrangements on Uganda. *Journal of Economic Integration, 24*(4), 685-708. https://doi.org/10.11130/jei.2009.24.4.685

Krugman, P., Obstfeld, M., & Melitz, M. J. (2018). *InternationalTrade Theory and Policy* (11th ed.). Harlow, United Kingdom: Pearson Education Limited

Levell, P. (2018). *The Customs Union, tariff reductions and consumer prices*. Retrieved from https://www.ifs.org.uk/uploads/publications/bns/BN225.pdf

Levell, P., O'Connell, M., & Smith, K. (2017). *The Exposure of Households' Food Spending to Tariff Changes and Exchange Rate Movements*. IFS Briefing Note.

Lwesya, F. (2022). Integration into regional or global value chains and economic upgrading prospects: An analysis of the East African Community (EAC) bloc. *Future Business Journal, 8*(1). https://doi.org/10.1186/s43093-022-00141-9

Marchand, B. U. (2012). Tariff pass-through and the distributional effects of trade liberalization. *Journal of Development Economics, 99*(2), 265-281. https://doi.org/10.1016/j.jdeveco.2012.02.004

Marchand, B. U. (2017). *How does international trade affect household welfare?* IZA World of Labor (August), 1-11. https://doi.org/10.15185/izawol.378

Marchand, B. U. (2019). Inequality and trade policy: The pro-poor bias of contemporary trade restrictions. *Review of Income and Wealth, 65*, 7-12, (1-306). https://doi.org/10.1111/roiw.12433

McIntyre, M. A. (2005). Trade Integration in the East African Community: An Assessment for Kenya. (*IMF Working Papers* 05/143), 1. IMF. https://doi.org/10.5089/9781451861624.001

Nakamura, E., & Zerom, D. (2010). Accounting for incomplete pass-through. *The Review of Economic Studies, 77*(3), 1192-1230.

Nicita, A. (2009). The price effect of tariff liberalization: Measuring the impact on household welfare

white star. *Journal of Development Economics, 89*(1), 19-27. https://doi.org/10.1016/j.jdeveco.2008.06.009

Nicita, A., Olarreaga, M., & Porto, G. (2014). Pro-poor trade policy in Sub-Saharan Africa. *Journal of International Economics, 92*(2), 252-265. https://doi.org/10.1016/j.jinteco.2014.01.001

Nowbutsing, B. M. (2014). The impact of openness on economic growth: Case of Indian Ocean rim countries. *Journal of Economics and Development Studies, 2*(2), 407-427

Omolo, M. W. O. (2012). The impact of trade policy reforms on households: A welfare analysis for Kenya. In 15th *Annual conference on global economic analysis*. Geneva, Switzerland.

Onyango, C., & Mugoya, P. (2009). A*n Evaluation of the Implementation and Impact of the East African Community Customs Union*. Arusha.

Pompelli, G. K., & Pick, D. H. (1990). Pass-through exchange and. *American Journal of Agricultural Economics, 72*(3), 676-681.

Porto, G. G. (2015). Estimating household responses to trade reforms: Net consumers and net producers in rural Mexico. *International Economics, 144*, 116-142. https://doi.org/10.1016/j.inteco.2015.09.001

Sequeira, S. (2016). Corruption, trade costs, and gains from tariff liberalization: Evidence from Southern Africa. *American Economic Review, 106*(10), 3029-3063. https://doi.org/10.1257/aer.20150313

Shepherd, B., De Melo, J., & Sen, R. (2017). *Reform of the EAC Common External Tariff costs*, (November 2017). Retrieved from https://www.theigc.org/project/reform-eac-common-external-tariff/. Internationa l Growth Centre

Shinyekwa, I. M. B., Bulime, E. N. W., & Nattabi, A. K. (2021). Trade, revenue, and welfare effects of the AfCFTA on the EAC: An application of WITS-SMART simulation model. *Business Strategy and Development, 4*(1), 59-74. https://doi.org/10.1002/bsd2.157

Södersten, B., & Reed, G. (1994). *International Economics*. Macmillan Press

Yang, H., Ou, J., & Chen, X. (2021). Impact of tariffs and production cost on a multinational firm's incentive for backshoring under competition. *Omega, 105*, 102500. https://doi.org/10.1016/j.omega.2021.102500

Zhu, J., Yu, W., Wang, J., & Elleby, C. (2016). Tariff liberalisation, price transmission and rural welfare in China. *Journal of Agricultural Economics, 67*(1), 24-46. https://doi.org/10.1111/1477-9552.12115

Appendices

Appendix 1. *Tariffs and Imports Share of Agricultural Products*

Harmonized System (HS) Products	Simple average ad valorem duty (Percent)			Share of Total Imports (%)		
	2004	2005	2015	2004	2005	2015
01- Live animals	4.10	19.6	18.8	0.01	0.00	0.15
02- Meat and edible meat offal	35.0	25.0	25	0.00	0.00	0.07
03- Fish and crustaceans and other aquatic invertebrates	15.0	25.0	25.0	0.06	0.04	0.41
04- Dairy produce; birds' eggs; natural honey	28.3	35.4	42.5	0.06	0.02	0.89
05- Products of animal origin	21.8	20.9	20.4	0.02	0.01	0.04
06-Live trees and other plants; bulbs, roots	9.20	10.4	14.1	0.13	0.09	0.17
07-Edible vegetables and certain roots and tubers	35.0	25.0	25.0	0.08	0.08	1.64
08-Edible fruit and nuts; peel of citrus fruit or melons	28.0	24.5	24.5	0.06	0.02	0.48
09- Coffee, tea, mate, and spices	14.7	25.0	25.0	0.22	0.06	0.55
10- Cereals	16.9	19.7	16.4	2.54	1.08	14.12
11- Products of the milling industry	17.8	22.4	21.9	0.13	0.10	0.51
12- Oil seeds and oleaginous fruits;	10.7	7.0	7.4	0.14	0.09	0.98
13- Lac; gums, resins, and other vegetable saps	2.90	0.00	0.00	0.01	0.01	0.07
14-Vegetable plaiting materials and vegetable products	15.0	10.0	10.0	0.00	0.00	0.01
15- Animal or vegetable fats and oils	17.1	13.7	13.9	2.42	3.15	2.94
16- Preparations of meat, fish, or of crustaceans	24.2	25.0	25.0	0.01	0.00	0.03
17- Sugars and sugar confectionery	12.7	17.9	14.2	0.71	0.33	3.45
18- Cocoa and cocoa preparations	18.5	13.2	13.2	0.06	0.03	0.33
19- Preparations of cereals, flour, starch, or milk	33.9	22.9	22.9	0.12	0.05	1.25
20- Preparations of vegetables, fruit, nuts	34.7	25.0	25.0	0.04	0.02	0.09

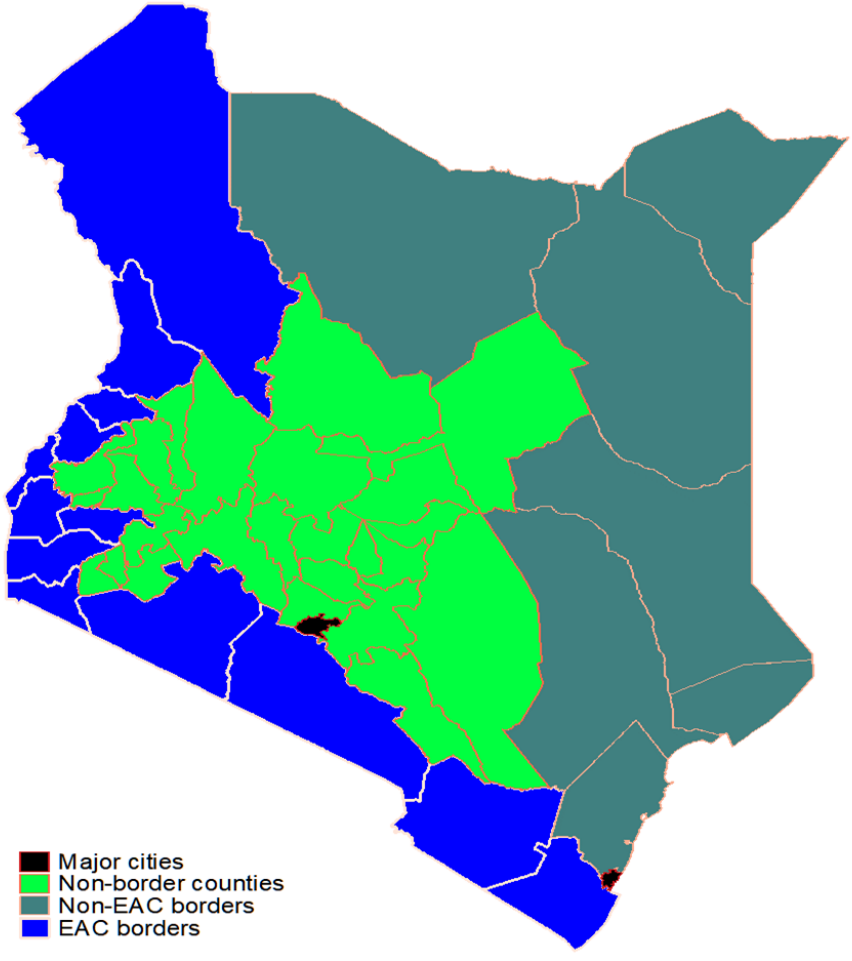
(Source) UN COMTRADE Database (https://comtrade.un.org/data/) and WTO STATS (https://stats.wto.org/)

Appendix 2. *MFN- Duty-free Imports by Product Groups (percent)*

Product/Sector	2005	2006	2014	2017
MT2 - 01 - Animal products	14.50	13.90	26.30	12.40
MT2 - 02 - Dairy products	0.00	0.00	0.00	0.00
MT2 - 03 - Fruits, vegetables, plants	45.00	36.70	13.60	6.40
MT2 - 04 - Coffee, tea	14.20	9.70	10.80	7.40
MT2 - 05 - Cereals and preparations	50.10	0.20	2.10	1.40
MT2 - 06 - Oilseeds, fats, and oils	8.00	78.50	84.50	77.80
MT2 - 07 - Sugars and confectionery	0.00	0.00	9.20	0.00
MT2 - 08 - Beverages and tobacco	0.00	0.00	0.00	0.00
MT2 - 09 - Cotton	100.0	100.0	100.0	100.0
MT2 - 10 - Other agricultural products	70.70	55.30	47.10	21.80
MT2 - 11 - Fish and fish products	0.00	24.20	2.20	0.10
MT2 - 12 - Minerals and metals	72.60	65.00	58.00	60.90
MT2 - 13 - Petroleum	98.40	97.20	97.40	96.80
MT2 - 14 - Chemicals	78.90	82.50	80.70	76.40
MT2 - 15 - Wood and paper	78.10	26.50	12.30	19.30
MT2 - 16 - Textiles	28.10	18.10	18.20	15.40
MT2 - 17 - Clothing	0.00	0.00	21.50	0.00
MT2 - 18 - Leather and footwear	25.90	20.30	13.40	9.10
MT2 - 19 - Non-electrical machinery	77.60	77.90	74.80	81.50
MT2 - 20 - Electrical machinery	34.00	40.10	68.10	54.20
MT2 - 21 - Transport equipment	72.60	60.00	66.00	47.40

(Source) UN COMTRADE Database (https://comtrade.un.org/data/) and WTO STATS (https://stats.wto.org/)

Appendix 3. Regions of counties according to EAC borders



(Source) Authors' Computation using data from GADM (https://gadm.org/download_country.html)