EFFECTS OF TRADE LIBERALIZATION ON HOUSEHOLD WELFARE IN KENYA: A CASE OF THE EAST AFRICAN COMMUNITY COMMON EXTERNAL TARIFF

MOGENDI JUSTINE ONGERI

X80/54253/2019

THESIS SUBMITTED IN PARTIAL FULFILLMENT OF THE REQUIREMENTS FOR THE AWARD OF THE DEGREE OF DOCTOR OF PHILOSOPHY IN ECONOMICS OF THE UNIVERSITY OF NAIROBI.

2023

DECLARATION

Declaration by the Student

I declare that this research proposal is my original work and has not been presented to any other university or institution of higher learning for examination or any other purpose.

Signed…… Date…12.08.2023……
Mogendi Justine Ongeri
Registration: X80/54253/2019

Declaration by the supervisors

This is to certify that this proposal has been submitted for defense with our approval as the university supervisors.

Signed…… Tabitha Nganga …… Date…12.08.2023……
Professor Tabitha Kiriti Nganga
University of Nairobi

Signed…… Date……12.08.2023……
Dr. Laura Barasa
University of Nairobi

COPYRIGHT

DEDICATION

This work is dedicated to the patience and moral support my family members have given to me. Specifically; Nellius, Craig, Harvey, Omwel, Agnes, Danlas, Geofrey, Irene and Ruth.

ACKNOWLEDGEMENT

This thesis could not have been accomplished without the invaluable input of several people and institutions that I sincerely want to recognize. I would first like to acknowledge the support I have received from my two supervisors, Professor Tabitha Kiriti Nganga and Doctor Laura Nelima Barasa. The work would not have been possible without their professional advice, guidance, dedication, and generosity of time. Secondly, I would take this opportunity to thank the African Economic Research Consortium (AERC) for their financial and training support, which I have received from them since 2016. Their generous support has facilitated the completion of this work. Thirdly, I would like to take this opportunity to acknowledge staff members, both teaching and non-teaching in the Department of Economics and Development Studies at the University of Nairobi for their support in developing this work. I would also like to acknowledge my mentors; Professor Wambugu, Dr. Ongeri, Dr. Oleche, Dr. Socrates and Dr. Wandenda, from the Department of Economics and Development Studies and Professor Luketero from the Department of Mathematics for their invaluable support in my academic life. Finally, and most important, I want to thank God for the energy, resilience, and strength that he has provided me throughout this journey.

TABLE OF CONTENTS

LIST OF TABLES

LIST OF FIGURES

LIST OF ABBREVIATIONS AND ACRONYMS

ACFTA	African Continental Free Trade Area
AIDS	Almost Ideal Demand System
CBK	Central Bank of Kenya
CET	Common External Tariff
CGE	Computable General Equilibrium
COMESA	Common Market for Eastern and Southern Africa
CPI	Consumer Price Index
CU	Customs Union
CUTS	Consumer Unity and Trust Society
EAC	East African Community
EAC-CET	East African Community Common External Tariff
ECOWAS	Economic Community of West African States
ERPT	Exchange Rate Pass-Through
HS	Harmonized System
HO	Heckscher-Ohlin
IID	Independent and Identically Distributed
ISI	Import Substitution Industrialization
IMF	International Monetary Fund
ITC	International Trade Center
KIHBS	Kenya Integrated Household Budget Survey
KIPPRA	Kenya Institute for Public Policy Research and Analysis
KNBS	Kenya National Bureau of Statistics
MERCOSUR	Southern Common Market
MFN	Most Favored Nation
NAFTA	North American Free Trade Agreement
NGO	Non-Governmental Organization
NTBs	Non-Tariff Barriers
ODI	Overseas Development Institute
OLS	Ordinary Least Squares
PCE	Per Capita Expenditure
PPML	Poisson Pseudo Maximum Likelihood
RTA	Regional Trade Area
SAPs	Structural Adjustment Programs
SDL	Sugar Development Levy
SMEs	Small and Medium Enterprises
WB	World Bank
WITS	World Integrated Trade Solution

WTO	World Trade Organization
UK	United Kingdom
UON	University of Nairobi
US	United States of America
VAT	Value Added Tax
WITS	World Integrated Trade Solutions

ABSTRACT

This study examines how the Common External Tariff (CET) of the East African Community (EAC) affects household welfare in Kenya. The inception of the CET saw a significant reduction in import tariffs, henceforth defined as a trade liberalization regime for Kenya. The price effect is looked at first in the analysis then the labor income effect of the price change is estimated. The interaction of price and income effects is the equivalent the welfare effect of trade liberalization. The analysis uses data from the Kenya Integrated Household Budget Surveys conducted in 2005/2006 and 2015/2016. Goods are classified as agricultural or manufactured. Households are classified as rural versus urban, and strictly urban households. In terms of labor incomes, the households are classified as; skilled versus unskilled, formal versus informal, and workers in agricultural sectors compared with those in non-agricultural sectors. Additionally, households are tracked based on where they live relative to the EAC borders. The price effect is estimated using a tariff pass-through equation while the labor income effect is estimated using a Mincerian earnings equation. Welfare is estimated using a negative compensation variation equation that evaluates the effect of price changes on households' income and expenditure. A significant pass-through is observed on manufactured goods while an incomplete pass-through is observed on agricultural goods. Tariffs are incompletely transmitted to rural and urban prices. Welfare estimations show that households in both urban and rural areas only slightly benefit from trade liberalization. Rural households gained from agricultural product protection. Urban households saw more gains from tariff pass-through of manufactured goods. Trade liberalization benefits were greater for rural households. Comparable to their contemporaries, skilled, formal, and non-agricultural sector workers benefited more from trade liberalization. Furthermore, male workers earn and gained more than female workers. Finally, households in the EAC borders and large cities gained more than households in other parts of the country.

CHAPTER 1: INTRODUCTION AND BACKGROUND

1.1. Introduction

Like many other developing nations, Kenya has adopted trade reforms as an essential part of its development strategy. Researchers (Adao, Carrillo, Costinot, Donaldson, & Pomeranz, 2021; Omolo, 2012) accept that opening up markets to international trade increases most countries' aggregate welfare. However, the distribution of welfare gains among households is still a contentious issue (Marchand, 2012). Under the classical approach, trade, in literature, is assumed to affect households via changes in the relative prices they face as both consumers and producers (Ghahremanzadeh, Khalili Malakshah, & Pishbahar, 2017). For the effect to be felt, trade policies need to operate within markets that can transmit them. Imperfections might hinder the transmission of trade policies' effect. These imperfections may prevent households from gaining from trade reforms. Given how Kenya has been involved in numerous trade liberalization measures, it would be prudent to question the effectiveness of these measures on household welfare in the country.

Omolo (2012) and Shinyekwa and Katunze (2016) previously examined trade liberalization and welfare in Kenya. However, their approach mainly uses aggregate welfare data and assumes that border prices always pass through to domestic prices faced by consumers. Further, from these studies, little is understood about how trade liberalization affects the poor versus non-poor, and rural versus urban dwellers. Answers to these concerns would be relevant because some trade policies could reduce poverty but, at the same time, accelerate inequality, and both could be a result of the same distributional impact (Marchand, 2012). There is also a concern that opening up domestic markets for developing countries could increase their vulnerability to trade (Siddiqui, 2015).

This study adds to the existing literature on trade and welfare policies in Kenya. Specifically, it investigates the micro-level distributional impact of tariff adjustments. It examines the price and labor income effects of trade policies using two household budget surveys: the Kenya Integrated Household Budget Survey (KIHBS) 2005 and 2015. The two surveys are not only necessary because they are comprehensive, but they also present two scenarios of trade liberalization in Kenya. The first survey of 2005 represents a period when Kenya, Uganda, and Tanzania revived

the East African Community (EAC) and formed a Customs Union (CU), which led to a Common External Tariff (CET). The second is ten years since the CET was created. Thus, the prices of 2005 are 'pre-reform prices' and the prices of 2015 are 'post-reform prices'. The critical element of these surveys is that they provide detailed expenditures and amounts of commodities households consume. From this information, it is possible to measure the extent to which household consumption levels are affected by price changes. This is conventionally done by taking a ratio of expenditures and goods consumed to obtain unit values (Deaton, 1989b). The unit values are then matched with import tariffs for the same products.

1.2. Background of Study

1.2.1. Trade liberalization

As Hillman (2003) states, "...Trade liberalization is the reverse of protectionism...p1" Protectionism occurs when countries impose trade barriers on each other. Trade barriers can be in the form of tariff barriers or Non-Tariff Barriers (NTBs). Thus, trade liberalization entails a reduction of tariffs and the removal or relaxation of NTBs (Adao, Carrillo, Costinot, Donaldson, & Pomeranz, 2021; Omolo, 2012). The process may be gradual or target specific sectors. Further, during liberalization, the benefits to economic agents in a country may not be equal. While some economic agents will gain, others will lose, and others will be bypassed (Nicita, 2009). Trade liberalization is often seen as a way to boost economic growth and development. However, trade liberalization can also hurt household welfare. This is because trade liberalization can lead to job losses in industries that are exposed to foreign competition. It can also lead to decreased prices for agricultural products, which can hurt farmers. Additionally, trade liberalization can lead to increased income inequality, as the benefits of trade are often concentrated among the wealthy. The impact of trade liberalization on household welfare is likely to vary depending on several factors, including the level of development of the country, the structure of the economy, how resources are allocated between men and women, and the specific policies that are implemented.

In terms of practice, Winters, McCulloch, and McKay, (2004) generally note that open economies fare better in aggregate than closed ones. However, most developing countries during the 20th Century advocated protectionist policies under the famous umbrella of Import Substitution Industrialization (ISI) strategies (Sebastian, 1993). The arguments for these policies were based

on two arguments. First, being small, they needed protection for the new manufacturing sector in the country. They mostly depended on the traditional agricultural sector. Secondly, with the worry of deterioration of world prices for raw materials, there would be less industrialization in these economies. These two arguments were seen to increase the gap between the advanced economies and the least advanced ones (Sebastian, 1993). Though these were some of the convincing arguments for protectionism, developing countries have recently been observed to move away from protectionism to more open policies. Notably, many developing countries have abandoned ISI strategies by sharply lowering their trade barriers (Kovak, 2013).

Becoming more open and adopting trade liberalization measures for developing countries began in the late 1980s. Several factors are noted in the literature to have triggered these changes in policies. Dornbusch (1992) noted three critical factors. The first is that these countries experienced poor economic performance. Secondly, there was an increase in exposure of information to the citizens of these countries about trade opportunities in other countries. Finally, the World Bank pressured them over the assistance they received during their financial downturns.

Kenya, like many other developing nations, adopted import substitution policies in its early years of independence to control its imports. Among the strict measures were quantitative restrictions, high import tariffs, overvalued exchange rates, and control of import licenses (Ng'eno, Nyangito, Ikiara, & Ronge, 2003). The history of Kenya's trade liberalization dates back to 1979 when coffee prices fell while world oil prices were rising. During this period, Kenya mainly depended on coffee as the main export and thus experienced massive balance of payment problems after the price shocks. The financial problems pushed the government to seek help from big international organizations like the World Bank (WB) and the International Monetary Fund (IMF). Kenya signed its first Structural Adjustment Loan in 1980 with these financial organizations that had conditions attached (KIPPRA, ODI, & UoN, 2007). Among the Structural Adjustment Programs (SAPs) conditions were trade liberalization, promotion of non-traditional exports, liberalization of the marketing systems, and reform of international trade (KIPPRA et al., 2007). Under the SAPs programs, trade liberalization entailed the introduction of tariffs to replace quantitative barriers to trade, and subsequently, the tariffs were supposed to reduce gradually over the years.

The SAPs regime dominated the country from the 1980s to the early 1990s. Most of the policies the country adopted were suggestions from the WB and the IMF. They were one of the requirements for their financial aid. In the early 1990s, Kenya embarked on export promotion strategies, which aimed to create an enabling environment for export growth. To achieve this, several measures, including a reduction and restriction of tariffs, were put in place. These reforms persisted up until 1995, when Kenya ratified a multilateral trading system and acceded to the World Trade Organization (WTO). Kenya has since joined organizations like the EAC and the Common Market for Eastern and Southern Africa (COMESA). All of these measures have been part of setting up rules that are to be followed in the process of trade liberalization.

1.2.2. Household welfare and trade liberalization

Household welfare is generally understood to mean living standards (Moratti & Natali, 2012). In terms of measuring these standards, appropriate indicators in the literature have been identified. The most common indicators are consumption levels and income. Consumption levels have been noted to be superior measures of standards of living since they better reflect long-term income (Deaton & Zaidi, 2002). There are other reasons why consumption is superior. First, consumption levels tend to be more stable than income, as households often smooth their consumption over time. This means that even if income varies, consumption may not fluctuate as much, making it a more reliable indicator of living standards. Secondly, consumption levels can capture non-monetary benefits that income does not. For example, home-produced goods, barter exchanges, or benefits from public goods and services contribute to household welfare but may not be reflected in income. Third, Consumption data reflects the actual goods and services utilized by a household, which is a direct measure of living standards. Income, on the other hand, is a means to an end and does not necessarily translate directly into welfare. Finally, Consumption is usually based on food and non-food items. Income, however, considers all the earnings of a household.

In trade, the analysis of household welfare takes two broad approaches. The first approach focuses on the changes in poverty levels in a country. Poverty in a country is viewed in terms of low consumption and income levels. The second focuses on changes in utility values when there are changes in domestic prices. The first, is a macro-level approach that evaluates welfare in terms of trade impact, trade diversion, and trade creation (Burfisher, Robinson, & Thierfelder, 2004; Freund

& Órnelas, 2008). Trade creation is the increase in trade within a Regional Trade Area (RTA). However, trade diversion happens in the event a member country changes and stops importing from a more efficient non-RTA Partner to a lesser efficient Partner in the RTA (Bhagwati, Krishna, & Panagariya, 1999).

The second, a micro-level approach, asks how much compensation a household could require to get back to the utility it had before the price increases. This is assuming that commodity prices increase (Deaton, 1988; Nicita, 2004). With this approach, adjustments to the import tariffs of traded items result in adjustments to the prices of domestic goods. A change in household demand follows from this alteration. The adjustments in household demand would then cause a change in the household level of utility, which is broadly a change in the consumption levels of a household. Empirically, trade liberalization's impact on welfare is known to be either a case or a country-specific issue (Cho & Diaz, 2011). In assessing how welfare is affected by various trade policies, several studies have used an approach proposed by Winters (2002). In this approach, trade policies affect households' welfare in three ways. The first is through the prices that they face as producers and consumers. The second is the labor income aspect, through employment, and the third is through government revenue. At an analytical level, the impact of various measurable trade policies like tariffs is traced through the price transmission mechanism. Here the question of interest is the extent to which an import tariff imposed on commodities is transmitted to domestic prices, labor incomes, and finally to households' disposable income. The impact is not expected to be uniform across the country due to other trade costs, like transport costs. A variation in the impact may be expected to exist in different regions of the country.

Tariff adjustments usually affect relative prices by changing the domestic-foreign price ratios as well as sectorial price ratios (Cabalu & Rodriguez, 2007). The changes in price ratios would affect production, household income, resource allocation, and household consumption levels. Some production sectors will expand while others will contract. Households that are in the expanding sectors may benefit more than those in the contracting sectors. Households gain if their consumption basket is dominated by goods whose prices are decreasing due to a decrease in import prices (Cabalu & Rodriguez, 2007). The reduction in import prices can be the result of a reduction in import tariffs. Thus, lower tariffs may result in a reduction in domestic prices. However, the fall in domestic prices of goods might affect the labor incomes of workers.

This study examines the links between tariff adjustments, domestic price changes, changes in income, and the amount of utility to be compensated for after changes in demand levels. Kenya forms a suitable case study as it has been observed to be among the most diversified countries in the EAC economies (Gasiorek, Byiers, Rollo, & CUTS International, 2016). Further, the share of Kenya's imports from EAC is around 2% implying that more than 90% of its imports come from outside the EAC. These statistics imply that a significant percentage of Kenya's imports are affected by EAC-CET[1].

1.2.3. East African Community Common External Tariff (EAC-CET)

Kenya, Uganda, and Tanzania agreed to form a CU while reviving the EAC in 2005. The CU came in handy with the establishment of a CET. The CET categorized imports into four main categories: raw materials, intermediate products, final products, and sensitive products. Raw materials attracted a tariff of 0%; intermediate goods attracted a tariff of 10%; final products attracted 25%, and sensitive products had a range of tariffs from 35% to 100%. The EAC-CET structure was designed to help local producers develop the capacity to produce locally inside the regional bloc. Additionally, the framework was intended to boost regional manufacturers and lessen imports from outside the EAC. 5395 tariff lines are currently available at Harmonized System (HS) digit level 8. Table 1.1 displays the dispersion of the CET band rates.

Table 1.1: CET tariff bands and Tariff lines

CET Band	Tariff lines	Percentage of total tariff lines
0%	2003	37
10%	1152	21.4
25%	2176	40.3
Above 25%	64	1.2

Source: Shinyekwa and Katunze (2016)

After the formation of the CET, the number of Kenya's tariffs that were lowered was 3,216, those that increased were 1,144 and those that remained unchanged were 753 (Karingi, Pesce, & Sommer, 2016). Uganda was the most liberalized Partner State at the time the CU was established, with rates ranging between 7% and 15%; Rwanda had rates between 5% and 25%. Tanzania had

[1] Imports from the EAC Partner States come to Kenya at a zero-rate based on the EAC-CU agreement

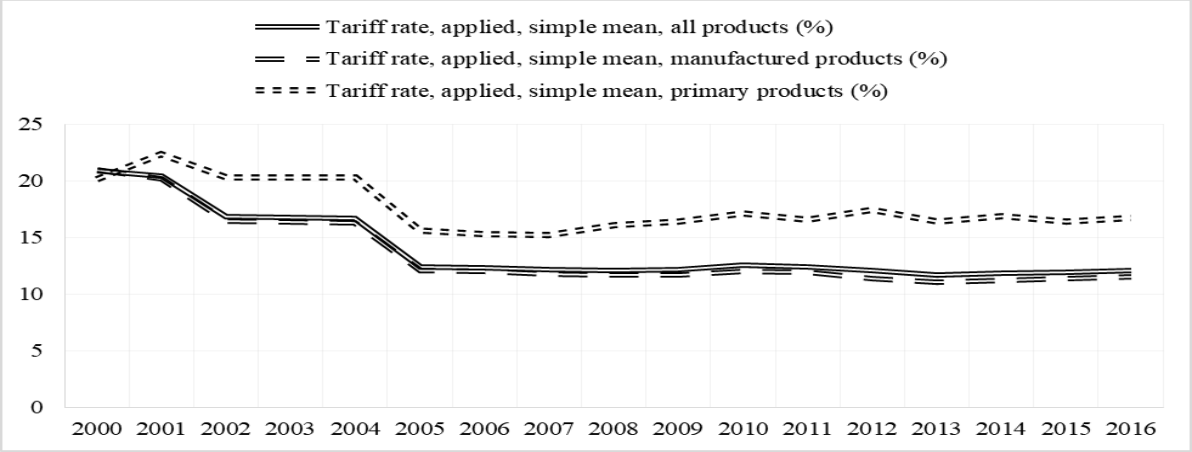
rates of 25% on average, Burundi had rates of 40%, and Kenya, which had the least permissive policies, had rates ranging from 35% to 100%. Two phases of implementation were planned for the EAC-CET. This was brought about by the disparities between the three countries' degrees of development. Tanzania and Uganda were expected to continue imposing an internal tariff on certain imports from Kenya during the first phase, which involved all nations adopting a three-tariff band system. Internal tariffs were to be eliminated in the second phase—which came after a transitional period of 5 years—allowing imports from Kenya to enter Tanzania and Uganda with zero tariffs (Onyango & Mugoya, 2009).

Kenya, by grouping products into four bands under the EAC-CET, saw a large number of its product tariffs reduced compared to the pre-CU tariffs. Several items, however— in the category of sensitive items- experienced an increase in their import tariffs compared to the tariffs before the CU. The EAC-CET also saw the removal of import tariffs among the Partner States. Goods were allowed to be imported into the Kenyan market from Uganda and Tanzania without any import tariffs, as long as they were proven to originate from these markets. Burundi and Rwanda joined the EAC in 2007. Like Uganda and Tanzania, their products were also allowed to enter the Kenyan market under zero tariffs. All these adjustments to tariffs were aimed at spurring growth in the EAC Partner States. This notwithstanding, there are scanty empirical studies that show how so far, adjustments have harmed or benefited the households of the Partner States, particularly Kenyan households.

1.2.4. Trade liberalization and household welfare in Kenya

Kenya has over time instituted various measures of trade liberalization in terms of the reduction of its import tariffs. As observed in figure 1.1, import tariffs have been falling drastically since 2000 for all products. The definition of trade liberalization in this study is the reduction of import tariffs that were caused by the inception of the EAC-CET in 2005.

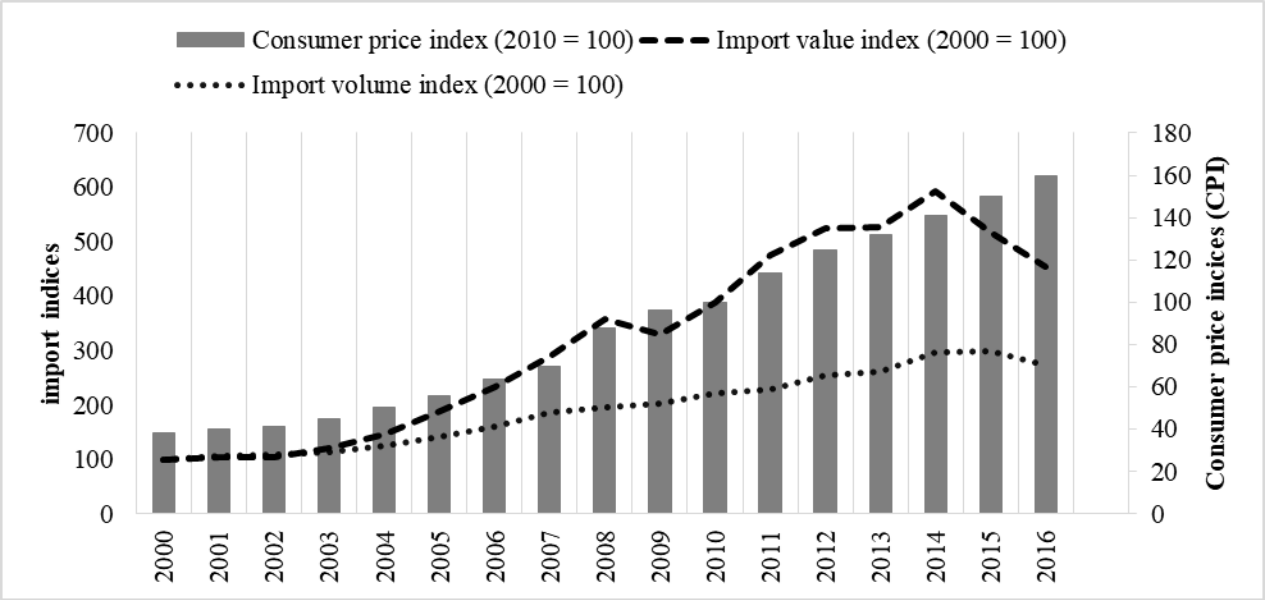
Figure 1.1: Import tariffs before and after the EAC-CET in 2005



Source: World Development Indicators

Manufactured products form the majority of the major imports and have close to the same tariff as all products. Primary products have had higher import tariffs but have been declining over the years. In 2000, the average import tariff (simple mean) was 20.9%, but in 2005, after the formation of the EAC-CET, the rate decreased to 12.42%. Before the creation of the CET in 2005, the tariff in 2004 was 16.66%. The figure shows that, on average, import tariffs fell by approximately 25% after the formation of the EAC-CET. There have been no changes to the tariffs since 2005 because the country is governed by the EAC-CET. From 2000 to 2004 imports remained fairly constant. However, after the formation of the EAC- CET and consequently, a reduction of import tariffs, import indicators were all observed to increase as seen in figure 1.2:

Figure 1.2: Import and consumer price indices (2000-2016)



Source: World Development Indicators

The import value index is a product of the import volume and unit value indices. All these indices have been observed to increase since 2005. This shows that trade liberalization under the formation of EAC-CET could have played a role in the increase in imports. The Consumer Price Index (CPI) for all products has increased over time. The magnitude of the increase in CPI seems constant, raising questions about whether the policy change in 2005 had any impact on the prices of products.

1.3. Problem Statement

Trade liberalization in Kenya, beginning in the 1980s, with the SAPs to the formation of a CU with the EAC has involved a series of trade policies that focused on the reduction of various trade barriers. However, little is understood about how these policies affect household welfare. In the initial years of trade liberalization, 1990/2005/2015 welfare indicators have shown significant declines or stagnation that could be attributed to trade liberalization. In Kenya, a trend of declining household expenditures has been observed, with mean per capita expenditures dropping from KSh 86,458 in 1994 to KSh 68,418 in 2016, as reported by the Kenya National Bureau of Statistics (KNBS) in 2020. This decline, occurring during periods of trade liberalization, suggests a decrease in average household financial resources. Concurrently, income inequality, as measured by the Gini coefficient, showed fluctuations, peaking at 0.692 in 2005 before falling to 0.594 in 2015. This indicates a period of increasing, then slightly decreasing income disparity. The country

experienced economic growth of 6.4% in 2005 and 5.8% in 2015, yet this growth did not uniformly benefit all segments of the population. Employment rates, a key indicator of economic health, remained consistent at 58.5% from 2005 through 2015, after being at 63.5% in 2000, as per data from the Kenya Institute for Public Policy Research and Analysis (KIPPRA) in 2020. The Consumer Price Index (CPI) witnessed a significant rise from 60 in 2005 to 160 in 2015, highlighting a substantial increase in living costs. These economic indicators, collectively, point towards an escalation in poverty levels across the nation. Importantly, trade liberalization may have contributed to these indicators in various ways. Trade liberalization leads to increased competition from imports, which lowers prices for local goods and services. As a result of this increased competition, many Kenyan businesses may be forced to shut down, leading to job losses and increased unemployment. The rise in unemployment makes it harder for people to earn a living, pushing more people into poverty. In addition to poverty, trade liberalization could also be blamed for a rise in inequality. This is because trade liberalization benefits the wealthy (the middlemen and the traders) more than the poor. The wealthy can take advantage of trade liberalization opportunities to expand their businesses and increase their profits. The poor, on the other hand, often lack the resources and skills needed to compete on the global market.

Welfare and trade liberalization concerns are not new to Kenyan literature. However, they have mostly been addressed at the macro level (Khorana, Kimbugwe, & Perdikis, 2009; McIntyre, 2005; Shinyekwa & Othieno, 2013). This has mostly been attributed to the lack of disaggregated information to trace consumer prices, labor incomes, and consumption patterns. The studies do not indicate which products or households are affected by trade liberalization. One may also ask if there is a difference between the impact on the poor versus the non-poor or rural versus urban households. Finding this micro-level disaggregated information is vital since some trade policies could reduce poverty but, at the same time, accelerate inequality, and both could be a result of the same distributional impact (Marchand, 2012). Further, the country emphasizes the importance of protecting domestic farmers and industries from fierce competition. Taking advantage of this opportunity, the country agreed to join neighboring countries in the form regional integration. However, little is done to evaluate how such strategic decisions affect households in the country. It has been a case where only a few traders reap the benefits of trade policies while other households are adversely affected. For example, Bergquist and Dinerstein (2020) show that in Kenya, consumers only reap 18% of trade gains while 72% is absorbed by middlemen.

This study attempts to fill this gap in Kenyan literature on trade liberalization and household welfare. It does this by analyzing the micro-level impact analysis of adjusting import tariffs on various groups of households and different categories of products in Kenya. The analysis is facilitated by two comprehensive household budget surveys. The first survey KIHBS 2005/2006, represents a period when Kenya entered a CU with the EAC while KIHBS 2015/2016 is ten years later. The former survey represents a pre-EAC-CU while the latter represents a post-EAC-CU. The current EAC-CU has not been around for long. Thus, this can be more of a short-run analysis, highlighting the concern whether in the short run trade liberalization may harm those who were initially worse off or less prepared for the transition (Borraz, Rossi, & Ferres, 2012). The two surveys report significant information about consumer prices and labor incomes that are used to analyze trade liberalization's impact on household welfare. Trade liberalization, in this study defined by the reduction of import tariffs after the EAC-CET inception, is examined using pre- and post-EAC-CET import tariffs. The effect of import tariffs on household welfare is reflected in commodities purchased and sold by households. Having information about commodity prices and factor returns, one can compute the welfare effect of a tariff by estimating the effect on commodity prices. In addition, one can trace the same effect on labor incomes (Nicita, 2009). The welfare impact is analyzed by categorizing households in various forms, including their income groups and their geographical locations. Tracing the actual winners and losers of the import tariff adjustments under the EAC-CUs using this micro-level approach could help advice targeted policies. The policies range from commercial policies like taxes to redistribution policies like allocation and reallocation of income. Additionally, the distributional analysis helps to understand how policies could be geared towards boosting those economic agents adversely affected by trade policies.

In terms of comparison with other studies done in sub-Saharan Africa, this study is unique in several ways. First, the research focus. Several studies that analyze trade liberalization are not usually clear on their definition of trade liberalization; their studies mainly examine it as a broad change in a trade regime, with no clear definition of the policy being examined. The focus of this study focuses on import tariffs, which are traceable and measurable trade policies. The second is the methodological approach. Most studies for sub-Saharan countries on trade policies are ex-ante simulation studies that rely on ad-hoc assumptions about import tariffs. One of the common assumptions is a complete import tariff pass-through effect on domestic prices. Facilitated by data

availability, this study is unique in its approach, conducting an ex-post analysis of a trade policy with little ad-hoc assumption. Finally, the study is unique in its findings and implications. The incomplete pass-through of import tariffs on agricultural products helps illuminate significant policy implications for policymakers in sub-Saharan African countries interested in trade policy issues.

1.4. Research questions

The main research question of this study is: What is the effect of trade liberalization under the framework of EAC-CET on household welfare in Kenya? Specific questions of the study are:

1) What is the effect of trade liberalization on domestic prices of agricultural and manufactured goods in Kenya?
2) What is the effect of trade liberalization on the labor income of households in Kenya?
3) What is the effect of price and labor income adjustments under trade liberalization on household welfare in Kenya?

1.5. Objectives of the Study

The overall objective of this study is to investigate the effect of trade liberalization on household welfare in Kenya. The specific objectives of the study are to:

1) Examine the effect of trade liberalization on domestic prices of agricultural and manufactured goods in Kenya
2) Examine the effect of trade liberalization on the labor income of households in Kenya.
3) Examine the effect of price and labor income adjustments under trade liberalization on household welfare in Kenya.

1.6. Contributions of the study

By showing how regions and groups of households in Kenya are affected by various trade policies, the study provides a basis for how policies, especially domestic-related policies, can be formulated in such a way as to cushion households from the external impact of opening up its economy to other countries. Further, showing gainers or losers at the household level provides a basis for policymakers whenever they are making price, tax, and tariff-related policies. In a regional policy context, the study comes at an essential time for Kenya when it is engaging in various regional trade agreements, the most recent one being the Africa Continental Free Trade Area (AfCFTA). As it is making decisions to further liberalize trade, the government needs to know how these

policies affect the citizens of the country. Kenya has opened its market to Uganda, Tanzania, Rwanda, and Burundi and has zero-rated most of the items imported from these countries. Further, the CET formed with the EAC has subjected the country to lower tariff bands. This comparison is made to the previous tariff structure it had before forming the CU in 2005. Thus, as Kenya plans to further open up its economy to all the African countries in the AfCFTA, it is vital to first understand the magnitude of importance of the current position to the households of the country before further liberalizing. It might be the case that households in Kenya only receive minimal benefits. This implies that most of the benefits accrue to the Partner States at hand.

There is this pertinent concern regarding how Kenya's efforts to open up to other Partner States are helping Kenya's households. Numerous macroeconomic studies have been conducted and found exciting evidence of trade creation and trade diversion effects. The limitation of these studies is that by aggregating the impact of trade policies, one may not see the distributional impact. One cannot tell who in the country is gaining or losing from the various policies. This study, by conducting a disaggregated distributional analysis of trade policies contributes to the literature on trade policies and household welfare in Kenya. The literature is vital for future researchers who would be interested to know how households are affected by different trade policies. This is more so given that the country is still involved in various global trade issues. The micro-level approach adopted in this study is among the first ex-post analysis of trade reforms in Kenya. The study is among the first, given the availability of the 2015/2016 household budget survey data, which was previously not available. The results from an ex-post analysis are crucial as they can trace the impact of a particular policy as compared to an ex-ante analysis, which relies on simulations[2] and predictions. Ex-ante studies suffer from the threat of numerous assumptions, which in some cases may not hold. Given this strength, this study provides an opportunity for future researchers who may be interested in analyzing the distributional impact of trade policies at the disaggregated level of households in Kenya. The researchers can use this study as a benchmark or reference for their studies in terms of their methodologies.

[2] The disadvantage of simulation studies is the heavy reliance on assumptions, which sometimes may not hold given the nature of market imperfections in developing countries (Nicita, 2009).

1.7. Organization of study

The study is divided into five chapters. The first chapter gives a broad discussion of the introduction, together with the background of the study. Further, it describes the research question and the general objectives of the study. The second chapter is the first essay, which analyzes tariff pass-through to domestic prices and the extent to which border price changes are transmitted to domestic markets in Kenya. The third chapter, which forms the second essay, investigates the impact of tariff adjustments on labor incomes and the income of households in Kenya. The fourth chapter contains the final essay. It incorporates the price and labor income effects from the first and second essays to analyze the aggregate welfare impact of trade liberalization. Finally, the fifth chapter gives the summary, conclusion, and policy implications of the whole study.

CHAPTER 2: EFFECT OF TRADE LIBERALIZATION ON DOMESTIC PRICES IN KENYA

2.1. Introduction

Tariffs and quotas through increased protectionism policies harm the terms of trade of a country and reduce a country's welfare (Bollen & Rojas-Romagosa, 2018). The general notion of reducing protectionism is to improve consumer welfare accruing from reduced domestic prices of imported items. However, the reduction of tariffs may not lead to a one-to-one decrease in prices. Feenstra (1989) terms this as an incomplete pass-through of import tariffs on prices. Generally, several economists view import tariffs to be a distortionary measure of collecting revenues. Nonetheless, several countries opt to offer at least some protection to domestic producers against foreign competition (Levell, O'Connell, & Smith, 2017).

Import tariffs and other trading costs are still substantially high in developing countries. Tariffs are still high for two reasons. First, let's consider the argument about the infant industry. The premise of this argument is that of protecting industries that these countries believe have a strategic or comparative advantage in terms of production. The second reason is revenue collection. In most developing nations, duties are easily collected on observable imports compared to taxes collected from domestic firms and individuals (Atkin & Khandelwal, 2020). The challenge with domestic firms in these countries is that most of the businesses are informal while majority of individuals are self-employed. Tariffs may therefore continue to exist despite their distortionary effects because they are the easiest accessible means of revenue collection for most countries. Further, in the event these developing countries eliminate their import tariffs, they may lose revenues that would have been used in providing services or even transfers to the vulnerable persons in the society. The debate on tariffs is not only a concern of developing nations but also of developed nations. Recently there have been discussions on which direction the United Kingdom (UK) should take in tariff adjustments following Brexit (Levell et al., 2017). Similarly, several discussions have taken place regarding the impact of the United States of America (US)-Chinese import tariff and quota wars on consumers both domestically in these countries and on global trade (Carvalho, Azevedo, & Massuquetti, 2019).

Consumers and importers globally experienced an immediate increase in domestic prices as a result of the US imposing import duties on Chinese products in 2018 (Amiti, Redding, & Weinstein, 2019). Import competition was reduced, which led to a rise in the prices of US producers' goods. This fast transmission rate is an attribute of US markets being somewhat efficient. Though the US is a very developed country, it can demonstrate how an import tariff may also affect its households. Some products that the US imposed high import tariffs on are closer to those applied in the EAC, under its CET. Some examples are shown in table 2.1.

Table 2.1: Comparison of import tariffs for selected items between the US and EAC-CET

Name of Product	Example-Harmonized System (HS) Chapter	US import tariff to China from 2018 (%)	EAC-CET in 2017 (%)
Washing Machine	84	20-50	10-25
Steel Imports	72	25	10-25
Aluminum imports	76	10	10-25

Source: Statistics for the US are from Amiti, Redding, and Weinstein (2019) and those for EAC are from EAC (2017).

China and the US are not comparable with the EAC-Partner States in terms of development levels. However, they present a crucial case where high tariffs can adversely impact households in their respective countries. Like the EAC Partner States, most developing nations hold the argument of having high tariffs to protect their infant industries and raise government revenue (Nowbutsing, 2014). Nevertheless, in achieving these objectives, high tariffs could harm households by increasing domestic prices and reducing welfare (Carvalho et al., 2019). However, for trade policies like tariffs to affect domestic prices, markets have to be responsive enough. Perfect transmission of trade policy to domestic pricing, including border and retail prices, may not be possible due to imperfect competition in both home and international markets. In case there is an increase in protection, for example, by a tariff, exporters would not allow consumer prices to rise by the full amount of the tariff. Exporting firms know that increasing tariffs by the full amount would push them out of the market. Therefore, they would absorb some of the tariff's impacts while transmitting little to the consumer. Reducing the tariffs may also not significantly impact domestic prices since firms may absorb the gains into their markups. Thus, due to these market imperfections, tariffs may sometimes cause minimal or no change in the domestic prices of the countries imposing them.

Numerous global economies have reduced their import tariffs since the 2000s, but their impact on their domestic markets, and especially domestic prices, is lacking. Due to the critical role that prices play in a nation's welfare, the impact of tariffs on domestic pricing is significant. Additionally, a thorough grasp of the distributional effects of taxes as well as the price elasticity of taxable goods is necessary for efficient policy designs including import revenues. Domestic pricing may respond differently to changes in trade policies in various parts of a nation. These differences could be due, among other things, to firms' markups and transport costs. According to Parsley and Wei (2007), border prices could be highly responsive to trade policy shocks as compared to retail prices. This reduces the impact of trade policies on households since they mainly receive retail prices. The lower response of the retail prices could be a result of the imposition of mark-ups by the intermediaries in the markets, the price of competitors locally, transport costs, and the ease of availability of close substitutes (Parsley & Wei, 2007). The effect of these elements on the domestic prices that households must pay will differ depending on the country's geographical location or the degree of market integration. As a result, a variety of effects from tariffs is anticipated on retail prices because of these reasons. Apart from imperfections caused by these factors domestically, imperfect pass-through could result in imperfect competition in foreign markets (Feenstra, 1995).

Many developing countries are hesitant to reduce their import tariffs. However, in recent years many have been convinced to adjust their tariffs, by either lowering them or completely removing them. In Africa, countries over the years have revised their tariff structures under different RTA. In East Africa, Kenya, Uganda, and Tanzania revived their RTA, which formed a CU that ultimately created a CET. In the CET, many products saw their tariffs revised. Some products saw their tariffs decrease; others remained the same while others increased. Given the importance of domestic prices in developing countries, understanding the effect of the alignment of tariffs under the East African CET is vital both for policymakers advocating for the welfare and revenue collection in these countries. As the literature is inconclusive on the effect of tariffs on prices, especially in developing countries, the effect of the CET in East Africa on domestic prices warrants an in-depth investigation. This study provides an empirical analysis of Kenya as a case study. Empirical evidence of price elasticity to tariffs is generally obtained by analyzing time-series data using aggregate demand, prices, and incomes (Deaton, 1988). While this is the case, most

developing nations like Kenya do not possess rich time-series data on commodities that would suffice to conduct a comprehensive analysis of elasticity. However, Kenya has two comprehensive household budget surveys of 2005/2006 and 2015/2016 that can be used to analyze on-demand responses using the Deaton (1989b) approach. 2005/2006 represents the period before the CET while 2015/2016 is ten years since the inception of the CET.

2.2. Background of study

2.2.1. Import Tariffs and Domestic Prices

Import tariffs can affect consumer prices through three main channels. The first channel would be the direct impact of tariffs on the prices of imported goods. For instance, a drop in import prices could result from a reduction in tariffs. In the end, the state of the market will determine how much of an influence there will be. The second is through increased firm efficiency in the form of the introduction of higher-quality, more cost-effective, or products that are more efficient. Therefore, low production costs would result in a drop in commodity prices (P.K. Goldberg & Pavcnik, 2016). The third channel is where domestic producers of finished goods are put under competitive pressure by the decrease in tariffs. Domestic producers face a downward demand curve for their goods, which is accompanied by an increase in the price of elasticity of demand given the increase in import competition. As such, with this demand facing domestic producers, it implies a lower markup and hence a decrease in prices of final commodities.

Finally, a reduction in tariffs for products used as intermediate inputs in domestic production would be expected to exert downward pressure on the prices of the final commodities produced. In all four cases, it may be explicit that a reduction in import tariffs would lead to a reduction in commodity prices. However, in practice, the effect of tariffs on prices is seen to be dependent on other factors like market structures and competitive conditions. Under very imperfect competitive markets affected by high transaction costs, the effect of tariffs on domestic prices would not be observed (Nicita, 2009).

2.2.2. Kenya and the EAC Import Tariff Structure

In Kenya, major tariff reforms governed by the principle of trade liberalization were formulated in 2001. During the reforms, the top tariff rates were reduced to align with COMESA and

subsequently EAC rates. The reforms saw a reduction in the top rates from 40% to 25%, over four years. By 2004, there were just 4 non-zero tariff bands, down from 9 previously. Kenya and the East African Partner States agreed to establish a 4-band CET system when they entered into a CU in 2005. The first band of 0% covered all raw materials, capital items, agricultural inputs, specific medications, and specific medical equipment. Intermediate commodities and other crucial industrial inputs were included in the second band, which was 10%. The third band, 25% covered final goods, and the final band covered 35-100% of EAC-sensitive items (Karingi et al., 2016). The EAC however, dates back to 1967, when Kenya, Uganda, and Tanzania formed the first EAC. The Partner States agreement later broke out in 1977 due to ideological and structural conflicts among these Partners (Kibua & Tostensen, 2010). Later in the 1990s, the Partner States restarted negotiations for reforming their regional body. This ultimately led to the formation of the EAC in 2005 with Kenya, Uganda, and Tanzania as the main partners. Later in 2007, Rwanda and Burundi joined the regional body and finally, South Sudan joined in 2018.

The goal of the 0% tariff band was to encourage local producers to stay within the confines of the regional bloc. To promote domestic production and reduce imports a 25% threshold was established for finished items. A band of 10% was created for intermediate goods and other essential manufacturing inputs. Tariffs above 25% were for sensitive items. Ad valorem rates for sensitive items varied from as low as 35% to as high as 100% for some products like sugar. According to the Partner States, the countries had a comparative advantage when it came to producing sensitive items and therefore needed more protection to do so. Uganda was the most liberalized Partner State during the CU's establishment, with rates ranging from 7 to 15%; Rwanda had rates between 5 and 25%. Tanzania had rates of 25% on average. The rate was around 40% in Burundi. The majority of the rates were between 35 and 100% in Kenya, the country with the least liberalization. Kenya, at the time of the formation of the CU, was regarded as a giant economy. Thus, to allow for fair competition, Tanzania and Uganda were allowed specified exemptions. Tanzania was allowed not to remove tariffs on 906 items, while Uganda was allowed 426 items.

2.3. Statement of the Problem

In literature, it is considered that trade has an impact on households through shifts in the relative prices that they must pay as both consumers and producers (Ghahremanzadeh et al., 2017). However, for trade to affect prices, trade policies must operate through markets that can transmit

the impact of trade policies. Most of the international economic literature assumes competitive markets and homogenous goods. Under this assumption, price rigidities are ignored. Thus, it is expected that the law of one price holds in such a manner that domestic prices are equal to foreign prices. Any differences between prices are attributed to different trade policies, exchange rates, transport, and other distribution costs. Thus, any change in tariffs is assumed to be passed on to the domestic price. However, there has been strong evidence against these predictions. For example, deviations from the law of one price have been widely criticized (Goldberg & Pavcnik, 2016).

The general notion of import tariff reduction is to improve consumer welfare by reducing the domestic prices of imported items. This has been the argument in favor of free trade globally. However, over many years, the domestic prices of those imported items have not decreased in direct proportion to the lowering or elimination of tariffs. This phenomenon is seen in figures 1.1 and 1.2. Feenstra (1989) terms this as an incomplete pass-through of import tariffs on prices. Based on the arguments, a decrease in Kenyan tariffs may not necessarily lead to a decrease in import prices. Further, we cannot conclusively say that increasing import tariffs for some products will increase their import prices. The reduction of tariffs would lead to more profits for them. Likewise, by increasing tariffs, firms that have significant economies of scale will absorb them. Changes in pricing at the border are more likely to be absorbed by traders rather than households when there are weakly competitive markets, as noted by Frankel, Parsley, & Wei (2012).

Under the EAC-CU, many commodities saw their tariffs reduced. However, a few products regarded as sensitive to the Partner States saw their tariffs increase. Nevertheless, over the years, Kenyan commodity prices have been observed to increase. The trend is attributed to different factors, but little is known about the contribution of import tariffs. By controlling for other factors, one would ask whether adjusting the import tariff under the EAC-CU had an impact on commodity prices in Kenya. This study fills this gap in the literature by investigating the impact of the EAC-CET on domestic prices in Kenya. The idea is to group products in terms of those whose tariffs increased, decreased, and remained the same. This group of product import tariffs is observed against domestic prices over the years 2005 and 2015 for different regions of the country. Other factors that may affect domestic prices are controlled for in the analysis.

The opportunity cost of eliminating tariffs is mainly loss of government revenue and a risk of the collapse of domestic industries. Nonetheless, the risk of the collapse of industries may only be a concern if domestic consumers substitute their consumption of domestically produced goods for imported goods. To maintain the revenue pool, governments can recover lost customs revenue domestically. This may involve introducing various local taxes, which would drive up domestic prices. Countries, especially developing ones, advocate for various macro and microeconomic policies and programs with an ambition to alleviate poverty. However, with the continuous increase in domestic prices, these ambitions might not be attained. Given this scenario, it is vital to understand whether regional policies like the EAC-CET play a role in Kenyan domestic prices. Policy designs regarding revenue from taxes require knowledge of price elasticity for taxable commodities.

2.4. Research questions

This study's main research question was: What is the effect of import tariff changes under the EAC-CET on domestic prices of products in Kenya? The specific research questions are:

1) What is the effect of trade liberalization on consumer prices of agricultural and manufactured goods in Kenya?
2) What is the effect of trade liberalization on consumer prices of agricultural and manufactured goods in rural versus urban areas of Kenya?
3) What are some of the possible policy implications regarding trade liberalization on domestic prices in Kenya?

2.5. Objectives of the Study

The main objective of this chapter was to investigate the effect of trade liberalization on domestic prices in Kenya. The specific objectives are:

1) To investigate the effect of trade liberalization on consumer prices of agricultural and manufactured goods in Kenya.
2) To investigate the effect of trade liberalization on consumer prices of agricultural and manufactured goods in rural versus urban areas of Kenya.
3) To give policy implications on the effect of trade liberalization on domestic prices faced by households in Kenya.

2.6. Significance of the Study

By understanding how the EAC-CET has affected domestic prices in Kenya, the study provides a basis for policy advice regarding taxation and domestic prices. The analysis of domestic prices is conducted by categorizing products and regions. The first categorization of regions is essential to show how effective import tariffs are at triggering changes in domestic prices. From the results, policymakers can understand the effect of various regional negotiations. This is significant as the country is still negotiating with other African countries to further its border.

The second categorization is agricultural against manufacturing. These categorizations are critical to see how regional decisions involving tariffs affect various sectors in the country. Policy decisions regarding the two sectors and import tariffs stand to benefit from these results. The role of market integration in the transfer of import tariffs to domestic prices is also demonstrated through this approach. This information is necessary for policymakers to make informed decisions about domestic and regional market integration measures. Finally, the outcome of how import tariffs affect domestic prices fairly reflects how import tariffs affect the welfare of households in the nation. This study also adds to the body of knowledge in Kenya about tariffs and domestic prices.

2.7. Theoretical Literature Review

According to Nicita (2009), import tariffs affect consumer prices in two broad ways. One is directly affecting the prices of imports through the imposition of a tax at the border. The other is indirectly through the prices of import-competing varieties on the domestic market. Domestic producers adjust their markup in response to import tariffs imposed. The nature of transmission of tariffs to domestic markets and thus prices are also influenced by the competition's nature in a market by firms (Krugman, Obstfeld, & Melitz, 2018).

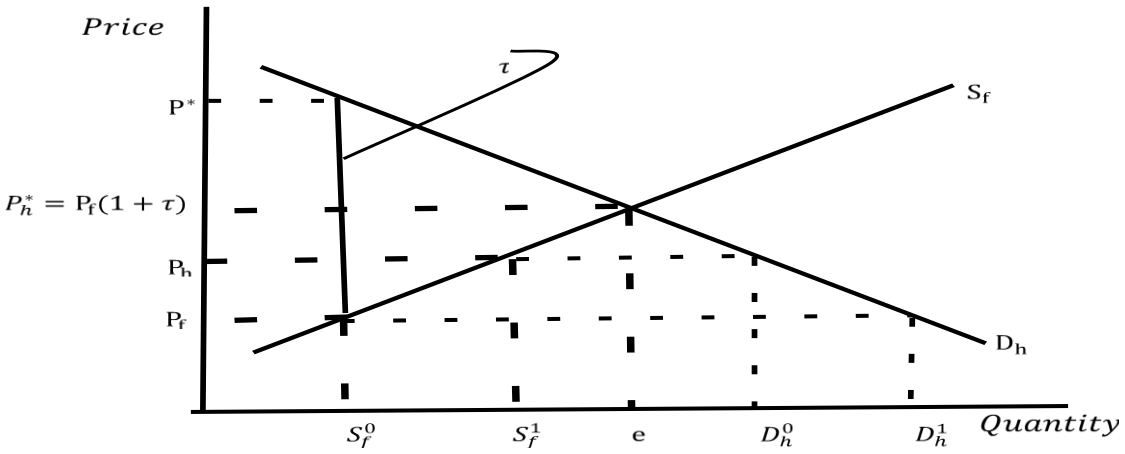
The agents who are directly affected by tariffs are firms involved in import and export activities. These firms' responses to tariffs and other market conditions determine the price of consumers' goods. Therefore, it is necessary to distinguish between the various types of firms involved in trade to understand how tariffs affect domestic prices. Further, in disaggregating the impact of tariffs on prices, a distinction is made between a small country and a large country. In trade literature, a

small country implies a country that cannot influence world prices. Kenya is a small country. Thus, a review of the theoretical and empirical literature on tariffs is limited to different markets operating within a small country setup.

2.7.1. Tariffs under perfectly competitive markets

A small country is a price taker in a market with perfect competition, meaning it cannot change the terms of trade by imposing tariffs. Being a price taker implies that it deals with an import supply curve that is perfectly elastic and an import demand curve that is similarly completely elastic. Assuming the country is involved in trade with one good, the home demand curve D_h and foreign export supply curve S_f in the trade market can be illustrated as shown in figure 2.1:

Figure 2.1: Import tariff and domestic price in a perfectly competitive market for a small country



Source: Adopted from Södersten and Reed (1994).

The foreign (world[3]) price can be denoted by P_f. Given the country is small; it can import any amount at this point (Södersten & Reed, 1994). Assume the home country introduces an ad-valorem tariff τ on its imports. The domestic price (P_h) will be pushed upwards by the full amount of the tariff to P_h^*. Any more increases in tariffs will keep on pushing the domestic prices upwards. Theoretically, a reduction of the tariff would be expected to perform the opposite of these effects. Thus, a small country's optimal tariff would be zero even when foreign supply is highly elastic.

[3] The world price is usually low compared to the domestic price due to cheaper labor and advanced technology in the large countries.

2.7.2. Tariffs under imperfect competitive markets

The main feature of imperfect markets is that no country is small. Firms producing goods will differ in terms of their strategic behaviors. Whenever there is an introduction of a trade policy like tariffs, firms' responses to prices and quantities traded will depend on the market structure. The main market structures under imperfect competitiveness are monopolistic competitive markets, monopolies, and oligopolies. Each has its features and is discussed separately in this study.

2.7.2.1 Monopolistic Competitive Market

The essence of monopolistic competitive markets is the production of similar but differentiated products in the market. In analyzing the effects of trade policies under the differentiation of products in terms of varieties, three conventional models are used: Falvey neo-Heckscher-Ohlin Model, the Krugman neo-Chamberlinian model, and the Lancaster neo-Hotelling model.

The Falvey Neo-Heckscher-Ohlin Model was proposed by Falvey (1981). It assumes the existence of two homogenous factors of production in two distinct sectors from two different countries (A and B). Labor may be movable, but capital has a sector-specific focus. The quality of manufactured product X serves as the foundation for differentiation. According to Södersten and Reed (1994), this is a vertical differentiation of products. Country A (assumed to be capital-rich) produces and exports higher-quality goods to Country B (assumed to be labor-rich). If A applies a tax on low-quality goods from B, imports of variants near the marginal quality may stop and be replaced by domestic variants (Södersten & Reed, 1994). However, because B's production costs might still be low, the A varieties that were replaced in A might not be exported to B. Imposing the tariff implies that both of the interested countries will generate a diversity of qualities, indicating that there will also be a variety of non-traded qualities. The tariff signifies that the newly produced quality in A will cost the same as B's imports when the tariff is included in the pricing. In general, governments may utilize tariffs to enhance the number of types produced by their domestic industry when such markets are present in trade (Södersten & Reed, 1994).

The Krugman neo-Chamberlinian model assumes horizontal product diversification, in contrast to the Falvey model. Krugman first put it up in 1979. When variations differ in terms of their attributes, differentiation of this kind happens. The features may be perceived, such as a product's taste, such as the flavor of wine, or they may be actual, like a product's color (Södersten & Reed, 1994). The model presupposes that there is only one factor of production—labor—and that

numerous firms are creating various, distinctive versions of the same good. Since the product's output is fixed at k, consumers buy 1/2k of each type. It is assumed that half of the good is domestically produced and half of it is imported. If one of the nations imposes a tariff that is not exorbitant, it will encourage the home consumer to consume more locally produced items and reduce the number of imports. However, the introduction of the tariffs will have no impact on the number of types and outputs produced in any nation. Because the price of imported varieties has increased, consumers in the importing nation would suffer because they will no longer be in a position to maximize their utility (Södersten & Reed, 1994).

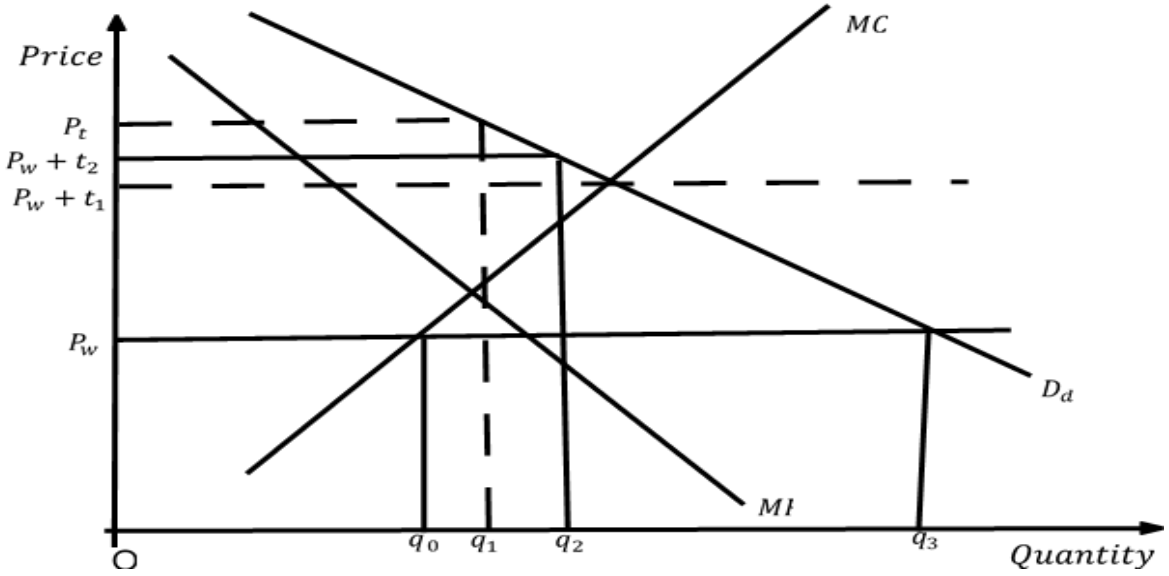
The Lancaster neo-Hotelling models expand on the consumer behavior methodology. Lancaster advocated the model in 1980. Products are separated horizontally based on the features that each type of product embodies. It is considered that the firms producing these products are the same. Two firms operating in a free-trade environment would each create half of the available variety while importing the other half (Södersten & Reed, 1994). However, the model does not specify which variety will be produced domestically and which will be imported, thus making it difficult to predict the impact of a tariff. To address this difficulty, Södersten & Reed (1994) consider two extreme cases. One of the cases is where the variety produced by country A is interleaved with those in B, such that if A produces 1, 3, 5, then B produces 2, 4, 6. The second case is where one of the countries produces one end of the goods' spectrum, and the other country produces the rest. Considering the first case, an imposition of a tariff will raise the imported variety's price, causing some consumers to shift to the domestic variety. The growth in domestic product demand boosts domestic firms' profits, luring new competitors. The supply of the variety will eventually expand, regardless of whether the new competitors are domestic or international. If output increases, this implies lower costs, and the price of domestically produced variety drops as a result of the tariff (Södersten & Reed, 1994). The two nearby types would be the only ones that could be substituted in the second scenario. Given that consumers are spending to the extremes, the number of businesses that would expand as a result of appealing prices would be low. Because they will spend more money and consume fewer variations, import variety consumers will suffer.

2.7.2.2 Monopolies

Cost increases, export promotion, and snatching rent from a foreign monopoly are all strategies used to safeguard a monopoly. With the implementation of a tariff, prices will react differently to these strategies. A government may introduce a tariff to protect a single domestic producer who

could either be exporting or producing only for the local market. The tariff's impacts on the two scenarios differ from one another. In the case of a monopoly manufacturing for the home market and being unable to export, the impact of the tariff will differ depending on the tariff level. While high levels will offer the producer some market leverage, low tariffs will encourage domestic producers to increase production (Södersten & Reed, 1994). This case is illustrated in figure 2.2:

Figure 2.2: Tariff protecting a monopoly

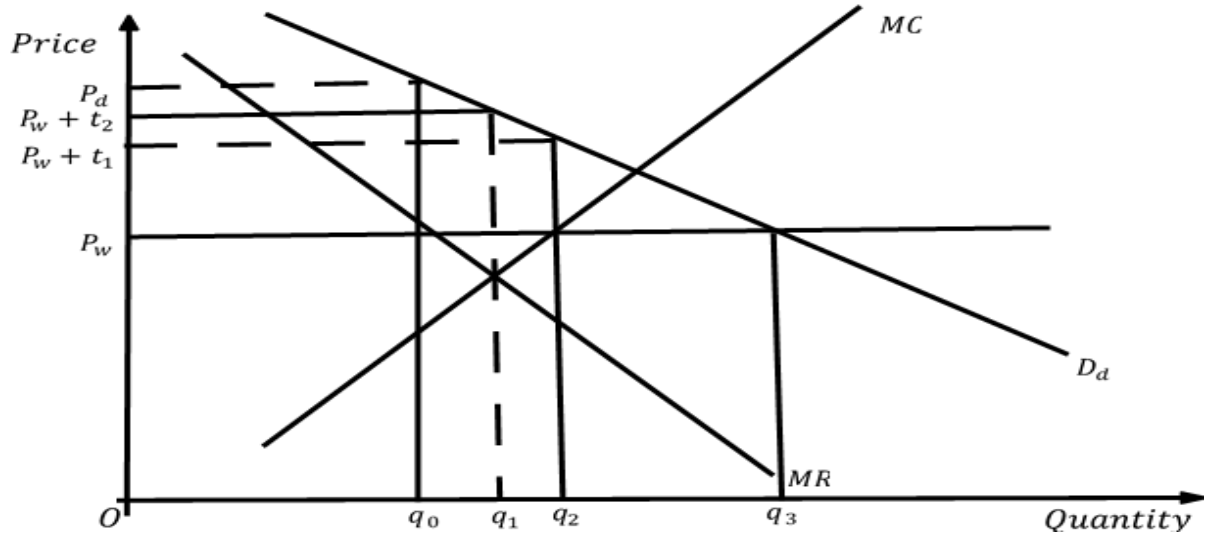


Source: Adopted from Södersten and Reed (1994)

P_w is the world price, MR and MC are marginal revenue and marginal costs of the monopoly, D_d is domestic demand. Assuming the government imposes a tariff t_1, on its imports, the domestic producer would increase production. At the price, $P_w + t_1$, the monopoly is a price-taker. Thus, an attempt to increase prices beyond this point by the monopoly would induce imports. If tariffs were further increased to t_2, the monopoly would receive market power since it will sell at $P_w + t_2$. However, it again cannot increase its price beyond this point since it will induce imports. If tariffs are again increased beyond t_2, the domestic producer's profit would increase up to a point where the domestic tariff-inclusive price is P_x at which point the level of tariff the monopoly enjoys is the same as that under autarky. Any further increase in tariffs beyond this point would not change this state of affairs (Södersten & Reed, 1994).

A low tariff again expands domestic production for a monopolist producing for domestic consumption and exports. A higher tariff does the same thing, giving the home producer monopoly power and raising profits by lowering output (Södersten & Reed, 1994). This scenario however will be the case up to a certain point in the tariff (t_k), where a further increase would induce the domestic producer to export, as seen in figure 2.3 below:

Figure 2.3: Tariffs that encourage a monopoly to export



Source: Adopted from Södersten and Reed (1994)

The notation is the same as those in figure 2.2; the main difference for this case is that the intersection of the marginal curve and marginal revenue lies below the world price. Suppose the tariff imposed increases the domestic price to p_d, then the firm will produce q_1 where MC intersects with MR, but now only sell q_0 on the domestic market and export the rest. Any increase of a tariff beyond this point would just increase domestic prices further. However, the producer will still produce the same amount q_1 and export a higher proportion. Thus, the tariff in this case only acts as a stimulant for exports.

The government might notice that a foreign firm manufacturing in the domestic market is returning a lot of profit to its own country in the scenario of snatching rents from a monopoly. Therefore, finding a way to maintain at least some of those rents or "snatching" them from the foreign producer may be in the best interest of the home country (Södersten & Reed, 1994). The cost of imports for the monopoly will increase if the government imposes a tax. If the monopoly

determines it wants to maximize profits, it will then react by selling fewer units at higher prices. The price rise will be smaller than the tariff's value if the demand curve is linear. Therefore, the compensation that a monopoly would want to obtain by increasing the prices would be less than what it would have lost to the government through the tariff.

2.7.2.3 Oligopolies

In analyzing the impact of tariffs on prices under an oligopoly, the classical illustration used is one of the duopolies. Two similar firms operating in two different countries will always operate under a strategic move. If one firm produces more and persuades the other firm that this additional output would be maintained, it may enhance its profits. According to Södersten and Reed (1994) doing so can lead the rival firm to produce less. Tariffs may provide a different way to transfer income if these firms compete in one other's home markets. The firm's profits in the other country will decrease if the government in one of the countries applies an import tariff. In this case, the tariff plays the role of shifting profits from the foreign firm. The analysis of this impact follows the same line as that of "rent-snatching" in the case of a monopoly, only that this scenario is profit shifting from the foreign firm to the domestic firm. The conclusion of tariffs and markets operating under an oligopoly setup is that an appropriate tax may improve domestic welfare.

2.8. Empirical Literature Review

The empirical work on tariff pass-through can be categorized into micro and macro-level studies. The micro-level studies-known as the Deaton (1989b) approach- rely on household surveys that report household expenditure and quantity consumed data. The data is used to compute proxies for domestic prices and then estimate the impact of tariff changes on these prices. Macro-level studies use consumer price indices over the years and compute the pass-through elasticity. However, the data suffer from the problem of aggregation. It may not reflect the actual changes in the prices faced by households. Given the availability of the 2005 and 2015 KIHBS, this study adopts the first approach to figure out how prices faced by households are affected by import tariffs. The bulk of the literature reviewed in this study is based on the micro approach of analyzing tariff-pass through that was proposed by Deaton (1989b).

Porto (2006) is among the first studies to adopt the Deaton (1989b) approach. The study estimated the responses of prices for both tradable and non-tradable goods to tariff changes. The study found

no impact on tariff changes. Nicita (2009) and Marchand (2012) however, later questioned these findings. The results were criticized because the study assumed a complete pass-through of tariffs to domestic prices. Notably, Nicita (2009) argues that market imperfections and high trade costs may influence how trade policies affect domestic prices.

Nicita (2009) extended the work of Porto (2006) by allowing markets to be imperfect and, as such, an incomplete pass-through effect of import tariffs on domestic prices. The study was conducted on households in Mexico. The study concentrated on the price transmission mechanism since, in low-income countries like Mexico, local markets are poorly integrated and may be subjected to high transaction costs (Nicita, 2009). The study found that the country's region and the destination of the product were essential for the pass-through effect. In particular, products from southern regions, like fruits and vegetables, had a significant tariff pass-through. This was explained by the fact that many exports from Central American countries to Mexico were fruits and vegetables. Cereals had a high pass-through in the northern region since they came from the United States, which borders Mexico in the north. The variable distance had mixed results. The pass-through effect of a tariff on prices for several products like oil was found to respond to distance, while others like cereals did not. Other factors contributing to the pass-through effects were partial government control, which affected the sugar sector, causing a pass-through effect of 26%. In summary, the study found that manufacturing goods were more responsive to tariff changes. However, those from the agricultural sector were less responsive and, in some cases, had no response to tariff changes. Most agricultural products were still highly protected by these policies as a result of tariff and non-tariff barriers.

Marchand (2012) extended the work of Porto (2006) and Nicita (2009) further to include both the traded and non-traded sectors. The author estimated a consumption effect that linked the tariff reduction to a given commodity's expenditure share. The study showed that the rural-area pass-through of tariffs to domestic prices was between 33% and 49%. However, when time trends were excluded from the model, the effects were observed to be lower. The main implication of the results was that in rural areas, prices tended to decrease more slowly. Removing the time trends led to slightly lower estimates for urban areas. It was observed that the pass-through rate was high in urban areas, ranging from 64 to 68%. This implies that urban households were more affected by tariff reductions. The study showed that higher transmission elasticity in urban areas was observed

to arise from better access to imported goods. This was due to the quality of transport infrastructure and road quality. Another finding was that states that were near the ports of entry benefited significantly from tariff reductions both for rural and urban dwellers.

Recent empirical research has usually indicated that decreases in import tariff rates may reduce domestic costs if markets can transmit the price changes from the border to consumers, following the micro-level frameworks of Deaton (1989b), Porto (2006), Nicita (2009), Marchand (2012) and Han, Liu, Marchand, & Zhang (2016). For instance, the costs of commodities subject to tariffs imposed by the Donald Trump administration in the US increased significantly (Amiti et al., 2019; Cavallo, Gopinath, Neiman, & Tang, 2021; Fajgelbaum & Khandelwal, 2022; Flaaen, Hortaçsu, & Tintelnot, 2020). However, before this, consumer prices had substantially fallen due to increased trade with China (Jaravel & Sager, 2019). Nevertheless, the US like many other advanced countries shows a greater response to trade policies compared to developing countries due to their lesser degree of market imperfections. Markets can transmit pricing adjustments from across borders to customers in this situation. Some of the significant pass-through effects are through the intermediate inputs used in the production of consumer goods (Bond, 2021).

Levels of market competition are important for the pass-through effects of taxes on domestic prices (Bajo-Buenestado & Borrella-Mas, 2022). However, many markets in developing nations exhibit uneven levels of competition. In addition, markets in underdeveloped nations frequently have high internal transportation costs because of inadequate infrastructure and chains of middlemen that are frequently not fully competitive (Atkin & Khandelwal, 2020). If domestic sectors are not perfectly competitive, profit margins or markups may be able to offset changes in tariffs (Campa & Goldberg, 2005). In this scenario, consumers only benefit in a minor way from the reduction of international trade barriers (Atkin & Donaldson, 2015). Most of the gains are taken by intermediaries, who are traders with the potential for market power. Therefore, even in the absence of other market frictions, consumer prices might not fall enough to fully reflect the magnitude of tariff reductions.

Market structure is critical for the pass-through effect of tariffs on consumers. A market that is heavily regulated would distort the pass-through effects (Engel, Kokas, Lopez-Acevedo, & Maliszewska, 2021). Sugar and maize in Kenya face a high level of regulation in terms of

protection, resulting in no price competition on the market. Furthermore, due to the level of protection against competition from more productive farmers, the sugar industry in Kenya can maintain its low level of competitiveness. The study shows that Kenyan wholesale prices for sugar are on average 149% above international wholesale prices. Value Added Tax (VAT), the sugar development levy (SDL), international shipping, port clearing-related fees, and inland transportation are all included in this pricing (Argent & Begazo, 2015). The study showed that removing these barriers would result in a reduction in Kenyan prices by 28%.

The uneven pass-through of tariff reductions to domestic prices is also strongly attributed to the market strength of intermediaries in the domestic market. Melo, Moita, & Sunao (2021) emphasizes the important role of market power on pass-through effects, where retailers are usually the ones who place a high degree of market power. Market-dominant traders can decide that it is more beneficial to absorb some of the price effects rather than allowing tariff reductions to fully reflect in pricing. An experimental study of Kenya by Bergquist and Dinerstein (2020) shows that in the country, there are high degrees of intermediary market power. In such a scenario, traders use their market dominance to pay farmers below-competitive prices while charging consumers above-competitive rates. The study found that consumers only enjoy 18% of the total surplus while intermediaries reap 72%. In addition, if traders priced at cost, then the total surplus would increase by 56%.

According to Atkin and Donaldson (2015), the benefits of loosening trade barriers for consumers in Nigeria and Ethiopia were marginal at most. Most of the gains are taken in by intermediaries with the potential for market power. Their percentage is considerably larger in remote areas, indicating that consumers in those areas only benefit in part from the reduction of trade barriers. Tariffs are only partially reflected in changes in retail pricing in Tunisia, with an average pass-through of 10% (Baghdadi, Kruse, & Martínez-zarzoso, 2015). Government distortions resulting from market interventions such as price controls, subsidies, taxes, and entry obstacles are blamed for partial transmission.

In other developing nations, there has also been evidence of minimal or nonexistent pass-through because of market imperfections. According to De Loecker, Goldberg, Khandelwal, and Pavcnik (2016), trade liberalization led to a 10% decrease in domestic pricing in India. This slight price

decrease was attributed to cost savings that were only partially passed on to the final product price. Costs weren't fully passed through, which suggested that markups were increasing. Significant differences in markups between firms and over time suggested that producers in the country profited more than consumers. Additionally, cheaper input tariffs increased the variety of home products produced by Indian firms. Reduced input tariffs made imported goods more accessible, which resulted in lower output prices (De Loecker et al., 2016). A worldwide-level study by Hayakawa and Ito (2015) showed that tariff reduction through RTA induced a higher tariff pass-through in the sense of a higher price for exporters than through the Most Favored Nation (MFN) tariff reduction. On average, the average tariff pass-through for RTAs was 72%, while MFN was 28%. Other factors like product differentiation and differences in country pairs' income levels had a significant influence on tariff pass-through for RTAs.

In terms of other factors that cause incomplete pass-through, intra-national costs have also been observed to be significant. Intra-national trade costs separate consumers from ports or borders (Atkin & Donaldson, 2015). If local prices are high, even a large increase in the price of an imported factor of production may have a minimal impact on marginal costs (Nakamura & Zerom, 2010). Thus, the benefits of declining global trade may only be partially felt by consumers. For instance, Atkin and Donaldson (2015) found that trade expenses brought on by distance were 4–5 times greater in Ethiopia and Nigeria. This suggests that customers pay a higher price per unit for imported items.

One of the factors affecting the implementation of trade policy has been identified as the practice of bribery at ports of entry in developing countries to avoid paying taxes (Atkin & Khandelwal, 2020). In the presence of tariff evasion, efforts to target industries using tariffs as a form of industrial policy may be ineffective. Trade elasticity in terms of changes in trade volume with tariffs has been observed to be low in developing countries. This has mainly been attributed to tariff evasion (Sequeira, 2016). In Mozambique, the estimate of trade elasticity was 0.1, which is quite small compared to developed–country estimates (Sequeira, 2016). The fact that firms were previously evading tariffs by paying bribes is significant because it shows how little trade volumes changed when the country decreased tariffs. The low pass-through is linked to corruption and bribe-taking. According to the study, even tiny bribes will dramatically lessen the effects of tariff

liberalization in settings where widespread corruption is present. Tariffs would have a relatively small impact on domestic prices under these conditions.

The market structure, in terms of private and public ownership, is also significant for the pass-through effect of tariffs on consumers. The presence of heavy government regulation would distort the pass-through effects. Engel et al. (2021) focus on the differences in the market structure in China when analyzing the pass-through effect of tariffs on consumer prices. The analysis expressly allows for variations in pass-through elasticity among cities with different privatization levels. To measure the shift in market structure in China, the size of the private sector is used. An imperfect pass-through effect is observed. According to the data, China's consumer prices decreased by 2.9% as a result of a 10% fall in import duties. The pass-through effect was significantly influenced by the size of the private sector relative to other sectors in the city. Importantly, the analysis demonstrates that a region with a larger private sector on average has a higher pass-through rate than one with a largely state-owned economy. Overly controlled domestic industries may slow pass-through to consumers, whereas a more competitive private sector may speed this up (Engel et al., 2021).

Although market imperfections cause small or no pass-through effects in developing countries, analyzing pass-through in terms of product categories has shown potential pass-through effects. Based on separating products into agricultural and manufactured products in China, Zhu, Yu, Wang, and Elleby (2016) showed that changes in tariffs are perfectly transmitted to consumer prices in the agriculture sector. For agricultural items, the pass-through coefficient is seen to be approximately 0.8. For manufactured goods, a 10% reduction in tariff is estimated to decrease manufacturing prices by around 13 to 23%. Domestic tariff pass-through prices for agriculture and industrial products were observed to be high in Nigeria by Kareem (2018). The tariff pass-through was 74% for agriculture products, which shows a near one-to-one decrease in domestic prices due to the reduction of import tariffs. The study also noted that the pass-through was high for regions near borders, which implied low trade costs. Nonetheless, internal domestic factors would tend to influence the level of tariff pass-through either upwards or downwards.

Finally, analyzing the tariff-pass though trade prices at a worldwide level using 71 importers and 169 exporters, Hayakawa, Ito, & Mukunoki (2022) find that tariff reduction decreases trade prices.

The study shows that a one-percentage-point reduction in tariffs decreases trade prices by approximately 0.1%. Their study shows that a one-percentage-point tariff reduction increases quality-adjusted trade prices by more than 1%, which is an indication that trade liberalization increases quality-adjusted consumer prices.

2.9. Summary of the reviewed literature and research gap

Theoretical literature analyzed the effects of tariffs on prices by classifying markets into different types. Under perfectly competitive markets, a country can be regarded as a small or large country. The full tariff amount will be passed through to the consumer in a small country, which Deaton (1989b) refers to as a complete pass-through. With imperfectly competitive markets, no country is small and tariffs are not entirely passed through. The way that tariffs affect pricing depends on several variables. The factors depend on the type of imperfect market. For monopolistic competitive markets, product differentiation and consumer behavior influence the pass-through effect. For monopolies, the tariff will affect prices based on the initial reason for the imposition of a tariff. The main reasons are the protection of a single domestic producer from increasing costs, stimulating exports, and snatching rent from a foreign monopoly. Finally, for oligopolies, the effect of tariffs on prices will highly depend on the strategic behavior of firms, both in the importing and exporting countries.

According to empirical research, there is hardly any tariff pass-through to domestic prices for products that are substantially protected by tariffs, such as those in the agricultural sector. Goods exhibiting less protection, such as those in the manufacturing sector exhibit slightly higher pass-through. In comparison to urban areas, it has been found that pass-through is lower in rural areas. Developed countries report high tariff pass-through values compared to developing countries. In fact, in most developing countries, an incomplete pass-through is observed. The main reasons for incomplete pass-through of tariffs vary depending on the country of study. However, the underlying reasons across the studies are market imperfections. These imperfections are either caused by intermediary market power (Bergquist & Dinerstein, 2020) market regulations (Engel et al., 2021), or domestic costs (Atkin & Donaldson, 2015).

In Kenya, the degree of intermediary market power is very high as illustrated by Bergquist and Dinerstein (2020). The study shows that consumers only enjoy 18% of the trade surplus while

intermediaries enjoy 72%. With this high degree of market power, the reduction of tariffs may not have a significant impact. However, the experimental study of Bergquist and Dinerstein (2020) only focused on a few products in the agricultural market. As such, these findings may not reflect on the entire market in the country. Further, the period covered by that study is only a short period; in that case, the findings could be attributed to circumstances existing only in that period. Nevertheless, the study helps to show the behavior of market agents in the country. This study complements the work of Bergquist and Dinerstein (2020) by observing the effect of a trade policy over a relatively long period, a large number of products consumed by households and different segments of the country.

2.10. Theoretical Framework

Firms are the ones involved in most of the trade between countries. Specifically in Kenya, identified and verified firms are the ones that secure licenses from the government for importation. How a tariff affects domestic prices faced by consumers depends on how firms respond to these tariffs. They can either absorb the tariffs in their markups or transmit them to prices faced by consumers. Imperfect markets characterize developing countries due to high transaction costs and minimal market integration. Thus, to analyze consistently the effect of a tariff on Kenya's domestic prices, this study considers pricing under an imperfectly competitive market. The import tariff pass-through 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 adopts an approach that involves assessing both exchange and tariff rates' effects on domestic prices. As Pompelli and Pick (1990) note, the tariff pass-through effect may be expected to be positive and following exchange rate pass-through, but the two effects on prices are not restricted to be equal. The derivation of the pass-through framework adopted in this study borrows from Pompelli and Pick (1990) and Feenstra (1995). A foreign firm exporting to a domestic country (Kenya) is assumed to face an import demand function of the form:

$$D = q(p^*, x) \tag{2.1}$$

Where q, is the amount of the commodity consumed domestically, p^* is the price of imports, and x are other variables assumed to be exogenous to the foreign firm. The cost of the domestic variety

and consumer income in the importing country are two examples of exogenous variables. The same firm is assumed to have a cost function that is homogeneous of degree one in factor prices:

$$C = f(q), m \tag{2.2}$$

Where m denotes a vector of aggregate factor prices in foreign currency. Assuming an imperfectly competitive industry, the firm's profit maximization problem is given by:

$$Max\ [sp^*q(p^*, x) - f(q), m] \tag{2.3}$$

Where s, is the Kenya/US[4] dollar exchange rate, the first term is the total revenue function obtained by multiplying price and quantity. Under maximum profit conditions, marginal revenue is equal to marginal cost, thus:

$$MC(q) = f'(q)m = sp^*\left[1 - \frac{1}{|\epsilon(q)|}\right] = MR(q) \tag{2.4}$$

Where $MR(q)$ is marginal revenue and $\epsilon(q) = -(\frac{dq}{dp^*})(\frac{p^*}{q})$, is the elasticity of import demand. Marginal cost $MC(q)$ in equation (2.4) can be re-written as:

$$sp^* = \frac{f'(q)m}{k} \quad Where\ k = \left[1 - \frac{1}{|\epsilon(q)|}\right] \tag{2.5}$$

Equation (2.5) 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 the imports implies that the import price changes by the amount of the tariff such that;

$$p^d = \gamma sp^*(1 + \tau) = \gamma \frac{f'(q)m}{k}(1 + \tau) \tag{2.6}$$

p^d is the domestic price of imports after the imposition of an import tariff; γ is a markup ($\gamma = 1 + \varphi$) imposed by the foreign firms, with φ being the profit margin (Nicita, 2009). The tariff may be internalized by the markup or may be passed through to domestic prices. In estimating the markup, the study follows the approach of Pompelli and Pick (1990), where it is assumed to represent competitive pressures in the domestic and foreign markets. It is thus the ratio between

[4] Other currencies can as well be used since Kenya imports from various countries. However, for simplicity in this case, the assumption is that Kenya only trades with foreign firms using the US dollar as the benchmark foreign currency.

the prices of an import-competing good p^c domestically, and the foreign cost of the import c. Foreign cost, in this case, is the import price at the border times the tariff;

$$c = \frac{f'(q)m}{k}(1+\tau) = sp^*(1+\tau) \tag{2.7}$$

The markup, therefore, is given by;

$$\gamma = \left[\frac{p^c}{sp^*(1+\tau)}\right]^\theta, and\ 0 \le \theta \le 1 \tag{2.8}$$

θ is a parameter that shows the level of competition between imported and domestic product varieties. For example, if $\theta = 0$ then the price of the imported variety and the price of the domestic variety are equal, and thus, the imported variety will not be sold profitably in the domestic market. Substituting equation (2.8) on (2.6), the model yields:

$$p^d = \left[\frac{p^c}{sp^*(1+\tau)}\right]^\theta sp^*(1+\tau) \equiv \left[\frac{p^c}{\frac{f'(q)m}{k}(1+\tau)}\right]^\theta f'(q)m(1+\tau) \equiv \left[\frac{kp^c}{f'(q)m\ (1+\tau)}\right]^\theta f'(q)m \tag{2.9}$$

From equation (2.9), it can be observed that if there are no import-competing varieties and foreign marginal costs are constant, then the imposition of a tariff is fully passed on to the domestic price of the goods in question.

2.11. Empirical Framework

The KIHBS data does not differentiate the nature of goods that are consumed by households and specifically, goods produced locally and those imported. As such, the price can only be observed as a uniform mixture of both. Empirically, the approach followed is to focus on the aggregate effect of a tariff change to a change in the price of a good rather than the variety. Deaton (1989b), Porto (2006), Nicita (2009) and Marchand (2012) have followed this approach in literature. Further, the approach does not differentiate the goods in terms of the region they are from since the households cannot easily report this in the household surveys. Finally, since Kenya is a small country[5], its import demand is assumed to be perfectly elastic $\epsilon(q) \ge 1$. Assuming the extreme case where $\epsilon(q) = 1$, it implies from equation (2.5) that:

$$sp^* = f'(q)m \tag{2.10}$$

[5] In trade literature, this implies that Kenya cannot significantly affect world prices

Thus, equation (2.9) becomes;

$$p^d = \left[\frac{p^c}{sp^*(1+\tau)}\right]^{\theta} sp^*(1+\tau) = \left[\frac{p^c}{f(1+\tau)}\right]^{\theta} f(1+\tau) \quad (2.11)$$

Where $f = sp^*$ is the foreign price in Kenyan currency. Taking the natural logarithm of both sides of (2.11) yields:

$$ln\ ln\ p^d = \theta\ ln\ ln\ p^c + (1-\theta)\ ln\ ln\ f + (1-\theta)\ ln\ ln\ (1+\tau) \quad (2.12)$$

The term $(1-\theta)$ is the indicator for the pass-through, which shows the extent to which a percentage change in import prices and import tariffs are passed to domestic prices. The term $(1-\theta)$ may differ in both magnitudes and sign (Nicita, 2009). Thus, including subscripts for products, time, and industries, equation (2.12) may be rewritten econometrically as:

$$ln\ ln\ p^d_{ict} = \delta_0 + \delta_1\ ln\ ln\ p^c + \delta_2\ ln\ ln\ p^*_{it} + \delta_3\ ln\ ln\ s_{it} + \delta_4\ ln\ ln\ (1+\tau_{it}) + \gamma_{jt} + \varphi_c + \mu_t + \varepsilon_{ict} \quad (2.13)$$

Where p^d_{ict} is domestic price of good i in the county c at a time t, p^*_{it} is 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 to be domestic demand for domestic prices. This study uses the county population as a proxy for domestic demand for domestic prices. The populations are disaggregated into rural and urban populations. Income would have been an ideal control variable for demand, however, in the model, it is an endogenous variable since variables left of the error term are likely to influence income. A susceptible example would be the price of non-tradable goods and the price of services. Thus, to capture the effect of demand on domestic prices, the population in rural and urban areas is used as the proxy for income. The term γ_{jt} represents the industry-specific trends, φ_c represents county fixed effects, μ_t represents time-fixed effects and ε_{ict} is an independent and identically distributed (*IID*) error term. The time-fixed effects control for the time-specific effects that are common to all 47 counties. For instance, other trade costs do not vary with types of products and technology advancements. Industry-specific trends control for the movements in producer costs that are associated with changes in input costs or production technology. Equation (2.13) is estimated separately for both rural and urban areas. To explore the effects of import tariffs on agricultural products against manufactured products, equation (2.13) is modified to be of the form:

$$ln\ ln\ p_{ict}^{d} = \delta_0 + \delta_1\ ln\ ln\ p^{c} + \delta_2\ ln\ ln\ p_{it}^{*} + \delta_3\ ln\ ln\ s_{it} + \delta_4\ ln\ ln\ (1+\tau_{it}) + \vartheta_{rt} + \theta_c + \mu_t + \varepsilon_{ict} \quad (2.14)$$

The variables are the same, except for the term ϑ_{rt}, which represents the residence-specific trends and θ_c which represent product category fixed effects. Residence in the analysis is taken to imply rural against urban. Thus, trends could range from patterns of migration to market segregation effects. Product category fixed effects are included to capture effects that may arise due to the specification of the product groups. The equation is first estimated for agricultural products, followed by manufactured products, and finally by 10 product categories.

2.12. Data types and sources

This study uses data from the two household budget surveys in Kenya (KIHBS 2005/2006 and KIHBS 2015/2016) and matches it with tariff data from World Integrated Trade Solutions (WITS). Data for products in the surveys are reported as final goods. For example; milk, maize, or wheat. While in WITS, they are disaggregated in a Harmonized System. For example, milk is in the form: Milk and cream are available in two varieties: non-concentrated milk and cream (HS 0401) and concentrated milk and cream (HS 0402) that contains added sugar or other sweeteners (HS 0402). Thus, 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.

Import tariffs used, are computed as follows: $\tau_{it} = \frac{\sum_i t_i I_i}{\sum_i I_i}$. Where t_i is the Ad Valorem tariff of good i in WITS and I_i is the import volume of that good. This ensures the weighting of the tariffs on their respective imports. Some products in the KIHBS are averaged to form one single representative product, for example, maize flour in the KIHBS 2015/2016, is computed by getting the average of maize flour loose (code 00108, maize flour sifted (code 00110), and fortified maize flour (00111). The list of product aggregation is shown in appendix 8. Averaging these product groups together and matching them with tariff data from WITS resulted in the formation of 110 products. Out of these, 50 are agricultural while 60 are manufactured. Agricultural products were further subdivided into, cereals, meat, and dairy products, vegetables and fruits, and beverages and tobacco. Manufactured products were also subdivided into garments and footwear, food accompaniments, household equipment, chemicals, stationeries, and furniture.

It is not possible to follow the same households from the 2005 survey to 2015. This panel data involving individuals may not be feasible. Nonetheless, a methodology proposed by Deaton (1989b) can be feasible, where a group of individuals called cohorts that share the same time-invariant characteristics or are in the same setup can be followed over time. Households for this study are categorized in terms of rural and urban households. Under these broad categories, variations in domestic prices are observed. The two surveys report expenditures and physical quantities purchased by households. If they two are divided, one obtains unit values that proxy domestic price (Marchand, 2012).

The unit values (domestic prices) obtained depend on actual market prices and, as such, are an indicator of spatial variation in prices across the country (Deaton, 1988). To control for inflationary factors, the unit values were adjusted to real values using the Consumer Price Indices for 2005 and 2015. To reduce measurement errors the prices used for analysis were median prices rather than average prices. Median prices are less affected by outliers compared to mean prices (Deaton, 1989a). The process of selection of the median price was done in two steps. The first step involved picking a median price amongst the 10 households in a cluster. The second step involved picking median prices from the clusters in each of the 47 counties. The segregation of households in terms of rural or urban was done after prices were selected. This was mainly to minimize sample selection bias. The analysis was conducted for all 47 counties in the country.

Foreign price is computed by dividing the number of imports by the value of the imports. Data on foreign prices are obtained from the United Nations Common Format for Transient Data Exchange for power systems (UN COMTRADE) and the International Trade Center (ITC). Matching foreign prices to domestic prices follows a similar approach to tariffs, where averages of products reported in the HS (4 digits) system are used. Exchange rates are official year average exchange rate values reported on the Central Bank of Kenya (CBK) website. The population is the average yearly nominal population value reported in the Kenyan Abstracts. A summary of the variables is shown in table 2.2:

Table 2.2: Summary of the Variables used in the analysis.

Variable	Description	Source

Import tariffs	Obtained by weighing Ad Valorem tariff against import volumes.	WITS
Domestic Price	The ratio of the amount in Kenya shillings spent on the purchase of the commodity with the amount purchased.	KIHBS
Foreign Price	Computed by dividing the import amount by the import value of the good.	ITC and COMTRADE
Exchange rates	Official Annual US Dollar/Kenya Shillings exchange rates	CBK
Population	Official population estimates are reported in government records.	Kenya Statistical Abstracts 2005 and 2015
Industry	Dummy variable for the type of goods, with 1 = Agricultural goods and 0 = manufactured goods	KIHBS
Border	Borders counties in relation to the EAC. It a Multinomial variable where 1 = EAC-borders, 2 = Non-EAC borders, 3 = Non borders, and 4 = Major cities	Kenya Statistical Abstracts 2005 and 2015

Source: Author's description.

2.13. Descriptive statistics

On average domestic prices of the products were higher in 2015 compared to 2005 as seen in table 2.2. The exception was cereals and food accompaniments. Foreign prices are also higher in 2015 compared to 2005 except for garments, furniture, vegetables, and fruits. For the two periods, domestic prices of beverages, cereals, food accompaniments, and furniture are generally higher than foreign prices in the two periods of the study. Foreign prices for vegetables and fruits, meat and dairy, garments, stationaries, household equipment, and chemical are generally higher than domestic prices. The differences in prices confirm the presence of prices arbitrage where, $p^d - p^* \neq 0$. Thus, a confirmation of the existence of trade and non-trade barriers that causes the differences in domestic and foreign prices. One of the potential trade barriers is trade costs like import tariffs.

Table 2.3: Average prices of product categories

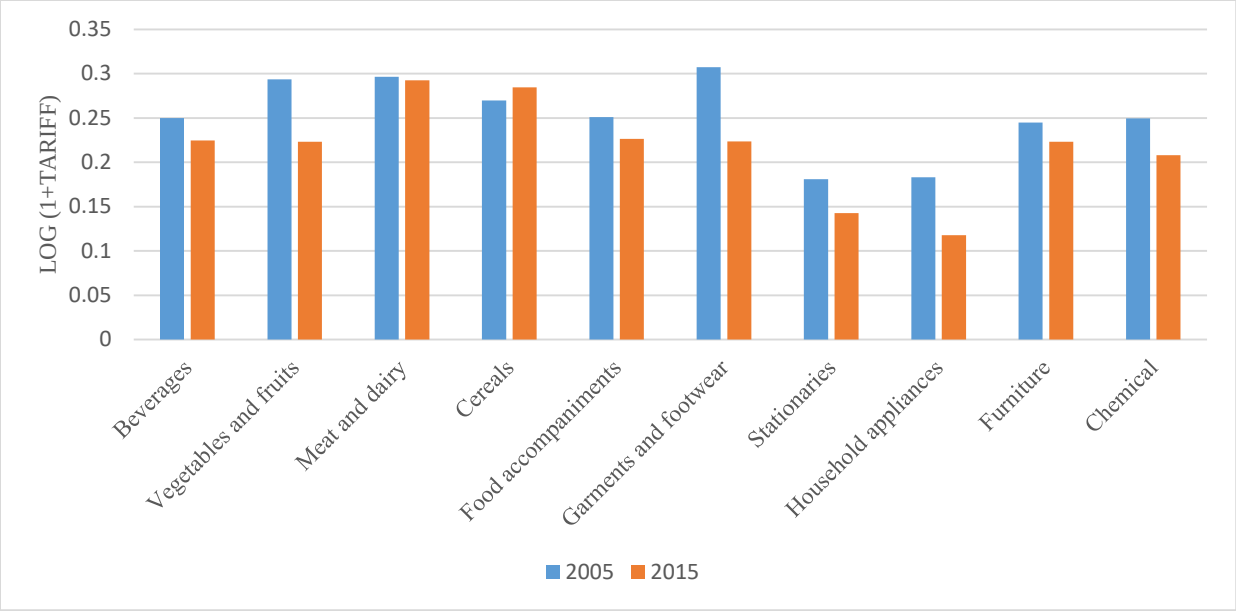
	Domestic prices (p^d)	Foreign prices (p^*)	$p^d - p^*$	Domestic prices (p^d)	Foreign prices (p^*)	$p^d - p^*$
	2005	2005		2015	2015	
			Agricultural products			
Beverages	5.006	4.948	0.058	5.593	5.515	0.078
Vegetables and fruits	2.795	3.932	-1.137	3.792	3.823	-0.031
Meat and dairy	4.391	5.173	-0.782	5.096	5.385	-0.289
Cereals	4.166	3.294	0.872	4.138	3.954	0.184
			Manufactured products			
Food accompaniments	5.123	4.05	1.073	4.886	4.327	0.559
Garments	5.462	7.127	-1.665	5.824	6.043	-0.219
Stationeries	3.519	4.977	-1.458	4.122	5.096	-0.974
Household equipment	3.693	6.333	-2.64	4.969	7.188	-2.219
Furniture	5.942	5.378	0.564	6.528	5.357	1.171
Chemical	1.752	4.685	-2.933	3.837	5.447	-1.61

Source: Author's computations

There is no significant variation in domestic prices in terms of counties for the two years as seen in appendix 6. In both 2005 and 2015, the highest average prices were observed in Nairobi, the capital city of Kenya. This generally shows that products are generally more expensive in the capital city compared to other counties in the country.

As expected, high import tariffs were observed on agricultural products as compared to manufactured products. This is seen in figure 2.4. However, there was a general decline in the tariffs for the two periods for almost all the product categories. An exception is cereals, meat, dairy products, furniture, and food accompaniments. There was a significant decrease in tariffs on garments, footwear, vegetables, and fruits. Figure 2.4, shows that, although the EAC-CET saw a reduction of import tariffs for many products, on average, the magnitude of the reduction was not very large since many products are still highly protected. In terms of industries, manufactured goods are observed to have experienced a higher reduction in import tariffs compared to agricultural goods.

Figure 2.2: Average changes in import tariffs between 2005 and 2015



Source: Author's computations with the available data

The country's agricultural sector is highly protected; several agricultural products like rice, sorghum, millet, fish, coconut, coffee, and tea saw their tariffs rise by over 50% for the two periods. Rice experienced an increase in import tariffs of 114% which is a reflection of its high level of protection. This is expected in a developing country like Kenya. Kenya tends to highly protect its agricultural sector to promote domestic production and cushion domestic producers against cheaper imports and fluctuations in domestic prices. Some products, like radios and cellular phones, received complete liberalization while others like bags and belts did not experience any change in import tariffs. Remarkably, quite many products consumed by households are final goods. The large number of products whose tariffs are bound by the 25% tariff band illustrates this.

Generally, there is a variation in import tariffs between and within agricultural and manufactured goods. For the other independent variables, a within, between, and overall variation analysis was conducted. The results are shown in appendix 5. Generally, all the variables of interest had significant variations as compared to within. In terms of magnitudes, more significant variations were observed in domestic prices. This implies that there was a lot of variation in the prices of commodities used. This was expected since it was a combination of agricultural products whose prices are relatively lower compared to some manufactured goods whose prices were relatively

large. Foreign prices also had a considerable variation implying the prices of imports varied with the type of products. Tariffs of the products did not show much variation. An implication is that, on average, tariffs imposed on products under the EAC-CET are the same. The higher variations imply that the products used in the analysis had unique features. In empirical estimation, this would imply that the observations would not have the same variance. Thus, there was a need to test for heteroscedasticity. We used the Breush-Pagan test for this. It was done in Stata software using the command xtest3. The command calculates a modified Wald statistic for group-wise heteroscedasticity in the residuals of a fixed-effect regression model. In each case, the reported p-value was 1.000 as shown in appendix 13. A p-value of 1.000 suggests that there is no evidence to reject the null hypothesis of no serial correlation or panel-level heteroscedasticity. Similarly, a chi-square value of 0.00 indicates that the observed test statistic is exactly zero. Combining these results, we concluded that there is no presence of serial correlation or panel-level heteroscedasticity in the panel data.

2.14. Empirical results and discussion

Panel data was used for empirical analysis. Thus, diagnostic tests were first conducted to verify which model to use between pooled OLS, Fixed, and Random effects. A Breusch-Pagan LM test was conducted to test whether to use a random effects model or a pooled OLS model. The null hypothesis for the LM test is that the variance of the random effect is zero $Var[\mu_i] = 0$, and thus, one should run a pooled OLS. The results are shown in appendix 3 where the chi statistic has a probability that is less than 0.05. This implies rejecting the null hypothesis and hence choosing the random effects model. A Hausman test was conducted to verify which estimator to use between fixed effects and random effects. The null hypothesis for the test is that the error term u_i is uncorrelated with the independent variables X_i. The fixed-effects model is consistent under both H_0 and H_1 while the random effect model is efficient and consistent under H_0, but inconsistent under H_1. The results in appendix 4 show that in both models, the chi statistic had a p-value that is less than 0.05, implying the null hypothesis is rejected. Thus, a fixed-effect model was appropriate for the analysis. Because time-invariant factors were not included, the estimated coefficients of the fixed-effects models could not be biased.

Equation 2.14 was estimated in five different setups. Each of the models was specified based on apriori expectations based on literature. The first model (1) was the reference model which did not

control for any fixed effects while the other models were controlling for specific fixed effects to try to obtain robust findings and try to examine some of the factors that would highly affect the pass-through effects of the import tariffs to domestic prices. For the second model (2) controlling for residence effects, we were expecting from reviewed literature that rural and urban markets would not be similarly affected. This is mainly due to factors like infrastructure, industries, and integration of these markets into international markets. The expectation was that urban markets would produce robust findings compared to rural. The third model (3) controlling for year-fixed effects was controlled for both observed and unobserved variables that were different for the two periods of the study. This would encompass variables like levels of technology, cost of fuel, economic stability, and preferences of products. From the literature, some of these variables were expected to affect the pass-through effect of tariffs although not included in the pass-through equation. Thus, the third model was to help to control for these effects. For the fourth model (4), product category fixed effects were to control for observed and unobserved features that would be in specific product categories and not in others. For example, more preferences for some product varieties like domestically produced varieties would affect the pass-through effect (Nicita, 2009). Thus, this model was to control for such features. Finally model five (5) was controlling for county fixed effects. These are factors that are within counties that would affect the pass-through effects. For example, some counties are more endowed in the production of certain goods. Hence consumption would be more biased toward domestically produced goods rather than imports. This would affect the pass-through effects. Other county factors would include their distances to the borders, their cultural beliefs towards some commodities, climatic conditions, and levels of development-in terms of infrastructure. In theory, all these factors would affect the pass-through effects. As such, the last model was to distill the contributions of these factors on the pass-through effect of tariffs on prices. Table 2.3 shows the results for the regressions on agricultural and manufactured goods. The results in table 2.3 show that most of the variables of interest are statistically significant. However, since the autonomous price represented by the constant term cannot be negative, it implies that model (3) is the correctly specified model (3). Thus, the interpretation of the results is based on model (3).

Starting with the variable of interest, the pass-through coefficient for manufactured goods is close to one. This suggests that tariffs were applied almost exactly one-to-one to domestic prices of

manufactured goods. The tariff pass-through elasticity measures how much prices drop for every 1% drop in tariff rates (Marchand, 2017). The definition of the pass-through effect requires the coefficient of the term 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 a pass-through of 83.9% for manufactured goods. A similar high pass-through rate is also observed in Mexico (Nicita, 2009). This high pass-through coefficient could be attributed to three possible aspects. First, average tariffs for manufactured goods were initially lower before the EAC-CET compared to agricultural goods, and they decreased with slightly larger margins compared to agricultural products as seen in figure 2.4. This shows that the degree of openness in manufactured goods is significant, and thus the reduction of tariffs under the EAC-CET significantly contributed to a reduction in the average domestic prices of manufactured goods in the country.

The second likely explanation for the significant pass-through effect is that, as shown in appendix 2, the percentage of manufactured goods imported duty-free increased in the EAC-CET. Clothing, leather, and footwear are exceptions. These products have a small percentage of duty-free imports. On average, however, they are the ones that saw the highest reduction in tariffs by the EAC-CET as highlighted in figure 2.4. The high percentage of duty-free imports of manufactured goods is attributed to the fact that the EAC-CET introduced zero tariffs for raw materials and inputs. Finally, the significant pass-through for manufactured goods could also be attributed to the fact that most of the manufactured goods are consumed and produced in urban areas. Urban markets are more integrated with international markets. Hence, this increases the likelihood of the pass-through effect of trade policies on domestic markets (Marchand, 2012).

There is no pass-through effect on agricultural goods since the coefficient has an unexpected sign and magnitude. By definition in equations (2.13) and (2.14), the coefficient should be between 0 and 1. Several reasons could be attributed to the lack of pass-through for agricultural goods. First, levels of protection of agricultural products before and after the EAC-CET are still very high as seen in both figure 2.4 and appendix 1. Further, most of the products had either their tariffs remain the same or increase after the inception of the EAC-CET. The second reason can be attributed to the fact that the share of agricultural imports to the country is very low. This is seen in columns 4 to 6 of appendix 1. These low shares of imports are a reflection that most of the food commodities consumed in the country are domestically produced. Preferences for domestic varieties and less

reliance on imports hinder the pass-through of tariffs to domestic prices as shown by Nicita (2009). Further, according to Nicita (2009) the fact that transportation costs are high in developing countries, and local production quickly becomes more profitable, hence a lesser share of imports of agricultural goods. Han et al. (2016) point out that the average impact of tariffs would be lessened if imported varieties only made up a tiny portion of the market. This demonstrates the significance of market penetration in estimating the average impact of tariffs on commodity prices.

The third reason for incomplete pass-through could be the existence of derogations of the EAC-CET by member countries. The provision of the EAC-CU to allow members to apply for a stay of applications for various tariffs could impede the impact of tariffs on domestic prices. According to Bünder (2018), the use of unilateral exemptions by nations on a variety of heavily traded items has greatly destabilized the CET. An example of derogation is seen in dairy products in appendix 1. While the inception of the EAC-CET in 2005 resulted in a tariff reduction from 28.3% to 35.4%, revisions of tariffs by the country led the average tariff to increase to 42.5% in 2015. A similar revision is seen in cereals and sugar. Although such derogations are product specific, they also represent some of the products whose import shares are the highest.

The fourth reason for incomplete pass-through is that the virtue of many agricultural products being consumed in rural areas shows that these markets are less integrated with international markets (Marchand, 2012). Finally, the incomplete pass-through on agricultural goods could be attributed to market imperfections caused by intermediaries in the supply chain, such as middlemen or brokers. In Vietnam for example, Pavcnik (2017) shows that intermediaries were better positioned to benefit from trade policies compared to consumers. The existence of these intermediaries in the market usually causes market imperfections through an increase in levels of mark-ups (De Loecker et al., 2016). The high level of intermediary market power in Kenya, as demonstrated experimentally by Bergquist and Dinerstein (2020) inhibits the transmission of the effects of trade policy to households through the prices of commodities.

Table 2.4: Effects of the EAC-CET 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

Notes: *** p<0.01, ** p<0.05, * p<0.1 indicate statistical significance at 1%, 5%, and 10% respectively. Standard errors are in parentheses. In the first column, there is no control for any fixed effects. The second column controls for residence fixed effects, the third column controls for year fixed effects, the fourth controls for product categories fixed effects, and the fifth controls for county fixed effects.

The negative sign on the coefficient of tariff on agricultural prices could be attributed to various factors in the literature. First, it implies that agricultural goods may be subject to more competition and have lower profit margins than other types of goods. As a result, firms may be more likely to absorb the costs of tariffs on agricultural imports rather than pass them on to consumers in the form of higher prices. Secondly, it could be the case that agricultural goods may be subject to more price sensitivity among consumers than other types of goods. This means that if firms were to pass

on the full cost of tariffs on agricultural imports to consumers, demand for these goods may decrease significantly, resulting in lower sales and profits for the firms. Therefore, firms may choose to absorb some of the costs of the tariffs themselves, resulting in lower pass-through rates. Finally, the negative sign could be an indicator that the production and distribution channels for agricultural goods may be more complex and fragmented than for other types of goods. This could make it more difficult for firms to pass on the full cost of tariffs to consumers, as there may be more intermediaries involved in the process, each taking a cut of the profit.

In terms of the control variables, foreign prices, exchange rates, and population positively and significantly affect domestic prices. For agricultural and manufactured commodities, respectively, a 10% increase in foreign prices results in price increases of 3.4% and 1.9% domestically. This shows that an increase in global prices exerts a more significant positive effect on the domestic prices of agricultural goods in the country compared to manufactured goods. The magnitude of the effect of exchange rates is higher for manufactured goods compared to agricultural goods. Domestic prices of manufactured goods rose by 0.5% for a 1% increase in exchange rates. This also implies a 1% increase in the depreciation of the Kenyan shilling and 0.3% for agricultural goods. These differences in magnitude could be attributed to the fact that its mainly manufactured goods that are imported. Thus, their exposure to fluctuations in exchange rates is higher than for agricultural goods. The positive coefficients for foreign prices and exchange rates were expected theoretically. When foreign prices increase, it becomes relatively more expensive for domestic consumers to purchase imported goods. To maintain profit margins, importers may pass on a larger portion of the tariff costs to domestic consumers, resulting in a higher pass-through rate. In terms of exchange rates, changes in exchange rates can affect import prices, as a stronger domestic currency makes imports relatively cheaper, while a weaker domestic currency makes them relatively more expensive. When the exchange rate changes, importers may adjust their pricing strategies, including the pass-through of tariffs. If the domestic currency depreciates, importers might increase their pass-through rates to offset the higher import costs.

Finally, compared to agricultural items, the population coefficient for manufactured goods is higher. This demonstrates that a rise in domestic commodity demand puts more pressure on the pricing of manufactured goods than it does on agricultural goods. The positive coefficient on population theoretically also shows there is a large consumer base in the country which leads to

higher import volumes. As such, when import volumes increase, the impact of import tariffs on domestic prices becomes more significant. In the model of interest (3), the R-squared is less than 20%, implying other possible variables explain the variation of domestic prices that are not included in the study.

There is incomplete pass-through in terms of disaggregated product categories as seen in table 2.4. However, the pass-through coefficient can be detected in terms of the magnitudes by relaxing the assumptions of complete and incomplete pass-through, as in Zhu et al. (2016) and Cheong, Kwak, & Tang (2018). The magnitudes of manufactured categories are higher than agriculture categories. This shows that, in terms of tariff protection, the agricultural sector is better off than the manufacturing sector. Similar differential effects of tariffs on domestic prices between agricultural and manufactured goods are also observed in other countries like China (Zhu et al., 2016).

Table 2.5: Effects of the EAC-CET on prices of product categories

	All households	Rural	Urban	Strictly urban
Agricultural goods				
Beverages	-0.199	0.275	-0.802	-0.091
	(0.493)	(0.652)	(0.587)	(2.954)
Vegetables and fruits	-2.832**	-3.021**	-0.337	-8.333
	(1.097)	(1.192)	(1.307)	(4.161)
Meat and Dairy products	-1.329***	-1.528***	-1.154***	-0.696
	(0.254)	(0.272)	(0.351)	(0.373)
Cereals	-1.318***	-1.665***	-0.832***	-3.363**
	(0.192)	(0.218)	(0.216)	(0.121)
Manufactured Goods				
Food Accompaniments	-2.632***	-2.992***	-2.299***	-2.665
	(0.367)	(0.431)	(0.599)	(1.448)
Garments	-3.128	-5.359	-7.116	13.359
	(4.229)	(5.486)	(4.964)	(34.656)
Stationeries	-7.113***	-5.891**	-6.897***	-7.691
	(1.427)	(2.319)	(1.666)	(3.910)
Household appliances	-7.948**	-3.404	-7.788*	-5.530
	(3.261)	(4.219)	(3.938)	(8.910)
Furniture	17.461**	7.711	27.137***	11.880
	(8.348)	(9.310)	(1.489)	(32.734)
Chemical products	2.609	0.943	11.223***	4.990

	(3.534)	(7.291)	(4.033)	(4.478)

Notes: *** p<0.01, ** p<0.05, * p<0.1 indicate statistical significance at 1%, 5%, and 10% respectively. Standard errors are in parentheses. The coefficients are only reporting the tariff effects, the other control variables are omitted for brevity.

It is significant to note that for manufactured goods, although there was a decline in tariffs on garments, there was no significant effect on the prices of these products. Average tariffs for worn clothes, which make up the majority of the imports of garments in Kenya, attracted a CET of 45% in 2007. This was reduced to 35% in 2016. The non-responsiveness of prices to the high tariffs on garments is a reflection of the high demand for worn clothes in Kenya. In 2017, there was a call for the enhancement of the EAC-CET on apparel by the EAC heads of state to cushion the domestic apparel industries. The high average tariffs on garments are a reflection of the importance of the apparel industry in the EAC.

On the difference in the effects of import tariffs on rural and urban prices, not much difference is observed in the aggregate effect of the EAC-CET on domestic prices as seen in table 2.5. The correct specification is model 3, which controls for year-fixed effects. This is because it reports a non-negative autonomous price value represented by the constant coefficient. Rural prices decreased by a small magnitude in comparison to urban and strictly urban prices. This shows that the effect of the EAC-CET was more experienced in urban areas relative to rural areas. This might be explained by easier access to imported items, particularly manufactured goods, in urban areas. Access is improved in urban areas through high-quality transportation infrastructure and roads (Marchand, 2012). Since urban markets mainly have a high demand for imported manufactured goods, they would tend to be more integrated with world markets compared to rural markets that mainly trade in agricultural goods. Further, urban markets would be more competitive relative to rural markets (Marchand, 2012). All these factors lead to urban prices responding more to the EAC-CET compared to rural prices. The EAC-CET currently highly protects the agricultural sector, hence another reason why urban households would experience a higher reduction in prices compared to rural households.

Most of the populations in rural areas are poor households involved in the production of agricultural commodities. Thus, the fact that the EAC-CET protects the agricultural sector and sees prices in rural areas decline by a smaller margin implies that the EAC-CET is pro-poor on the

incomes of households (Marchand, 2019). A trade policy is pro-poor, according to Nicita, Olarreaga, and Porto (2014), if the protection framework that is put in place favors poor families more proportionally than rich households.

Table 2.6: 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)
Observations	4,526	4,526	4,526	4,526	4,526
R-squared	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

Notes: *** p<0.01, ** p<0.05, * p<0.1 indicate statistical significance at 1%, 5%, and 10% respectively. Standard errors are in parentheses. In the first column, there is no control for any fixed effects. The second column controls for industry fixed effects (agricultural or manufactured), the third column controls for year fixed effects, the fourth controls for product categories fixed effects, and the fifth controls for county fixed effects.

Generally, the differences in the magnitudes of the coefficients of tariffs between rural and urban areas are not very high. This demonstrates that Kenyan markets do not have a significant rural-urban divide. In particular, prices are nearly identical in both urban and rural areas. This can also be seen by the constant term, which is approximately 4 for all prices. Finally, the foreign price coefficient is statistically significant for all prices. However, a large effect is observed in strictly urban areas. This further confirms that it is mainly manufactured goods that are purchased and hence affected by external factors in strictly urban areas. In the model of interest (3), the R-squared is less than 20%, implying there are other possible variables that explain the variation of domestic prices that are not included in the study.

The EAC-CET eliminated tariffs for goods that were being traded within the EAC Partner States. The removal of tariffs was intended to cut the prices of commodities encountered by households within the partner states in addition to increasing trade among the partner states. To observe whether this provision affected the prices of commodities, the tariff-price effect was observed while demarcating the country according to the borders with the EAC Partner states. As can be seen in Appendix 7, the classification led to four regions. The first region is EAC-border counties, the second is non-EAC border counties; the third region is non-border counties, and finally major cities.

The magnitude of the price effect was expected to be higher for counties/regions that border the EAC. Lower transport costs make it simpler for low tariffs to be passed on to local prices, which is why this is the case. Due to low transportation costs, the scale of the effect was also anticipated to be large in the capital city. This is so because it is where a lot of goods are cleared from the main international airport. The same phenomenon was expected for Mombasa County where a

majority of the commodities enter the country through the port. The tariff-price effect on counties against the borders is shown in table 2.6.

As expected, the tariff pass-through rate was highest for major cities. The coefficient for non-border counties is relatively high because these counties are close to the major cities or to counties that border the EAC. Although the tariff coefficient for EAC border counties and non-EAC border counties are closely equal at -1.5, product categories show that the magnitude of the reduction of domestic prices was more significant in counties on the EAC borders. The effect of the tariff, especially for agricultural goods, reduced as one moved away from these counties. This is so because the magnitudes of tariffs on agricultural product categories for non-border counties were higher compared to that of non-EAC border counties. Cereals, vegetables, fruits, meat, and dairy products were all highly affected. This shows that counties that border Uganda and Tanzania saw prices of agricultural commodities significantly reduced compared to other counties after the formation of the EAC. An implication of this is that the EAC led to an increase in cheaper agricultural imports from Uganda and Tanzania. These less expensive imports put downward pressure on Kenya's domestic markets' prices for agricultural products. There is no discernible trend of the EAC-effect CET on borders for manufactured goods. In cases where the effect is significant, the coefficients are approximately equal in all the regions. This confirms that Uganda and Tanzania manufactured goods imports did not significantly exert pressure on domestic prices of manufactured goods in the country after the formation of the EAC.

Table 2.7: EAC border effect of Tariffs

	EAC borders	Non-EAC borders	Non-Border	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 and fruits	-1.739***	-1.156***	-1.665***	-1.294
	(0.080)	(0.130)	(0.049)	(0.249)
Meat and 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 and 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

Notes: *** p<0.01, ** p<0.05, * 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.

2.15. Summary of the findings

The EAC-CET was observed to generally result in a decline in import tariffs for almost all product categories in this study except cereals, meat, dairy products, furniture, and furnishings. The tariffs on garments, footwear, vegetables, tubers, and fruits declined significantly. However, although the EAC-CET saw a reduction in import tariffs for many products, on average, the magnitude of the reduction was not very large since many products are still highly protected. In terms of industry, manufactured goods experienced a higher reduction in import tariffs compared to agricultural goods. Very significant import tariff rates are observed for agricultural products in comparison to manufactured products. In terms of domestic prices, agricultural goods experienced a higher reduction as compared to manufactured goods. The variations in tariffs and pricing between product categories demonstrate how crucial it is to account for product heterogeneity when examining the impact of tariffs on domestic prices.

Tariffs have a pass-through effect on the domestic prices of manufactured goods that is almost one-to-one. Tariff values of manufactured goods were not only smaller before the EAC-CET, but they also experienced a higher reduction after the adoption of the EAC-CET. Further, manufactured goods are less affected by intermediary market power compared to agricultural goods. This enhances the pass-through effect. Manufactured goods are mostly consumed in urban areas. This is because domestic markets in these areas are not only closely integrated with international markets but trade costs in these areas are lower. Some forms of trade costs are transport and transaction costs. All these aspects enhance the pass-through effect for manufactured goods. There is incomplete pass-through for agricultural products. Bergquist and Dinerstein, (2020); Engel et al. (2021); Nakamura and Zerom (2010), and Sequeira (2016) attribute incomplete pass-through of tariffs to various factors. They include heavy market regulations, the market power of intermediaries, markup adjustments, barriers to price adjustment, bribery at the ports of entry hence tariff evasion, uncompetitive firms, direct state intervention in markets, and local costs that involve transport and transaction costs. The transmission of prices may also be impacted by merchants' lack of competition (Marchand, 2017).

This study attributes imperfect transmission to three main factors. First is the high degree of intermediary market power. Bergquist and Dinerstein (2020) experimentally show that Kenya has high degrees of intermediary market power. This market power caused by middlemen prevents a one-to-one response of consumer prices to tariff changes due to an increase in mark-ups (De Loecker et al., 2016). The second is anticompetitive business practices and explicit government market interference. These two market distortions in Kenya as shown by Argent and Begazo, 2015) prevent a complete pass-through of trade policies to consumer prices in Kenya. Finally, the imperfect pass-through could be attributed to the distortions that arise through the derogation of the EAC-CET. Member countries under the EAC-CET are allowed to apply for a stay of application of tariffs in the event they have substantive reasons. By invoking unilateral exemptions on a variety of heavily traded items, governments have significantly undermined the CET through this route (Bünder, 2018). Using this avenue, Kenya has requested numerous stays of application either through lobbying and interest groups or under the duty remission schemes (Bünder, 2018). The country has mainly applied unilateral stays of application to rice, wheat, paper, iron, and steel.

Although they are product specific, they also represent products that are highly traded and have large import tariff values.

Prices categorized according to household residence indicate that the impact of the EAC-CET on domestic prices is more pronounced in urban than rural areas. Agricultural products make up the majority of the goods bought in rural regions and are strongly protected by the EAC-CET. In general, this caused prices in rural areas to drop by a small amount. Most of the commodities bought in urban and exclusively urban areas are manufactured items, whose tariffs are substantially cheaper than agricultural goods. This explains why aggregate prices in these areas declined by a larger magnitude compared to those in rural regions. Since most of the populations in rural areas are poor households involved in agricultural activities, the fact that prices in rural areas declined by a small magnitude shows that the EAC-CET is pro-poor in income (Marchand, 2019). Specifically, the EAC-CET structure highly protects agricultural goods and hence, slight price declines imply that the welfare of most rural farmers involved in the production of agricultural goods was not adversely affected by the EAC-CET.

External factors like foreign prices and exchange rates push prices of manufactured goods higher compared to agricultural goods. This shows that most of the manufactured commodities are imported and hence more susceptible to influence by external factors. The effect of external factors on manufactured goods is seen to be approximately twice that of agricultural goods. The magnitude is much higher in urban areas compared to rural areas. This could be so because cost of production in urban areas is higher than in rural areas. In the current global economic landscape, the rise in prices of manufactured goods, driven by external factors such as foreign prices and exchange rates, poses a significant challenge for developing countries. Firstly, the increased cost of living is a primary concern. As the prices of imported manufactured goods escalate, households find themselves grappling with higher expenses to maintain their standard of living. This issue disproportionately affects lower-income groups, who may already be stretched financially. The consequence is not just a matter of economics but also of social equity, as the gap between the affluent and the poor widens. Furthermore, the reduced purchasing power due to global inflation significantly alters consumption patterns. With the same amount of money now buying fewer goods and services, families are forced to prioritize their spending, often at the cost of non-essential or luxury items. However, the more alarming aspect of this situation is its impact on food

consumption. In countries already facing challenges in food security, like Kenya, higher prices can lead to reduced food intake, lower nutritional quality, and an increase in hunger and undernutrition. The overall welfare implications of these economic pressures are profound. Welfare is not solely measured by income levels but encompasses access to goods and services, health, education, and overall quality of life. When essential aspects like food become less accessible due to inflation and reduced purchasing power, the welfare of the population inevitably suffers. In the long term, these challenges can lead to broader socio-economic issues, including social and political unrest, increased poverty rates, and a slowdown in development. The situation demands proactive policy responses from governments and international organizations. Measures might include subsidies for essential goods, targeted support for vulnerable populations, and efforts to stabilize local currencies.

Finally, in terms of the EAC boundaries, the findings indicate that Kenya's agricultural commodities prices dramatically decreased as a result of cheaper imports from Uganda and Tanzania. This was when the EAC was formed and allowed the free movement of goods within the borders. The border effect is however seen not to be very significant for manufactured goods.

2.16. Conclusion

The main objective of this study was to investigate the pass-through effect of the EAC-CET on domestic prices in Kenya. The study analyzes prices between 2005 and 2015. Two household surveys KIHBS 2005/2006 and KIHBS 2015/2016) coincide with the period when the EAC-CET came into being (2005) and 10 years after (2015). The study uses a panel fixed effects model in the analysis. Domestic prices are divided into rural and urban prices. Further, in industry classifications, prices are classified into agricultural and manufactured goods. Agricultural products are further subdivided into cereals, meat, and dairy products, vegetables and fruits, beverages, and tobacco. Manufactured products are subdivided into garments and footwear, food accompaniments, household equipment, chemicals, stationery, and furniture. In all these classifications, 121 products are analyzed.

Significant pass-through effects are observed for manufactured goods at 0.84%. It should be noted that there is an incomplete pass-through effect for agricultural goods. The tariffs on agricultural goods are quite substantial in the EAC. For most of the agricultural commodities that are traded

by the EAC-CET, such as maize, wheat, rice, and sugar, there are high tariffs. Some of the causes of the incomplete pass-through of tariffs to domestic prices of agricultural goods include these high tariffs. Both rural and urban areas have been reported to have insufficient pass-through effects. Significant market imperfections, including those brought on by excessive market intermediary power, prohibitive transaction costs, anti-competitive business practices, and direct government intervention in markets, are the main causes of incomplete pass-through. Furthermore, because they primarily target some of the most marketable commodities, the derogations that member states have encountered under the EAC-CET are probably responsible for the incomplete pass-through of tariffs to local pricing.

2.17. Policy Implications

The study's imperfect pass-through effect suggests that policymakers should consider various policy options to facilitate the pass-through effects of tariffs. The first is to monitor the market power of the country. The country should monitor the levels of market power in the country and ensure that market intermediaries are not absorbing the benefits of trade policies without passing them on to consumers. This could involve policies aimed at increasing competition and reducing market power. Key things that can be done; Establishing a dedicated agency or task force to regularly assess the market power of key players in relevant industries, implementing specific thresholds or indicators for market power that trigger regulatory scrutiny or action and developing policies that encourage new entrants into the market or support smaller competitors to enhance competition. Secondly, policymakers need to address market imperfections in the country. The country should address market imperfections such as high transaction costs and poor infrastructure that limit competition and prevent full pass-through of tariffs to domestic prices. This could involve policies aimed at improving infrastructure, reducing transaction costs, and promoting competition. Some of the key actions would be; conducting a comprehensive audit of existing infrastructure and transaction systems to identify key areas for improvement, allocating targeted investment towards upgrading infrastructure, particularly in transport and logistics and finally simplifying and streamlining transaction processes, possibly through digital solutions, to reduce costs and enhance efficiency.

The findings of this study demonstrate that the assumption of complete tariff pass-through to domestic prices is not always true. Thus, policymakers need to carefully evaluate the effectiveness

of tariffs. If import tariffs are not fully passed on to domestic prices, the intended effects of the tariff may not be achieved. Policymakers may need to carefully evaluate the effectiveness of tariffs in achieving their objectives, such as protecting domestic industries or raising revenue. They may do so through different means: one is setting up of a periodic review process to assess the impact of tariffs on domestic prices and adjust them accordingly, second is comparing the outcomes of tariff policies with their intended objectives, such as industry protection or revenue generation and third in cases where tariffs fall short, exploring and implementing alternative policy tools or revenue sources. Finally, due to incomplete tariff pass-through, policymakers should consider the broader welfare implications of trade policies beyond just their impact on domestic prices. This could involve; developing a framework for assessing the overall economic, social, and environmental impact of trade policies, regularly publishing reports on how tariffs and other trade policies affect consumer welfare, producer welfare, and economic growth and finally involving a range of stakeholders, including consumer groups, industry representatives, and economic experts, in policy evaluation and development.

2.18. Limitations of the study and areas of further research

Using 121 products for this study entailed averaging several products to conform to the Harmonized System of Naming Products. This exercise led to the aggregation of substantial information regarding specific products. As such, some information may have been lost in the process; hence, the findings may not be very representative of the disaggregated effect of tariffs on products. This forms the limitation of this study. However, on average, the findings can be used to illustrate the picture of the effect of tariffs on products in developing countries like Kenya and such exclusion may not affect the findings and recommendations provided. Finally, another limitation of the study is that it is centered on products only. This leaves out the potential tariff effect on services in developing countries. This highlights potential areas for further research in the future.

CHAPTER 3: EFFECT OF TRADE LIBERALIZATION ON HOUSEHOLD LABOR INCOME IN KENYA

3.1. Introduction

Based on economic theory, a change in the domestic price of a commodity affects the returns on the factors of production involved in its production. Changes in the price may cause some industries to contract and others to expand. These adjustments affect the demand for factors of production and subsequently affect factor prices (Casabianca, 2016). For example, in the United States (US), employment in the chemical sector increased after the imposition of tariffs on other sectors. This shift was attributed to a decline in production, which released labor and capital that was used more productively in sectors like chemicals (Francois & Baughman, 2019). Such shifts in labor within sectors due to tariff changes may influence labor incomes paid to workers.

According to the literature, households that live in various native labor markets typically experience the varied effects of international trade on their labor wages. Some regions within a nation may be more exposed to global trade than others. While some parts of a nation have a high concentration of competitive industries, others are more focused on export-oriented industries that are opening up new global markets (Pavcnik, 2017). In such circumstances, national trade reforms or trade liberalization are expected to have varying effects on labor incomes across a nation's labor market. One of the most crucial issues in international economics is how trade liberalization affects labor incomes (Amiti & Davis, 2012). Although a lot has been written about how trade liberalization impacts labor incomes, little has been done in developing nations. Since the early 1980s, developing nations have enacted a variety of trade liberalization programs. However, as Engel et al. (2021) point out, little is known about how trade liberalization has affected the local labor markets in developing countries.

By conducting an empirical assessment of the relationship between household labor incomes and trade liberalization in Kenya, this study seeks to close this gap. The study uses Kenya as a case study. Kenya is an ideal case study as it has actively adopted various trade reforms with the latest one being the adoption of the AfCFTA. The study uses Kenyan microdata from 2005 and 2015. The study, in particular, ties changes in industry-level tariffs to in-depth data from KIHBS on workers' labor incomes and industry affiliation. The formation of the EAC-CET saw industry

inputs required for producing manufactured goods being zero-rated while intermediary inputs saw a realignment of their tariffs to a standard rate of 10%. Goods categorized as final goods attract a 25% tariff. Others categorized as “sensitive items” attract rates above 25%. Theoretically, these tariff adjustments were expected to affect labor incomes through the prices of commodities. Changes in producer pricing and the types of employment that people are working in will both contribute to changes in households' nominal labor wages. Additional factors that affect the position include age, gender, and level of education (He, 2019).

This study focuses on three main channels through which household labor income distribution is affected by trade liberalization. The first channel focuses on increasing returns on education, where more education is expected to be correlated with higher labor incomes. In this category, skilled workers, considered to be more educated, are compared to unskilled workers. Skilled workers are expected to experience the effects of trade liberalization due to their easier access to information on trade policies. In addition, they are likely to be affiliated with industries that experience the effects of trade openness. The second is the informality of employment, where it is anticipated that trade liberalization will cause a shift in the labor force toward the unorganized sector, which normally offers lower wages (Attanasio & Pavcnik, 2004). The final one is a comparison of the agricultural and non-agricultural sectors where more protection in terms of tariffs is still prevalent in the agricultural sector. This final classification is crucial to provide light on the impact of tariffs on industries that saw significant tariff reductions in comparison to those in Kenya that continue to enjoy strong protection.

3.2. Background of the study

3.2.1. Import tariffs and labor incomes

Domestic prices are influenced by import tariffs, which have an impact on households' employment and consumer spending. While workers are influenced by changes in returns to their productive activities, households as consumers are affected by the cost of traded consumption products tariffs (Artuc, Porto, & Rijkers, 2019). Imported inputs are less expensive relative to domestically produced inputs due to lower input (Amiti & Cameron, 2012). Firms may substitute domestically produced inputs for imported inputs. This shift is likely to affect the labor market as well as the incomes of workers. Labor would likely become less in demand in sectors that had previously generated local inputs. The general decrease in manufacturing costs, however, is

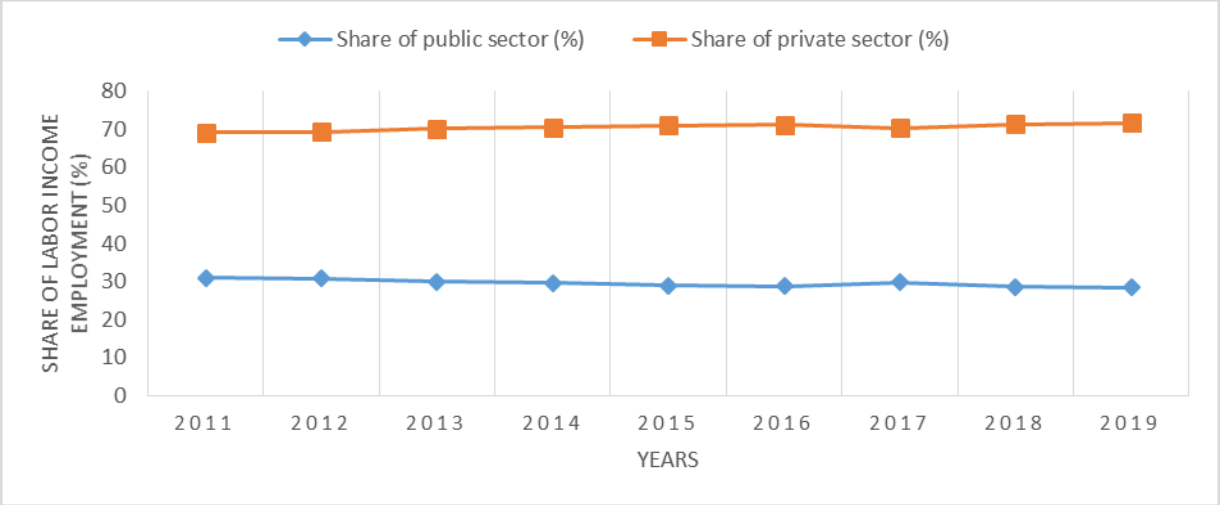
expected to increase demand for labor in sectors of the economy that rely on imported inputs. This illustrates that trade liberalization's effects on a country's labor market, in the form of lower tariffs, are ambiguous. While some industries are likely to see benefits, others are likely to experience drawbacks.

In developing countries, increased international trade has been assumed to make households better off (Pavcnik, 2017). A key mechanism through which increasing openness and trade leads to meaningful gains is the reallocation of resources across economic activities (Dix-Carneiro & Kovak, 2017). However, most developing countries suffer from poor policy frameworks that might hinder them from fully reaping trade liberalization gains. Further, high transaction costs characterize high market imperfections in these countries' markets (Nicita, 2009). In these countries, these imperfections might hinder the transmission of trade policies to household labor incomes.

3.2.2. The labor market in Kenya

The majority of labor-income employees in Kenya are from the private sector, as seen in table 3.1. In the public sector, the largest number of labor-income employees is under the Teacher's service commission, followed by workers in ministries and extra-budgetary institutions. While private-sector employment has been increasing over time, employment in some public sectors like ministries and extra-budgetary institutions has been decreasing. County governments have experienced the highest employment growth among labor-income jobs. Between 2011 and 2017, employment in county governments increased by more than 200%. This reflects the positive aspect of devolution in the country in terms of labor markets. The definition of the domestic market structure makes the aspect of labor income employment significant in trade literature. The share of the country's economy made up of the public or private sectors affects the tariff pass-through and, as a result, the effect of changing tariffs on household welfare (Engel et al., 2021). The pass-through of tariffs to domestic pricing and, consequently, the factor prices of a country, could be distorted by a strongly regulated domestic industry. In Kenya, as seen in Figure 3.1, the market structure is highly dominated by the private sector (70%), hence a lesser degree of regulation.

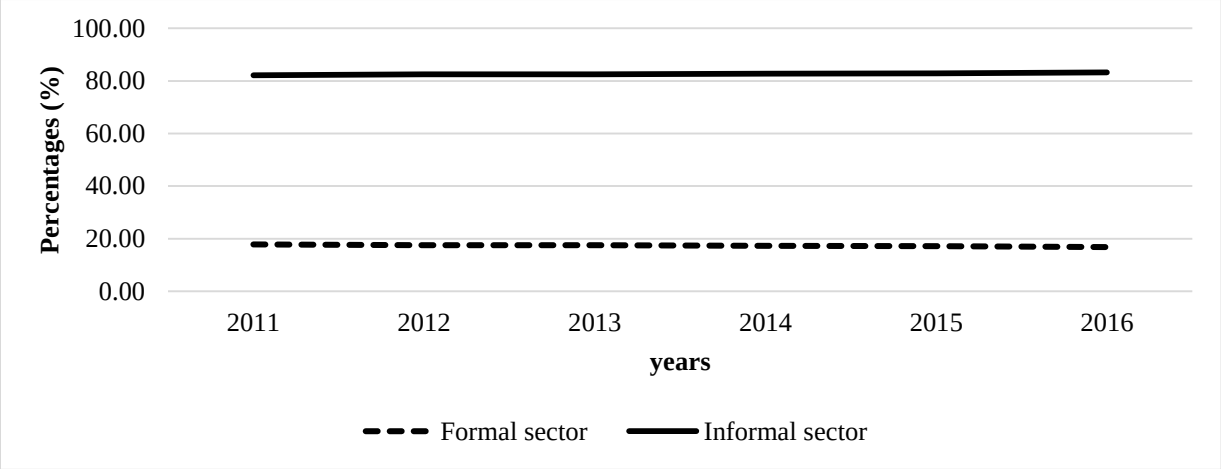
Figure 3.1: Categories of labor income employment in Kenya



Source: Kenya National Bureau of Statistics (KNBS)

Informal employment mainly characterizes Kenya's labor income employment as seen in Figure 3.2. The proportion of workers in the informal sector has fairly remained constant at 82% while the formal sector has constantly remained at 18% from 2011 to 2016 as seen in Figure 3.1.

Figure 3.2: Share of formal and informal sector labor income employment in Kenya



Source: Kenya National Bureau of Statistics (KNBS)

As the study focuses on employment in the goods sector rather than the service sector, Table 3.1 highlights a review of labor income employment in main goods' trading sectors. Labor income employment in the main trading sectors is around 41% for male workers and 25% for female workers. This shows that male workers dominate most of the goods' trading sectors in the country.

Table 3.1: Share of labor income employment by industry and gender (percentage of total sectors 2012-2016)

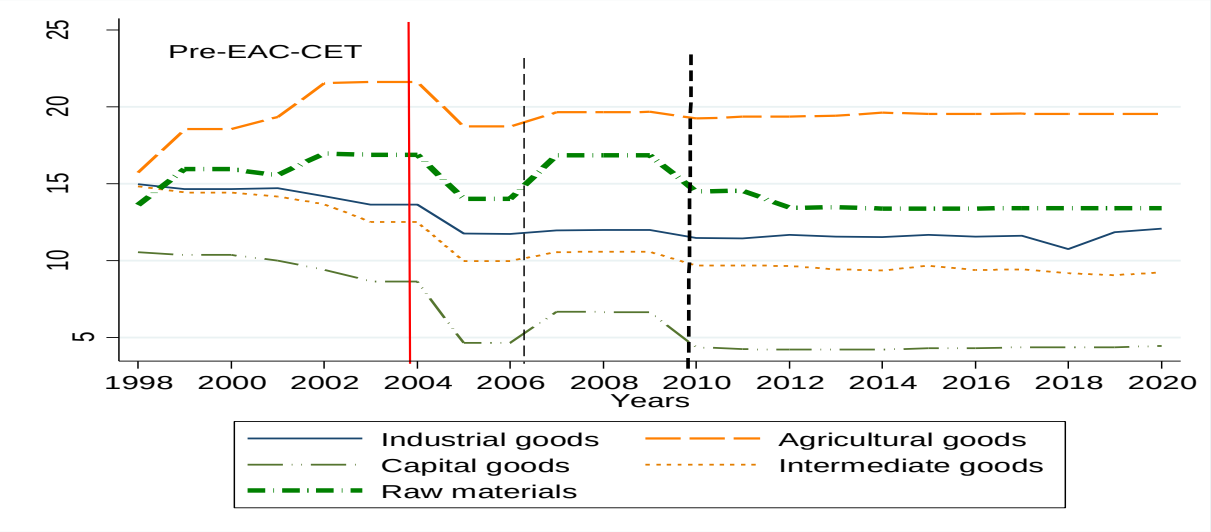
	2012		2013		2014		2015		2016	
	M	**F**	**M**	**F**	**M**	**F**	**M**	**F**	**M**	**F**
Agriculture	15.4	8.8	15.1	14.9	15.4	12.0	13.7	13.3	13.4	12.7
Mining and quarrying	0.5	0.5	0.5	0.2	0.8	0.2	0.8	0.3	0.8	0.3
Manufacturing	14.1	13.9	15.8	6.1	16.4	5.6	15.2	5.8	15.1	5.5
Wholesale and retail trade	10.8	11.0	11.0	6.3	11.5	5.9	11.1	6.2	11.1	6.2
The total share of employment	40.8	34.2	42.4	27.5	44.1	23.7	40.7	25.5	40.3	24.7

Source: Author's computation using data from Kenya National Bureau of Statistics

3.2.3. EAC-CET and tariff reforms before and after the EAC-CET

The EAC-CET classified products into four main categories: the first was raw materials and capital goods, the second was intermediate goods, the third was final goods and finally the fourth was sensitive items. The first category attracted a tariff band of 0%, the second one attracted 10%, the third attracted 25% and the fourth attracted a tariff band of between 30%-100%. The classification of the goods created 5,395 tariff lines at the Harmonized System (HS) 8-digit level. Out of these, 2,003 (37%) accounted for the 0% band, 1,152 (21.4%) were for the 10% band, 2,176 (40.3%) were for the 25% band and 64(1.2%) were tariff bands that were greater than 25% (Shinyekwa & Katunze, 2016). These classifications of goods brought a general reduction in import tariffs in 2005 as seen in Figure 3.3.

Figure 3.3: Kenya's Simple Average tariffs pre and post the EAC-CET



Source: Computations based on WITS-World Bank Database (1998-2020)

The reduction of average tariffs, in this study, is defined as trade liberalization. Tariff reductions experienced under trade liberalization regimes like the introduction of the EAC-CET were expected to lower the price of imports. This was particularly true for inputs and intermediary products, whose tariffs were respectively zero-rated and modified to 10%. Tariff cuts have an unclear impact on the labor market. The less expensive inputs might increase worker productivity and benefit both the traded and non-traded goods sectors (McCaig & McMillan, 2021). Additionally, if industries in the exportable sector competed with the highly protected importable sector for limited resources, the decrease in input import duties might increase the production of exportable items. However, the cheaper imports could also displace workers and lead to the shutting down of industries, thereby affecting productivity and reduction of labor incomes in the country. Generally, liberalization policies are likely to induce a change in the sectoral structure of production (Gaddis & Pieters, 2017). This can have a positive or negative effect on labor income in a country.

Cheaper imports due to trade liberalization may not be the only aspect of interest in labor income differentials. Other parameters like regional factors (rural against urban settings or regions on the borders of the country against those that are far) and individual characteristics like age, gender, education, marital status and religion, may also affect how trade reforms are transmitted across different households. In terms of regional effects, the EAC-CET allowed for zero tariffs on all products originating in the EAC Partner States. An apparent impact of this on labor incomes would be observed in regions that are closer in terms of borders to Tanzania and Uganda. This is because the majority of products come from these countries. As long as consumers enjoy cheap imports from these two Partner States—which translates to an increase in their real labor incomes—workers may experience a decline in their labor incomes. Generally, this results from cheap imports or a complete exit of the industry. This can be a result of fierce competition from neighboring countries. This is because they may have comparative advantages in the production of particular goods. Regions that are far from the border may not be adversely affected due to high transport costs. Considering the regional aspect, this study categorizes the effect of trade liberalization based on the type of product produced and the rural-urban status of the economy. The agglomeration of regions follows an argument by Hanson (1997) where industries concentrate geographically and relative labor incomes decrease with transport costs from industrial centers.

The implication of this is that labor markets are expected to clear at these aggregated regional levels instead of single counties.

3.3. Problem Statement

Reductions in import tariffs under trade liberalization reduce the prices of imports. Cheaper imported inputs are likely to raise labor productivity and hence boost both the trade and non-trade sectors. However, cheaper imports may also displace workers and lead to the shutting down of businesses (McCaig & McMillan, 2021). Likewise, tradeable sectors that experience larger tariffs would sometimes experience a significant decline in levels of employment driven by a decline in manufacturing as the country accesses cheaper imports (Erten, Leight, & Tregenna, 2019). However, for poor countries where farmers highly depend on agricultural incomes, having a protective tariff structure would see an increase in their income (Nicita et al., 2014). These contrasting views on the effect of adjusting import tariffs show that adjusting a tariff structure like in the EAC-CET would have an ambiguous effect on labor income in a developing country.

There are few studies on import tariff adjustment and labor incomes for developing African countries. Recent studies like McCaig and McMillan (2021) for Botswana, relied on aggregate levels of income rather than segmenting the types of workers. Their study mainly focuses on the size of industries. Erten et al. (2019) in their South African case analyzed incomes but mainly concentrated on the effect of tariffs on transition in employment and more specifically, the substitution of workers from tradable to non-tradable sectors; formal to informal employment, and generally from employment to unemployment. Artuc et al. (2019) looked at the effect of trade liberalization on several developing countries, but the study does not delve deeper to look at the variation of labor incomes amongst different types of workers and reveals a possibility of labor income inequality amongst different workers in developing countries. Previous work in Kenya, like that of Manda (2002) focused on trade liberalization for the period 1993-1995, Bigsten and Durevall (2006) focused on trade liberalization for the period 1964-2000 while Omolo (2012) focused on the period 2003 and made simulations to 2011. These studies are not only outdated but their definition of trade liberalization is different. Specifically, they all do not capture the aspect of a CET. Other studies like Onchari (2019) have mainly focused on the unemployment aspect but have not linked tariffs with labor market parameters like labor incomes or earnings.

Further, in all these studies reviewed, the emphasis on the labor characteristics of workers when analyzing the impact of liberalization on labor income is minimally placed.

This study complements these strands of research by focusing on recent household-level data and the variation in labor incomes among different types of workers. The study exploits both the exogeneity of tariff reductions and the large variation in tariff cuts across industries. This is done to estimate the effects of trade policy on labor incomes in Kenya. Finally, the study answers the question of who gains and who loses after a period of trade liberalization. The 'who' aspect of the labor market involves categorizing workers based on their comparison forms. The first form is skilled versus unskilled workers; the second is formal versus informal workers and the third is workers in agricultural sectors compared to workers in non-agricultural sectors. In all these classifications, workers are observed in terms of rural versus urban areas.

Understanding the effect of adjusting import tariffs on labor income in a developing country while segmenting workers into their different forms is significant for two reasons. First, in trade, there are losers as well as gainers (Wood, 1995). The magnitude of the loss or gain depends on the labor market structure of a country. In a country like Kenya characterized by a large informal sector and a weak manufacturing and agricultural sector, gainers or losers will depend on how exposed the workers are to import tariff liberalization. The second is that Kenya and many other developing countries are constantly reviewing their trade policies. Through broader regional integration policies like the AfCFTA and other bilateral trade agreements. In conducting these reviews, it is pertinent to understand which types of workers are gaining or losing in terms of their incomes. This is crucial since some of the trade policies could be adversely affecting some labor market sectors of the country.

3.4. Research Questions

The main research question of this study is: what is the effect of trade liberalization under the EAC-CET on household labor incomes in Kenya? The specific research questions are:

1) What is the effect of trade liberalization on labor income of skilled and unskilled workers in Kenya?

2) What is the effect of trade liberalization on the labor income of formal and informal workers in Kenya?
3) What is the effect of trade liberalization on the labor income of workers in agricultural and non-agricultural sectors in Kenya?

3.5. Objectives of the Study

The main objective of this study is to analyze the effect of trade liberalization under the EAC-CET on household labor incomes in Kenya. The specific objectives are:

1) To analyze the effect of trade liberalization on the labor income of skilled and unskilled workers in Kenya
2) To analyze the effect of trade liberalization on the labor income of formal and informal workers in Kenya.
3) To analyze the effect of trade liberalization on the labor income of workers in agricultural and non-agricultural sectors in Kenya.

3.6. Significance of Study

Understanding the effect of import tariffs on labor incomes is relevant both for policymakers and for contributing to the literature on labor incomes in Kenya. Information regarding levels of labor incomes against the skill level shows whether trade policies have varying impacts on workers in Kenya based on their skill level. Particularly, whether skilled households are affected differently. Such information is helpful for policymakers when making decisions regarding labor incomes under various trade policies. Minimum wages could be set for skilled or unskilled workers. Further, by categorizing the analysis of labor incomes in terms of formal versus informal sectors and agriculture versus non-agricultural sectors, the study shows that sector is more affected by import tariffs. A majority of workers in Kenya are in the informal sector, while the country heavily relies on the agricultural sector. Thus, observing labor incomes in these broad categories is significant not only for trade policies but also for domestic policies that deal with minimum labor incomes and taxation. Finally, the findings of the impact of tariffs on labor incomes indicate how the EAC-CET affected household welfare. This forms a basis for policymakers when making regional negotiations to open or close Kenya's domestic markets.

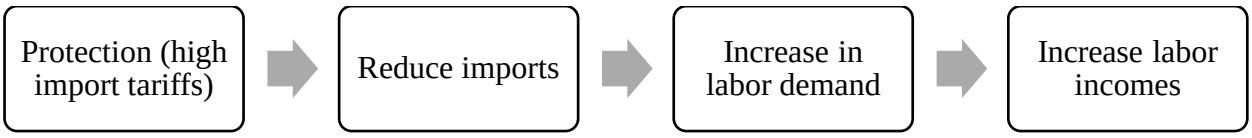
3.7. Theoretical review

Theoretically, import tariffs should result in a rise in the average cost of imported items (Södersten & Reed, 1994). The relative return of the factor utilized in the manufacturing of goods is impacted by a rise in the relative prices of goods. Therefore, it is anticipated that a rise in the relative pricing of an import item as a result of a higher tariff will lead to an increase in the factor returns of import-competing commodities. The production period will determine how tariffs affect production factor returns. Short, medium, and long-term timeframes are used. The short term is the time frame during which there are no movable production factors. The medium term is when labor is mobile and the long term is when both capital and labor are mobile. Based on these aspects, three main approaches to analyzing trade policies and labor incomes are presented. The first, specific factor model focuses on one factor being mobile and the other being immobile. The second is the Stolper Samuelson (SS) model, which considers all factors as being mobile. The third approach, the factor endowment model, focuses on the endowment and productivity of factors rather than aspects of their mobility.

3.7.1. Specific Factor Model

Viner (1924) developed the framework, also called the Ricardo-Viner model. According to the model, there is imperfect factor mobility. It is a form of short to medium-term framework. Given two factors of production, one factor is assumed to be mobile across sectors while the other is specific to a particular sector. In such a case, a reduction in the protection of a given sector may lead to a decline in the earnings of the workers who were in sectors that are unable to relocate elsewhere (Milanovic, Branko; Squire, 2005). The mechanism is, in the event, there is trade protection, like high tariffs, there would be a reduction in imports which would lead to an increase in labor demand and therein exert pressure on labor incomes as illustrated in Figure 3.4:

Figure 3.4: Summary of specific Factor Model



Source: Author's summary from Literature Review

The model predicts that a fall in the price of a good—following trade liberalization (low tariffs)—may cause a loss to the factor that was specific in the production of that good. The other sector whose goods' prices have not been reduced will see an increase in labor demand and thus an

increase in labor incomes. An implication of this is that those workers depending on labor incomes may gain or lose after trade reforms, depending on which sector they are in (Milanovic, Branko; Squire, 2005).

The model generally asserts that when a good's price decreases as a result of trade liberalization (low tariffs), the factor unique to the sector that saw a price decrease loses while the other sector gains. The implication is that depending on which industries (import-competing or export-competing) workers are employed in, trade liberalization may benefit them (Milanovic, Branko; Squire, 2005). As a result, when certain industries face tariff reductions, workers' pay levels in those industries fall behind those of industries with strong tariff protection. In such situations, the factor in the export competition would win when tariffs were reduced while the factor linked with the import-competing industry, such as labor, would suffer. Depending on the preferences of the consumer for the two products, the impact on actual labor wages (the mobility component) will be equivocal (Elshennawy & Said, 2010). The fundamental criticism of this model is that it may only be valid in the short term since, as the SS model predicts, workers may have time to adapt through skill acquisition and learning and may thus become mobile between industries.

3.7.2. Stolper Samuelson Theorem

The Stolper and Samuelson (1941) theorem, sometimes known as the SS model, develops within Heckscher-neoclassical Ohlin's trade theory (H-O). It is a long-run model that works under the premise that all production factors are mobile. The SS theorem states that if there are two factors of production and two goods, the price decrease of one of the items lowers the returns of the component that was extensively utilized to generate the other two goods. The SS theorem's main goal is to demonstrate that changes in relative commodity prices have a discernible impact on real incomes. Thus, changes in commodity prices would have a distributional impact on returns between labor and capital. If the commodity's price of the labor-intensive goods increases, then returns on labor would increase relative to returns from the capital while the reverse would take place for commodity prices of capital-intensive goods. The "magnification effect," which occurs when a given proportionate change in commodity prices results in a more substantial proportional change in factor prices, is another prediction made by this theory. The consequence is that concerning both commodity prices, one factor's price unambiguously increases while the other unambiguously decreases. This theorem is supported by the observation that when a nation opens

up its market, the abundant factor benefits, and the scarce factor loses. The converse of the statement is true as well. If a capital-rich country imposes a tariff on its imports, labor will gain, while for a labor-rich country, imposing a tariff will see more gains in the capital goods (Södersten & Reed, 1994). Most developing nations, endowed with labor, will see factor returns of labor (labor incomes) increase as compared to those of capital when they open up their markets. Hence, following these arguments, it would be expected that trade liberalization in a developing country such as Kenya should be inherently pro-poor[6] because the country is more labor-intensive in its production. The notion behind this is specialization. The country is predicted to specialize in the production of a labor-intensive commodity and thus experience more labor incomes (Won & Kennedy, 2005).

The following assumptions are made in the SS theorem: perfect competition, given technology, and free mobility of labor within countries. A number of these assumptions may not hold for several developing countries, which are characterized by significant labor rigidities. The theorem has received criticism based on products. Goods that are imported are not necessarily the same ones that are produced domestically (Lawrence & Edwards, 2012). According to this argument, specialization can take place in international trade, and as a result, these departures from the underlying model may indicate that the outcomes it predicts are divergent.

3.7.3. Factor endowment theory

This theory was reviewed by Easterly (2007) under the neoclassical growth model. It does not consider the mobility of factors of production but the "endowments" and "productivity" of those factors. The basis of the theory is globalization and poverty. However, the elements of globalization are openness/trade liberalization, and the elements of poverty are the incomes of the poor. According to this theory, globalization can affect income in two ways: factor endowments and productivity of factors. The former point of view contends that globalization should increase the earnings of the poor if production levels across nations are comparable, but endowments vary. This is based on the idea that loosening trade restrictions will encourage capital inflows, which will raise per capita income in nations with weaker economies that are more endowed with labor. In the latter view, the differences observed in per capita income within countries may be due to

[6] Ibid

exogenous productivity differences across countries and not endowments. In such a case, trade openness may have no impact on income levels or could deepen the levels of income since labor/capital may be drawn away from low-productivity countries to high-productivity countries.

The theories above provide standard frameworks on how the labor incomes of workers would be affected by the degree of openness. Nonetheless, further review of the literature has shown that other factors are also crucial in explaining labor income, particularly worker heterogeneity (Nicita, 2004). Thus, in modeling labor incomes, it would also be ideal to consider other factors like regional factors and individual characteristics. Notable as well in the theory of trade and labor incomes would be the degree to which firms are engaged in international trade.

3.8. Empirical Review

Empirically the linkage between import tariff liberalization and labor incomes has been established through the price mechanism. Specifically, tariffs affect the prices of commodities and in turn affect factor incomes through general equilibrium models. Most of these general equilibrium models of trade have shown that trade affects labor incomes through prices that are set on the margin (Pinelopi Koujianou Goldberg & Pavcnik, 2005). The effects of trade liberalization on labor incomes are however country-specific (Becker, 2018). According to Amiti, Redding, and Weinstein (2019) a 10% cut in tariffs for outputs in the US markets, saw a reduction in labor incomes for firms that were producing for domestic markets. Labor incomes for firms that were producing for exports were observed to increase. On the other hand, a similar cut on tariffs on the inputs had no significant impact on the labor incomes of firms that did not import but raised the labor incomes of those that did. The implication is that integration into the global economy plays a vital role in the determination of the effects of tariffs and trade liberalization on labor incomes for different firms. Further, the effect varies within regions of the country and among households. Thus, studies find various results using; country case studies, regional case studies, and controlling for various labor characteristics. Empirical literature shows that in-country case studies, import tariffs' effects on labor incomes are observed to vary between households; in rural-urban areas, within formal and informal sectors, between male and female workers, and between skilled and unskilled workers. In estimating the price effects of import tariff liberalization and linking the results to the income of households using a Computable General Equilibrium (CGE) framework, Nguyen, Dang, and Huynh (2020) show that trade liberalization increases income disparities between; rich and poor households, rural and urban areas, and among rural-urban people.

Mensah (2019) concentrating specifically on rural and urban households, discovers that trade liberalization benefits urban non-farm households in Ghana while negatively affecting total and factor income for rural farm households. According to the study, lowering import taxes has a substitution effect that lowers the demand for domestic goods. This eventually affects domestic farmers' income and the demand for labor and land decreases. Chao, Ee, Nguyen, and Yu (2019) demonstrate, however, that trade liberalization through tariff reductions causes capital to move from the urban sector to the rural agricultural sector. In the short term, the move reduces the wage difference between skilled and unskilled labor. However, the urban manufacturing sector continues to draw new businesses thanks to its low capital costs. Long-term, the new businesses might reduce the disparity in labor income. Dai, Huang, & Zhang (2021) for Chinese urban dwellers' response to a reduction of the tariff showed that there were significant effects on industries that faced massive tariff cuts. Households faced a relative decline in labor incomes due to tariff cuts. Due to this effect, households were compelled to work more, especially those in the non-tradable sector. Other effects that spilled into the economy were an increase in the number of young adults who co-resided with their parents. However, in the same country China, Tao & Song (2022) show that tariff reduction and high incidence of NTBs can decrease the cost of living.

Selwaness and Zaki (2015) show that trade liberalization decreased informal employment in Egypt's industrial sector. They showed this by establishing a link between trade liberalization and informal employment using survey data and import tariffs. This finding was based on the theory that firms discovered that transitioning to the formal sector from the informal one was more advantageous as trade got more liberalized. While the most productive sectors with legal workers boosted their exports to foreign markets, the least productive firms that employ informal workers were put out of business (Selwaness & Zaki, 2015). According to Cruces, Porto, and Viollaz (2018), businesses can switch out formal for informal employees to mitigate the effects of trade shocks. Therefore, industries that would be subject to deeper tariff cuts would see a rise in informality. The authors show that increases in labor informality result from industry tariff reductions in Argentina. Industries with a high percentage of small-size enterprises are more likely to experience the effect. However, a decline in overall national tariffs decreased overall informality in the manufacturing sector using aggregate time-series variations, whereas it increased it in the non-traded sector. Becker (2018) showed that trade liberalization unambiguously decreases informal employment. The economic conditions of a country are the ones that determine whether

the reduction of informal employment is beneficial or harmful to labor income inequality and welfare in the presence of informality. However, Vazquez and Winkler, (2023) show that in Mexico, trade induces a shift from informal to formal work, which generally shows no aggregate effects on employment levels. The effects are more of movements within sectors, rather than a general increase in employment levels.

Trade liberalization could significantly increase the demand for male labor relative to female labor in formal work if competitively advantaged sectors are comparably more intensive in formal work and if male labor is comparably more substitutable for capital than female labor (Yahmed & Bombarda, 2020). Tariff reductions in Mexico made it more likely for both men and women to have formal jobs in the industrial (Yahmed & Bombarda, 2020). The formalization of jobs was mostly driven by large businesses. Men were more likely than women to work in a formal capacity, although, for low-skilled women, the likelihood of doing so was reduced. Blyde, Busso, Park, Romero, & Bank, (2023) examined the impact of trade liberalization on occupational segregation by gender and skill in China. The authors used a difference-in-differences approach to estimate the impact of China's accession to the World Trade Organization (WTO) on occupational segregation by gender and skill. They find that WTO accession led to a decrease in occupational segregation by gender, but an increase in occupational segregation by skill. The authors conclude that trade liberalization can have a mixed impact on occupational segregation, depending on the dimensions of segregation that are considered.

Besedes, Lee, and Yang, (2021) used a difference-in-differences approach to estimate the impact of the North American Free Trade Agreement (NAFTA) on gender gaps in employment, wages, and occupational attainment. They find that NAFTA led to a decrease in employment for both men and women, but the decrease was larger for women. NAFTA also led to a decrease in wages for both men and women, but the decrease was larger for women. Finally, NAFTA led to a decrease in the likelihood of women working in high-paying occupations. The authors conclude that trade liberalization can hurt women's labor market outcomes. Although variations are observed between men and women, Juhn, Gergely, and Villegas-sanchez (2013) note that labor income inequality could arise within the same gender. Inequality arises due to the differences in the types of jobs. In their study, tariff reductions were observed to raise female labor incomes in blue-collar jobs. However, for white-collar jobs where the demand for skilled workers was high; there was little

evidence of an increase in female labor incomes due to tariff reductions. Gailes, Gurevich, Shikher, and Tsigas (2018) conducted a review of the levels of tariff burdens amongst households that differ in their income levels and their gender. The study showed that the tariff burden was closely constant across all the income deciles. However, in terms of gender, the burden was more on female workers compared to male workers.

When modeling the heterogeneity of workers depending on skill levels, Harrigan and Reshef (2015) suggest a model where only the lowest-cost companies engage in the global economy. They show how a fall in trade prices raises the relative demand for skilled workers since the least expensive or most skilled firms expand to serve the export market while the less skill-intensive non-exporters cut down due to rising import competition. According to Burstein and Vogel (2017), the decline in trade costs causes the reallocation of factors of production to the industry in which a nation has a comparative advantage because it alters the definition of skill levels to take into account differences in skill intensity between industries and sectors. This lowers the skill premium elsewhere and raises it in nations that have a competitive advantage in skill-intensive industries.

Input tariff reductions brought forth by China's entry into the WTO led to an increase in the wage gap between skilled and unskilled workers (Fan, Lin, & Lin, 2020). However, Kis-Katos and Sparrow (2015) have demonstrated that in Indonesia, rather than cuts in import tariffs of final outputs, the creation of jobs and increases in pay for unskilled workers are associated with declines in import levies of intermediate goods. Indonesian areas that were more directly impacted by the deregulation of import tariffs, saw a higher poverty reduction. These findings support the findings of Amiti and Cameron (2012), who found that decreasing input tariffs reduced skill premiums in firms importing intermediate inputs. Reducing tariffs for finished items doesn't appear to have any major effects on worker income.

The reduction of tariffs and subsequent labor income variation also depends on the sector where large tariff reductions are observed and the types of workers in this sector. For example, in India, Marchand (2017) showed that tariff reductions increased labor incomes overall but the effect was more pronounced for unskilled workers. Mishra and Kumar (2005) made similar observations. Workers in South Africa saw a considerable fall in both official and informal employment in the tradable industry in districts that witnessed more tariff reductions (Erten et al., 2019). This was

mostly attributed to a loss in manufacturing employment when compared to workers in areas that were less affected by tariff reductions.

The varying impacts of import tariffs on labor incomes across families and industries raise the possibility of rising inequality as a result of trade liberalization. Several studies looking into the connection between trade liberalization and increasing labor income disparity have been prompted as a result of this. Helpman, Itskhoki, Muendler, and Redding (2017) note that workers with similar observable traits and those in similar sector occupations experience labor income inequality brought on by trade liberalization. The trade participation and labor pay disparity between enterprises, however, are what is responsible for these discrepancies. Rojas-Vallejos and Turnovsky (2017) demonstrate using panel data models how a permanent drop in import tariffs would dramatically increase both short- and long-run income inequality. The analysis demonstrates that households in the lowest income quintile suffer the greatest, whilst those in the second-richest quintile benefit the most.

In terms of multi-country studies, heterogeneity is observed in terms of the effects of import tariff reductions on household labor incomes. While some countries gain in terms of an increase in labor incomes, others experience losses. To estimate the impact of import tariffs on household incomes, Artuc et al. (2019) combined household surveys with data from 54 low- and lower-middle-income countries. They discovered that the unilateral removal of agriculture tariffs would increase household income by 2.5 percentage points. A general finding is that the effects of import tariffs differ between and within countries. Additionally, heterogeneity is seen among households and wage workers. Of the 54 countries, 45 see income increases from the relaxation of import tariffs, while 9 see income losses (Artuc et al., 2019). The 54 countries provide compelling evidence that the removal of import tariffs results in a trade-off between income gains (losses) and inequality costs (gains). Fajgelbaum, Goldberg, Kennedy, and Khandelwal (2019) analyzing the impact of the US raising tariffs while other nations retaliated, showed that imports that were targeted by the tariffs did not significantly fall. This implied there was a complete pass-through of tariffs on prices. This effect on prices caused a loss of real income by 0.04% of GDP. Most of the loss for workers was observed in those regions that were politically active.

In Africa, numerous studies have shown that trade liberalization affects labor income. The effect however varies by country. In Egypt, Gignoux and Suwa-Eisenmann (2017) found that the regimes

of trade liberalization mattered when analyzing the labor income effects of trade liberalization. For the first regime between 1999 and 2004, households' levels of labor income were adversely affected. Nevertheless, for the second regime of trade liberalization between 2004 and 2012, the effects on the households were mild (Gignoux & Suwa-Eisenmann, 2017). The difference between these two regimes was brought about by the trade reforms that were implemented in the country in 2003. An important observation from this study was that in a country where trade liberalization has adverse effects on labor, domestic labor reforms might be implemented to cushion the laborers from external shocks. In South Africa, Bastos and Santos (2022) showed that local labor markets that were more exposed to tariff reductions tended to experience slower growth in incomes than the less exposed regions of the country. This was attributed to the fact the households in regions that were more exposed, were at the same time had little economic activities beyond subsistence agriculture and were characterized by highly depressed incomes.

In Kenya, after globalization, less-skilled workers' labor wages decreased, and the gap between highly and less-skilled workers widened, according to Manda and Sen (2004). The manufacturing industry saw poor labor market outcomes in the 1990s. This had a detrimental impact on overall employment and raised economic disparity within the industry. The results by Manda and Sen (2004) contrasted those of Bigsten and Durevall (2006) who, by comparing the agriculture and manufacturing sectors as proxies of skilled and unskilled labor, observed that income inequality had decreased due to openness. The main argument of Bigsten and Durevall (2006) was that inequality only occurred in the period 1995-2000, but inequality was not there between 1978 and 2000. Perhaps the two results differed due to the time aspects of analysis, or the methodology used since one used the manufacturing sector only while the other combined the agricultural sector with the manufacturing sector.

In summary, the literature shows there is an existing relationship between trade liberalization globalization/openness, and labor incomes. Theoretically, the relationship can be viewed from the angle of the SS framework or specific factor framework, or even the factor endowment framework. Nevertheless, in either case, there is an argument in favor of an existing relationship between wages and trade liberalization. The results of empirical studies for various nations on the effects of trade liberalization on skilled and unskilled employees vary. While some research indicates that

trade liberalization benefits the skilled, others suggest the exact opposite. The same is also observed in terms of formal against informal workers.

3.9. Summary of the reviewed literature and research gap

Theory shows that the effects of tariffs on labor income manifest themselves through prices. The relative return of the factor employed in the production of those items is impacted by an increase in relative prices brought on by the introduction of an import tariff. Three main theories explain how trade liberalization affects the labor income of the country. First, there is the specific factor model. It asserts that if the price of a good's decreases as a result of trade liberalization, the factor unique to the sector that saw the price decrease will lose out to the other sector. The implication is that depending on which industries (import-competing or export-competing) workers are employed in, trade liberalization may benefit them. The second is the SS theorem. According to the SS theorem, in the event, there are two factors of production and two goods, the returns of the factor that was extensively used to manufacture one good are decreased when the price of that good decreases. When the price of commodities of labor-intensive goods increases, returns on labor increase relative to returns from the capital, while the reverse is true for commodities of capital-intensive goods. Finally, the third is the factor endowment theory. According to this theory, globalization can affect income in two ways. The first is through factors of endowments, and the second is through factors of production. The effects of globalization will increase the earnings of the poor if production levels across nations are comparable but endowments vary. The differences observed in per capita income within countries may be due to exogenous productivity differences across countries and not endowments. In this situation, trade openness may not affect income levels or may even increase them since labor and capital may be attracted from low-productivity nations to high-productivity nations.

Empirical studies show that tariffs affect the prices of commodities and in turn affect factor incomes through general equilibrium models. However, the effects are country-specific. According to several empirical studies reviewed, trade liberalization widens the gap between rural and urban residents' incomes. Mensah (2019) finds that trade liberalization negatively affects the incomes of rural households in comparison to urban households. However, Chao, Ee, Nguyen, and Yu (2019) note that the incomes of urban households are negatively affected in comparison to rural households. In terms of formality, some studies like Selwaness and Zaki (2015) and Yahmed and

Bombarda (2020). show that formal workers gain, more compared to informal workers while Cruces, Porto, and Viollaz (2018) show that informal workers gain more. Studies like Harrigan and Reshef (2015) and Burstein and Vogel (2017) demonstrate that skilled workers earn more than unskilled workers. However, others like Mishra and Kumar (2005), Kis-Katos and Sparrow (2015), and Marchand (2017) demonstrate that unskilled workers gain more from trade liberalization.

The majority of the studies reveal that there is uncertainty on how trade liberalization affects labor income. For Kenya, the studies by Manda and Sen (2004) and Bigsten and Durevall (2006) provide two contrasting views on the effect of trade liberalization on labor income in the country. While Manda and Sen (2004) find openness to cause more income inequality between highly skilled and less skilled workers, Bigsten and Durevall (2006) find that openness has decreased income inequality between skilled and unskilled wages. Due to the different approaches used, the two studies may appear to differ. However, in both cases, they use aggregated data that could not be easily pinned down to the household or regional labor income effect of openness. An important aspect that is not captured by the two studies is the effect of trade liberalization under regional integration on household labor incomes. Regional integration, from the revival of the EAC in 2005, introduced new trade dynamics, which changed how Kenya operated in international trade and domestic trade. With the EAC, there was the formation of the CU, which allowed the Partner States to operate under one CET structure. There was also the formation of a common market, which allowed the free movement of labor, goods, and services within the region. Notably, the EAC-CET saw a reduction of import tariffs for many products, which, in linking with theory; it would be expected would affect the labor incomes of households. It has been more than ten years since the EAC came into place. Little research has been conducted so far to investigate the effect of these regional agreements on labor incomes in Kenya at the household level. The main reason for this gap has been the absence of disaggregated household data. However, from the Kenya Integrated Household Survey data for 2015 and 2005 one can evaluate trade liberalization on household labor income, since the surveys capture disaggregated wage data at the household level. This study fills this research gap.

3.10. Theoretical Framework

A large body of research on trade and labor incomes builds on the Mincerian earnings equation, famously known as the human-capital earnings function (Heckman, Lochner, & Petra, 2003). The Mincer earnings equation well elaborated in Mincer and Polachek (1974) builds on the idea that potential earnings today depend on investments in human capital made yesterday. Letting I_t to be the amount of net investment yesterday (time t), while earnings in the same period before investment expenditures are subtracted are E_t, and then letting r be the average rate of return to the individual's human capital investment, where r is assumed to be the same in each period, then:

$$E_{t+1} = E_t + rI_t \quad (3.1)$$

Letting $k_{t+1} = \frac{I_{t+1}}{E_{t+1}}$ be the ratio of human capital investment expenditures to gross earnings. Then we can have $k_t = \frac{I_t}{E_t}$, where k_t is capital in period t. Substituting this in equation (3.1) then

$$E_{t+1} = E_t(1 + rk_t) \quad (3.2)$$

By repeated iterations of equation (3.2) from period 0, we can have:

$$E_t = \prod_{j=0}^{t-1}(1 + r_j k_j)\, E_0 \quad (3.3)$$

Because rk_t is assumed to be a small fraction (Mincer and Polachek, 1974) then, a logarithmic transformation for (3.3) is:

$$lnE_t = lnE_0 + \sum_{j=o}^{t-1} ln(1 + r_j k_j) \quad (3.4)$$

Human capital investments can be in the form of schooling or another form of formal and informal training. Thus, the k terms can be separated to be in the form:

$$lnE_t = lnE_0 + \sum_{i=o}^{s-1} ln(1 + r_i k_i) + \sum_{j=s}^{t-1} ln(1 + r_j k_j) \quad (3.5)$$

Where k_i and k_j are investment ratios during and after schooling periods (Mincer & Polachek, 1974). If the cost of learning, student earnings, and scholarships are added together, then k_i terms can roughly be assumed as 1. Similarly, the returns of post-schooling in terms of potential earnings are assumed to be constant over time $r_j \ldots r_{j+1} = \Omega$, then equation (3.5) can be transformed to be:

$$lnE_t = lnE_0 + rs + \sum_{j=s}^{t-1} ln(1 + \Omega k_j) \quad (3.6)$$

This yield:

$$lnE_t \approx lnE_0 + rs + \Omega \sum_{j=s}^{t-1} k_j \quad (3.7)^7$$

[7] The *equality* symbol changes to a symbol of *roughly equal* because if x is close to zero then $ln(1 + x) \approx x$

For small values of r, Ω, and k.

To form a link between potential earnings and labor market experience y, Mincer assumed that the post-schooling investment was linearly decreasing over time, such that:

$$k_{s+y} = \Phi(1 - \frac{y}{T}) \quad (3.8)$$

Where $y = t - s \geq 0$, T is the last year of working in life, and $\Phi \in (0,1)$. Rearranging equation (3.7) and using equation (3.8) we have:

$$lnE_t \approx lnE_0 - \Phi\Omega + rs + \left(\Phi\Omega + \frac{\Phi\Omega}{2T}\right)y - \left(\frac{\Phi\Omega}{2T}\right) \quad (3.9)$$

To obtain an expression for potential net earnings of post-schooling investment, one can subtract equation (3.8) which represents investments from equation (3.9) which is an equation for gross earnings, thus:

$$lnE_t - \Phi\left(1 - \frac{y}{T}\right) \approx lnE_0 - \Phi\Omega - \Phi + rs + \left(\Phi\Omega + \frac{\Phi\Omega}{2T} + \frac{\Phi}{2T}\right)y - \left(\frac{\Phi\Omega}{2T}\right)y^2 \quad (3.10)$$

This can be summarized to be:

$$ln\, npe_t \approx \beta + rs + \theta y - \alpha y^2 \quad (3.11)$$

Where the $npe_t = lnE_t - \Phi\left(1 - \frac{y}{T}\right)$ is potential net incomes at time t, the other new symbols are constants, in that $\beta = lnE_0 - \Phi\Omega - \Phi$, $\theta = \left(\Phi\Omega + \frac{\Phi\Omega}{2T} + \frac{\Phi}{2T}\right)$ and $\alpha = (\frac{\Phi\Omega}{2T})$. In literature, it assumed that observed earnings are equal to potential net labor income at any time t, implying:

$$ln\, e_t = ln\, npe_t \quad (3.12)$$

Where e_t is observed in labor incomes. Therefore, equation (3.11) can be rewritten to form the Mincerian earnings equation of the form:

$$ln\, e_t = \beta + rs + \theta y - \alpha y^2 \quad (3.13)$$

The equation implies that the earnings of an individual will increase by the number of investments in training and education.

3.11. Empirical Framework

Empirically, apart from individual characteristics like investments in schooling noted in equation (3.13), other variables have been observed to influence the labor incomes of an individual and more specifically, the price of a good. High prices reduce disposable incomes (Beyene, 2014). Acknowledging the impact of prices on labor incomes, equation (3.13) can broadly be rewritten as:

$$e_{jt} = e_{jt}(P_{it}, Z_{jt}) \quad (3.14)$$

Where e_{jt} is labor income of individual j at time t, P_{it} is the price of goods i and Z_{jt} is a set of individual characteristics. Considering labor characteristics, earnings in equation (3.14) are expected to vary amongst various forms of labor particularly, amongst skilled versus unskilled, those workers in formal versus informal sectors, and finally workers in agricultural versus non-agricultural sectors. The categorization of labor in these forms is important because Kenya is characterized by a lot of informal labor. Further, the agricultural sector significantly contributes to Kenya's GDP. Thus, there is a need to control for specific factors that are in these categorizations that would tend to push labor incomes upwards or downwards. Finally, the categorization of labor within these characteristics helps to identify the possibility of inequality effects of trade liberalization. Thus, taking into consideration that workers are usually paid labor incomes, the earnings equation (3.14) can be log linearized and transformed to have a variation of labor incomes amongst skilled and unskilled workers in the form:

$$ln\, w_{jsrt} = \beta_0 + \beta_1 lnP_{irt} + \beta_2 Des + \beta_3 Sec + \lambda_w Z_{jt} + Y + \varepsilon_{jsrt} \quad (3.15)$$

Where w_{jsrt} represents average labor income for household j with skill level s, in region r, and at time t. The main explanatory variable is P_{irt} which represents the price of goods i in region r, and at time t. This price is directly affected by import tariffs, thus the coefficient β_1 is the measure of how labor incomes respond when prices change. The symbol Z_{jt} represents individual characteristics. Among the characteristics are age, gender, marital status, and religion λ_w are the coefficients of these characteristics. Des is a dummy for job formality, where 1 = informal and 0 = formal work, Sec is also dummy, where 1 = agricultural sector and 0 = non-agricultural sector. The term Y is a year dummy to control for fixed-year effects. Finally, the error term is ε_{jsrt} and is assumed Independent and identically distributed (IID).

To observe the effect of changes in prices on labor incomes in the various job formality equation (3.15) is remodified to be of the form:

$$ln\, w_{jdrt} = \beta_0 + \beta_1 lnP_{irt} + \beta_2 Skill + \beta_3 Sec + \lambda_w Z_{jt} + Y + \varepsilon_{jdrt} \quad (3.16)$$

Where w_{jdrt} represents the average labor income for household j in job formality Des, in region r, and at time t. The other variables are the same as those in equation (3.15), except $Skill$ and ε_{jdrt}. The term $Skill$ is a dummy that takes the value of 1 = skilled and 0 = unskilled. Finally ε_{jdrt} is an

error term, which is IID. To observe the effect of changes in prices on labor incomes in the various sectors, equation (3.15) is again modified to be of the form:

$$ln\, w_{jkrt} = \beta_0 + \beta_1 lnP_{irt} + \beta_2 Skill + \beta_3 Des + \lambda_w Z_{jt} + Y + \varepsilon_{jkrt} \quad (3.17)$$

The description of most of the terms in equation (3.17) are the same as those in equations (3.15) and (3.16), except w_{jkrt} and ε_{jkrt} . For both of these terms, k is included to imply the job sector. Finally, since the equations estimated are log-linear, the interpretation of dummy variables follows Nicita's (2009) approach where the percentage change in the dependent variable β^* due to the dummy variables being given by;

$$\beta^* = \left(e^{\beta} - 1\right) \times 100 \quad (3.18)$$

Data types and sources

The labor incomes of workers were classified into three major groups. The first group is skilled versus unskilled workers. Under this classification, workers who have at least completed their primary education are regarded to be skilled. The second classification was informal versus formal workers. Informal workers are those who indicated in the survey that they work in the informal sector (*"Jua Kali"),* either as employed or self-employed. Formal workers are those who indicated to work for; the national government, civil service ministries, judiciary, parliament, commissions, state-owned enterprise/institution, teachers service commission, county government, private sector enterprise, international organization/NGO, local NGO, faith-based organization, and formal self-employed. The third classification was workers in the agricultural sector versus the non-agricultural sector. The workers in the agricultural sector were either: small-scale agriculture (employed), large-scale agriculture, pastoralists (employed, and self-pastoralist activities). All these workers were observed in terms of their residence, either rural or urban. The summary of the variables is shown in Table 3.2:

Table 3.2: Summary of the variables used in the analysis

Variable	Description	Type of variable	Source
Labor income	A summation of salaries, house allowances, medical allowances, other allowances from work, and average daily wages.	Dependent variable (continuous)	KIHBS
Price	The ratio of the amount in Kenya shillings spent on the purchase of the commodity with the amount purchased.	Independent variable (continuous)	KIHBS
Age	A continuous variable of households reporting an age of 13 and above.	Independent variable (continuous)	KIHBS
Gender	A dummy variable indicating whether male or female. 1= Male 0 = Female	Independent variable (Dummy)	KIHBS
Marital status	A multinomial variable with indicators given by 1-monogamous married 2-polygamous married, 3-living together, 4-separated, 5-divorced, and 6-widow.	Independent variable (Multinomial)	KIHBS
Religion	A multinomial variable with indicators of 1-catholic, 2-protestant, 3-other Christians, 4-Muslim, 5-Hindu, 6-traditionist, 7-other religion, and 8-no religion	Independent variable (Multinomial)	KIHBS
Skill	A dummy indicator of a worker who is either skilled or unskilled. 1 = skilled 0 = Unskilled	Independent variable (Dummy)	KIHBS
Formality	A dummy indicator of a worker doing either formal or informal work 1= Formal workers 0=Informal worker	Independent variable (Dummy)	KIHBS
Sector	A dummy indicator of a worker either in the agricultural or non-agricultural sector. 1 = Agricultural sector 0 = Non-agricultural sector	Independent variable (Dummy)	KIHBS

Industry	A dummy indicator of the types of goods to which the prices are classified into. 1 = Agricultural 0 = Manufactured	Independent variable (Dummy)	KIHBS

Source: Author's description

3.12. Descriptive statistics

Descriptive statistics show the general features of the data used in the study. Prices may not vary significantly within one single survey to allow for the estimation of price-labor income elasticities (Nicita, 2009). Thus, observations in 2005 and 2015 were stacked together to better capture the effects of prices on labor incomes. Generally, heterogeneity is observed in the sample used. To reduce measurement errors, observations that did not report any labor income values were dropped from the study. The average real labor income for 2005 was lower than the average labor income in 2015 as seen in Table 3.3. On the other hand, the average price in 2005 was larger than the price in 2015. A reduction in prices and an increase in labor incomes were expected. This was so because the introduction of the EAC-CET saw a fall in the average prices of commodities. The standard deviation for both labor incomes and prices was quite high for the two periods, a reflection of the significant spread of these variables from their means.

Table 3.3: Summary statistics

Variables	2005 No. of Observations	Mean	Standard Deviation	2015 No. of Observations	Mean	Standard Deviation
Labor income	25,047	3191.185	10074.110	13,705	5191.004	10067.910
Price	25,047	214.381	3828.217	13,705	196.361	1381.607
Residence	25,047	0.603	0.556	13,705	0.529	0.547
Gender	25,047	0.560	0.464	13,705	0.641	0.454
Age	25,047	31.137	9.125	13,705	32.981	8.573
Religion	22,572	2.243	1.014	13,705	2.245	0.990
Sector	25,047	0.525	0.499	13,705	0.358	0.479
Formality	17,081	0.362	0.481	13,705	0.621	0.485
Skill	25,047	0.532	0.499	13,705	0.968	0.177
Marital Status	22,571	4.004	2.385	13,705	3.090	1.991

Source: Author's computations with the available data

The overall number of residences was nearly the same for both periods. The magnitude indicates that on average, the number of rural and urban households in the sample was approximately equal for the two periods. The magnitude of the gender coefficient shows that the average ratio of males to females in the sample was approximately the same for the two periods. Skill and formality dummies were higher in 2015 compared to 2005. This shows that most of the households in 2015 reported being more skilled and doing formal jobs. In 2005, more people worked in the agricultural sector than in 2015 as shown from the sector dummy, which decreased from 0.613 to 0.153. These statistics and differences in the composition of workers show high levels of labor heterogeneity among the households that were used in the analysis.

To understand further the distribution of income, the mean income for different groups of workers was computed for the two forms of residence in the sample years. The results are highlighted in table 3.4. The standard errors, reported in brackets, are all very small. This implies that on average, labor income values are close to the mean. Although the sample units collected in 2005 were not the same as those in 2015, it can still be observed that on average, the number of unskilled workers declined for the two periods, while skilled workers increased. This could be attributed to the introduction and sensitization of free primary education in the country in 2003. While informal workers decreased under job formality, formal workers increased. Further, in the job sector, the number of workers in the agricultural sector declined while the number of workers in the non-agricultural sector grew.

Table 3.4: Average labor incomes of households (logs)

	2005		2015		Percentage changes		
	Unskilled	skilled	Unskilled	skilled	Unskilled	skilled	Average
Rural	5.879	7.490	7.657	7.748	30.24	3.44	15.23
Urban	6.351	7.932	7.601	8.289	19.68	4.49	11.25
Strictly Urban	5.960	8.342	7.887	9.225	32.34	10.59	19.65
Sample	11717	13330	444	13261			
	Informal	Formal	Informal	Formal	Informal	Formal	Average
Rural	5.988	7.688	8.360	7.343	39.63	-4.49	14.83
Urban	6.837	8.030	8.604	8.032	25.84	0.02	11.89
Strictly Urban	6.737	7.802	9.089	9.284	34.92	19.00	26.37
Sample	10897	6184	5201	8504			
	Agriculture	Non	Agriculture	Non	Agriculture	Non	Average

Rural	6.438	7.212	7.883	7.650	22.44	6.07	13.79
Urban	7.191	7.353	8.138	8.323	13.16	13.19	13.17
Strictly Urban	5.921	7.370	9.580	9.124	61.79	23.81	40.73
Sample	13155	11892	4907	8798			

Source: Author's computations with the available data

In terms of labor incomes, on average the labor incomes of skilled workers, both in rural and urban areas are more than those of unskilled workers. The gap in labor incomes is, however, more pronounced for urban households compared to rural households. Generally, labor incomes for formal workers were higher than for those doing informal jobs. An exception was observed for rural households in 2015, where labor incomes for informal workers slightly increased. Finally, labor incomes for workers in the non-agricultural sector are larger than in the agricultural sector.

3.13. Empirical Results and discussion

The study estimated a Mincerian wage equation to examine the variation of labor incomes with prices under three classifications of labor characteristics. The first classification observed labor incomes in terms of skilled and unskilled workers. The second classification of labor incomes was in terms of formal and informal work while the final classification of labor incomes was in terms of the agricultural sector versus the non-agricultural sector. For all these classifications, the study observed labor incomes between rural and urban areas. The price coefficients in each model define trade liberalization in this study. As such, it is interpreted as a form of more openness since prices generally decreased following a reduction of tariffs that were introduced by the EAC-CET.

Table 3.5 shows that the price of goods, both in rural and urban areas is positively associated with the labor incomes of skilled workers. The effect is larger for the two major cities categorized as strictly urban, where labor incomes increased by an average of 0.16%. The price coefficients for unskilled workers were not statistically significant. This shows that skilled workers gained more from trade liberalization compared to unskilled workers. In Africa, similar observations were made for Burkina Faso, Cameroon, Ivory Coast, Ethiopia, Gambia, and Madagascar (Nicita et al., 2014). The findings are ascribed in part to the fact that industries that compete with imports frequently require a disproportionate amount of skills, as well as to the fact that political economies in Sub-Saharan African nations are frequently tilted in favor of skilled laborers. The EAC-CET thus is seen to protect skilled labor that is predominantly owned by rich households (Nicita et al., 2014).

These findings conform to trade literature, where Trade liberalization can have a differential impact on different sectors and occupations. Some industries may benefit more from international trade, particularly those that are export-oriented or have a comparative advantage. If these industries demand higher-skilled workers, it can create a skill premium where wages for skilled workers increase at a higher rate compared to low-skilled workers.

Trade liberalization-related labor income disparities between skilled and unskilled employees have also been noted in other emerging nations such as China (Fan et al., 2020) Indonesia (Kis-Katos, Pieters, & Sparrow, 2018), and Columbia (Pavcnik, 2017). Harrigan and Reshef (2015) attribute the difference in the increase in labor incomes to an increase in the relative demand for skilled workers compared to unskilled workers. In response to growing import competition, less skill-intensive non-exporters cut back while new firms enter the more skill-intensive industries. Theoretically, Chao, Ee, Nguyen, and Yu (2019) argue that the labor income gap can be caused by a shift in capital and labor. Generally, if tariffs on manufactured goods are lowered, they could have a short-term negative impact on protected manufactured goods in the urban sector. As a result, capital from the urban manufacturing sector is transferred to the rural agriculture sector, which in the long-term benefits unskilled workers in the country. However, lower capital costs lure new firms into the urban manufacturing sector. Due to the increased demand for skilled labor, skilled workers' incomes eventually outpace those of unskilled ones.

The H-O model, which states that trade liberalization increases the skill premium in a country with a surplus of skilled labor (Davis and Mishra, 2007) can be used to explain the increase in labor wages of skilled workers in this study. Along with the labor income gap, Pavcnik (2017) and Amiti and Cameron (2012) demonstrate that in many developing nations with trade liberalization policies, the labor incomes of more educated workers rise relative to less educated workers. Kenya is one of the emerging nations with a disproportionately large number of skilled workers when compared to other developing nations. The results of this investigation thus support the H-O model's theoretical predictions. Further, the findings conform to the theoretical arguments of Chao, Ee, Nguyen, and Yu (2019). Specifically, there was a possibility of the entrance of new firms that required skilled workers in the manufacturing sector due to a reduction in capital costs. The reduction of costs was a result of the elimination of import tariffs for inputs used in the manufacturing sector under the EAC-CET. Caliendo, Feenstra, Romalis, and Taylor (2015) find

that trade liberalization has a positive impact on firm entry. However, the magnitude is higher for developed countries compared to developing and emerging countries.

Table 3.5: Skilled vs Unskilled Workers

	Rural		Urban		Strictly Urban	
	Skilled	Unskilled	Skilled	Unskilled	Skilled	Unskilled
Log price	0.049**	-0.015	0.059***	0.022	0.164***	0.076
	(0.020)	(0.000)	(0.014)	(0.000)	(0.048)	(0.061)
Log age	0.838***	0.762	0.948***	0.762	0.166	1.326
	(0.187)	(0.000)	(0.170)	(0.000)	(0.695)	(1.346)
Marital status	-0.094***	0.090	-0.041**	0.068	0.057*	0.236*
	(0.024)	(0.000)	(0.017)	(0.000)	(0.032)	(0.125)
Religion	-0.073*	0.104	-0.179***	0.124	-0.197*	0.025
	(0.043)	(0.000)	(0.048)	(0.000)	(0.102)	(0.233)
Gender	0.260***	0.047	0.357***	0.455	0.419***	0.616
	(0.094)	(0.000)	(0.067)	(0.000)	(0.140)	(0.385)
Industry	0.044	-0.049	-0.062	0.129	-0.015	-0.464
	(0.063)	(0.000)	(0.061)	(0.000)	(0.159)	(0.310)
Formality	-0.012	1.367	0.087	0.324	0.517***	0.915**
	(0.087)	(0.000)	(0.072)	(0.000)	(0.143)	(0.372)
Sector	-0.163*	-1.001	-0.415***	0.271	-0.443	0.461
	(0.093)	(0.000)	(0.102)	(0.000)	(0.327)	(0.742)
Year	0.248**	0.839	0.216**	1.132	1.008***	2.111***
	(0.118)	(0.000)	(0.093)	(0.000)	(0.164)	(0.563)
Constant	4.701***	2.791	4.935***	2.595	6.562***	-0.250
	(0.695)	(0.000)	(0.620)	(0.000)	(2.302)	(5.146)
Observations	8,132	2,016	10,191	3,063	624	265
R-squared	0.061	0.192	0.089	0.089	0.243	0.143

Notes: *** p<0.01, ** p<0.05, * p<0.1 indicate statistical significance at 1%, 5%, and 10% respectively. Standard errors are in parentheses

This study shows that the magnitudes of the price effects are quite low. The effects typically attributed to the tariff changes are just an overestimate of the pure tariff effect as it reflects the combined effect of the tariff and NTB change in 2007 (Pinelopi Koujianou Goldberg & Pavcnik, 2007). This implies that, although there were labor income increases due to trade liberalization, the effects were not very large. A further implication is that the increase in demand for skilled workers in comparison to unskilled workers did not increase by a large margin. The low

magnitudes reflect market imperfections in the country, where much of the tariff-border effects are not heavily felt in domestic markets. Many developing countries like Kenya face the problem of market imperfections caused by large transaction costs and poor infrastructure (Nicita, 2009). This hinders the domestic markets from fully gaining from the benefits of trade liberalization. According to Shepherd, Melo, and Sen (2017), the EAC-CET did not significantly reduce the trade costs of the EAC Partner States. They attribute this to high non-tariff measures like poor trade facilitation which imposes higher trading costs compared to import tariffs.

For skilled employees, age matters and is statistically significant in both rural and urban settings. This demonstrates how skilled professionals' labor incomes in the nation improve with each extra year of employment. This suggests that more experience and years of employment are linked to higher incomes in Kenya's rural and urban areas. For unskilled workers in purely urban regions, the age coefficient is negligible. In rural and urban areas of the country, marriage lowers skilled employees' wages. This reflects the burden of sharing labor incomes among married couples who are skilled in rural and urban areas. However, the opposite is observed in the major cities of the country. Married households are observed to earn more.

The coefficient for gender is positive and statistically significant for skilled workers in both rural and urban areas. The coefficient is approximately 0.4 in urban areas. This implies that *ceteris paribus*, on average, male skilled workers earn 40% more than female workers in both urban and strictly urban areas of the country. In rural areas, skilled male workers earn an average of 30% more than females. This finding could be pegged to the fact that male workers are more likely to work in the manufacturing sector compared to female workers (Gaddis & Pieters, 2017). The manufacturing sector experienced more trade liberalization compared to the agriculture sector in Kenya. These findings generally conform to the literature on the labor income gap between males and females. Studies have shown that, globally, women make less than men even after controlling for individual characteristics such as age and education (Benguria & Ederington, 2018).

Dummy for job formality is positive and statistically significant for unskilled and skilled workers in strictly urban areas of the country. This implies that both skilled and unskilled workers doing formal jobs in the major cities of the country earn more than those doing informal jobs. The magnitude is highest for unskilled workers doing formal jobs since they earn close to 150% more

than unskilled workers doing informal work in the major cities of the country. For skilled workers, those doing formal work earn 68% more than those doing informal work, but they are skilled. These indicators reflect the high labor income disparity between skilled and unskilled workers doing formal and informal work in major cities of the country. The sector dummy is negative and statistically significant for skilled workers in rural and urban areas. This shows that ceteris paribus, skilled workers in the agricultural sector earn less than skilled ones in the non-agricultural sector of the country. The difference is more pronounced in urban areas, where skilled workers in non-agricultural sectors earn close to 52% more than those in the agricultural sector. In rural areas, those in the non-agricultural sector earn 17% more. This shows that income and returns for workers in the agricultural sector in the country are lower than income from the non-agricultural sectors. Agricultural sector workers in major cities are not many. This could be the reason behind the non-significant effect of income for skilled and unskilled workers in major cities in terms of sector of work.

The separation of workers based on their types of jobs shows that on average both formal and informal workers gained from trade liberalization in strictly urban areas. Specifically, labor incomes increased due to a decrease in prices as seen in table 3.6. In urban areas, only the labor incomes of formal workers increased. In terms of magnitude, the largest effect is observed on formal workers in strictly urban areas of the country. The reduction of prices under the EAC-CET saw an increase in labor incomes. For formal workers in strictly urban areas, the increase was 0.17% while in urban areas it was 0.07%. Labor incomes of informal workers in both rural and urban areas did not significantly respond to changes in prices. These differences signify some levels of labor income disparities between formal and informal workers caused by tariff changes. Two reasons could be attributable to the variations. First, firms would have found it more profitable to move to the formal sector rather than remain informal after the formation of the EAC-CET. This is because much of the tariff reductions were on capital goods, raw materials, and intermediate goods. The shift is enhanced by the fact that firms in the informal sector are less capital-intensive compared to those in formal sectors. Selwaness and Zaki (2015) observed a similar case in Egypt, where, as tariffs were reduced more for intermediate products, firms found it more profitable to shift to formal manufacturing industries in the country. Secondly, due to cheaper capital goods, raw materials, and intermediate goods, new firms would have been attracted to enter the formal

manufacturing industry in Kenya. This would see an increase in labor incomes for formal workers compared to informal ones. A similar phenomenon was observed in Mexico, where tariff cuts increased the probability of formal employment in manufacturing industries (Yahmed & Bombarda, 2020).

The coefficients for labor incomes of workers in the informal sector in strictly urban regions are positive. This shows that consumers in these regions of the country may have experienced declining incomes and, as a result, shifted toward lower prices and lower-quality goods produced in the informal sector after a regime of trade liberalization, which is a possible explanation for the trend. Dix-Carneiro and Kovak (2017) also observed this in Brazil. Although the effect of prices on formal workers is significant compared to informal workers, the coefficients for labor incomes of workers in the informal sector in strictly urban areas are still significantly positive. Consumers in these regions of the country may have experienced declining incomes and, as a result, shifted toward lower prices and lower-quality goods produced in the informal sector after a regime of trade liberalization, which is a possible explanation for the trend. Dix-Carneiro and Kovak (2017) also observed this in Brazil. Further, if trade liberalization under the EAC-CET caused some workers to shift from the formal to the informal sector, the formal workers would tend to have more favorable unobserved characteristics than the average informal worker. This would be the case if, for example, they were more skilled than the average formal worker. Correspondingly, the country is likely to attract the entry of new foreign firms after a regime of trade liberalization. Prices and markups of domestic firms fall as foreign firms enter the domestic market (Amiti et al., 2019). A lot of domestic firms in Kenya employ informal workers as seen in figure 3.1 meaning that if prices of commodities fall, these firms may end up reducing the labor incomes they pay their workers. Finally, the magnitudes of the price effects on labor incomes, though positive, are quite low. This implies that, even though there were new entrants or movements within the formal and informal sectors, the effects were not very pronounced after the adoption of the EAC-CET.

Table 3.6: Formal vs informal workers

	Rural		Urban		Strictly Urban	
	Formal	Informal	Formal	Informal	Formal	Informal
Log price	0.004	0.041	0.065***	0.027	0.173***	0.117**
	(0.019)	(0.028)	(0.018)	(0.022)	(0.053)	(0.054)

Log age	1.043***	0.282	0.989***	0.198	0.912	-0.008
	(0.255)	(0.231)	(0.208)	(0.279)	(0.617)	(0.732)
Marital status	0.002	0.006	-0.025	0.028	0.086*	0.060
	(0.034)	(0.027)	(0.023)	(0.022)	(0.046)	(0.050)
Religion	-0.074	0.038	-0.143**	-0.007	-0.076	-0.074
	(0.084)	(0.043)	(0.059)	(0.059)	(0.115)	(0.247)
Gender	0.307**	0.098	0.411***	0.219**	0.369*	0.420
	(0.121)	(0.112)	(0.099)	(0.097)	(0.219)	(0.325)
Industry	-0.068	0.088	-0.075	-0.007	-0.055	-0.283
	(0.066)	(0.082)	(0.080)	(0.063)	(0.181)	(0.206)
Sector	0.160	-0.911***	-0.380***	-0.132	0.292	-0.263
	(0.140)	(0.108)	(0.112)	(0.140)	(0.320)	(0.638)
Skill	1.084***	0.885***	1.641***	0.861***	2.463***	1.497***
	(0.205)	(0.169)	(0.186)	(0.169)	(0.288)	(0.424)
Year	-0.578***	1.929***	-0.568***	1.490***	0.256	1.651***
	(0.155)	(0.156)	(0.134)	(0.107)	(0.185)	(0.276)
Constant	3.223***	4.490***	3.648***	5.304***	2.124	5.380**
	(0.964)	(0.808)	(0.731)	(1.057)	(2.068)	(2.546)
Observations	5,888	4,260	6,842	6,412	431	458
R-squared	0.130	0.419	0.213	0.344	0.546	0.494

Notes: *** p<0.01, ** p<0.05, * p<0.1 indicate statistical significance at 1%, 5%, and 10% respectively. Standard errors are in parentheses

Age is positive and statistically significant for formal workers in both urban and rural areas. This shows that as these workers age, they tend to gain more experience and hence have more returns from their jobs. The coefficient for age is however non-significant for informal workers. This demonstrates that the number of years of experience does not significantly affect the pay of workers in the informal sector. This illustrates how dynamic the country's informal economy is. The study found that neither marital status nor religion significantly affects the labor incomes of the nation's formal and informal workers. The gender coefficient for formal workers is statistically significant and favorable in both rural and urban areas. According to the coefficient, formal male workers in the country's urban areas make an average of 40% more money than female workers. The variation in size in rural areas is about 30%. These differences have been attributed to two reasons in literature. First, women in Kenya are more likely to be employed in lower-paying occupations than men. For example, a study by ILO (2017) found that women in Kenya were more likely to be employed in occupations such as sales and service, while men were more likely to be employed in occupations such as construction and manufacturing. These occupational

differences can lead to a gender wage gap. The second reason is discrimination. Omanyo (2021) found that in Kenya, women were less likely to be hired for jobs than men, even when they had the same qualifications. Additionally, the study found that women were paid less than men for the same work.

The sector dummy is negative and statistically significant for formal workers in urban areas and informal workers in rural areas. Workers in agricultural sectors doing informal jobs in rural areas earn 90% less than they earn their counterparts doing informal jobs in non-agricultural sectors. In urban areas, formal sector workers in agriculture earn 38% less than formal sector workers in non-agricultural sectors. This mainly shows that there are higher returns from the non-agricultural sector of the country. For the skill dummy, the coefficient for both the formal and informal labor force in the nation is positive and statistically significant. This shows that in Kenya, skilled employees earn more than unskilled individuals. The larger magnitudes of the difference are observed in formal workers in urban areas. These workers doing formal jobs earn close to 2 times what unskilled workers earn.

The final classification of labor incomes was in terms of workers in the agricultural sector compared to those in the non-agricultural sectors. As seen in table 3.7, the price effect in both rural and the two major cities in the country was more pronounced in the non-agricultural sectors. Specifically, workers in non-agricultural sectors experienced gains in their levels of labor incomes compared to those in agricultural sectors. The difference in effects, affirms that trade liberalization under the EAC-CET mainly favored workers in the non-agricultural sectors. Most of the workers in the agricultural sector, mainly farmers of crops and livestock, did not experience a significant increase in their labor incomes after the introduction of the EAC-CET. Not much trade liberalization was observed on agricultural commodities as they are still highly protected. As such prices in agricultural sectors were not very responsive to changes in import tariffs under the EAC-CET. The significant positive labor income effects in the non-agricultural sectors could be attributed to either the entrance of new manufacturing industries due to cheaper raw materials or shifts in firms from agricultural sectors to non-agricultural sectors.

Table 3.7: Agricultural vs Non-Agricultural sector workers

	Rural		Urban		Strictly Urban	
	Agricultural	Non-Ag	Agricultural	Non-Ag	Agricultural	Non-Ag
Log price	0.023	0.036*	0.037	0.051***	0.094	0.078**
	(0.026)	(0.020)	(0.025)	(0.016)	(0.083)	(0.037)
Log age	0.171	1.245***	-0.171	1.623***	-0.474	1.126**
	(0.219)	(0.237)	(0.268)	(0.195)	(0.966)	(0.471)
Marital status	-0.008	-0.024	-0.014	-0.001	0.099	0.019
	(0.029)	(0.032)	(0.032)	(0.017)	(0.147)	(0.029)
Religion	0.118***	-0.176***	-0.109	-0.063	-0.756*	0.094
	(0.046)	(0.067)	(0.126)	(0.044)	(0.395)	(0.090)
Gender	-0.140	0.381***	0.173	0.414***	0.478	0.105
	(0.117)	(0.118)	(0.147)	(0.064)	(0.725)	(0.112)
Industry	0.057	0.021	0.100	-0.050	0.369	-0.140
	(0.084)	(0.067)	(0.087)	(0.065)	(0.379)	(0.134)
Formality	1.088***	-0.350***	0.160	0.132*	3.454***	0.290***
	(0.109)	(0.123)	(0.150)	(0.077)	(0.980)	(0.108)
Skill	1.380***	0.973***	1.028***	1.416***	-1.238	2.425***
	(0.146)	(0.211)	(0.249)	(0.137)	(1.398)	(0.174)
Constant	0.769***	0.103	0.533***	0.350***		0.653***
	(0.142)	(0.164)	(0.187)	(0.098)		(0.139)
Observations	4.191***	2.603***	6.999***	0.718	8.672*	1.383
R-squared	(0.839)	(0.868)	(0.981)	(0.787)	(4.626)	(1.672)

Notes: *** p<0.01, ** p<0.05, * p<0.1 indicate statistical significance at 1%, 5%, and 10% respectively. Standard errors are in parentheses

Age is positive and statistically significant for labor incomes in the non-agricultural sector. This shows an increase in the age of workers and hence more experience is associated with an increase in labor incomes of workers in non-agricultural sectors in Kenya. However, age is not a determining factor in the agricultural sector in Kenya. Gender is positive and statistically significant for workers in the non-agricultural sectors in rural and urban areas. This result affirms that male workers generally earn more labor incomes than female workers in Kenya. The job formality dummy is statistically significant in both the agricultural and non-agricultural sectors. This implies that on average, workers doing formal work earn more than those doing informal work in the country. Finally, the skill dummy shows that skilled workers make more than unskilled workers in the country.

One of the key elements of the EAC-CET was the elimination of import tariffs among the EAC partner states. Besides promoting trade among the partner states, the elimination of tariffs was expected to lower the prices of commodities faced by households within the partner states. Theoretically, the reduction in commodity prices is expected to increase the real labor incomes of households. The magnitude of the effect is predicted to be higher for counties/regions that border the EAC. This is so because of low transport costs and hence easier pass-through of low tariffs to domestic prices. In the capital city, the magnitude of the effect is also predicted to be high because of low transport costs. This is so because it is where a lot of goods are cleared from the main international airport. The same phenomenon is expected for Mombasa County where the majority of the commodities enter the country through the port. The sensitivity of labor incomes on these aspects of; borders, clearances, and transport costs were tested and reported in this section of the study. The respective zoned areas are highlighted in appendix 7. The results of the analysis are shown in table 3.8.

Table 3.8: Effects of trade liberalization on labor incomes of households on EAC borders

	EAC bordering counties	Non-EAC bordering counties	Non-bordering counties	Major cities
Log price	0.094***	-0.019	0.026	0.138***
	(0.022)	(0.036)	(0.017)	(0.039)
Log age	1.218***	0.011	0.670***	0.387
	(0.211)	(0.365)	(0.163)	(0.536)
Marital status	-0.028	-0.006	-0.065***	0.084**
	(0.030)	(0.053)	(0.019)	(0.033)
Religion	-0.099	-0.152*	0.042	-0.086
	(0.062)	(0.079)	(0.044)	(0.125)
Gender	0.257**	0.481**	0.177**	0.470**
	(0.110)	(0.198)	(0.076)	(0.191)
Industry	0.044	-0.251**	0.058	-0.109
	(0.074)	(0.128)	(0.052)	(0.143)
Skill	1.211***	0.881***	1.282***	1.944***
	(0.169)	(0.315)	(0.126)	(0.324)
Formality	0.274**	-0.164	0.231***	0.413***
	(0.128)	(0.176)	(0.074)	(0.131)
Sector	-0.216**	0.067	-0.507***	-0.142

	(0.109)	(0.222)	(0.084)	(0.294)
Year	0.476***	0.430*	0.308***	1.068***
	(0.159)	(0.233)	(0.100)	(0.176)
Constant	1.668**	6.973***	4.036***	3.639**
	(0.836)	(1.373)	(0.585)	(1.805)
Observations	7,212	2,769	13,421	889
R-squared	0.217	0.119	0.202	0.542

Notes: *** p<0.01, ** p<0.05, * p<0.1 indicate statistical significance at 1%, 5%, and 10% respectively. Standard errors are in parentheses

As expected, the price effect was positive and significant for counties that are adjacent to the EAC partner states and the two major cities in the country. These findings show that labor incomes were sensitive to transport costs and border clearance effects. The coefficient for major cities was the highest followed by counties that border Uganda and Tanzania. The coefficients of price changes for non-EAC bordering and non-border counties were not significant. This implies that counties that are far from the EAC borders or far from the major cities in the country did not experience any substantial increase in their labor incomes after the adoption of the EAC-CET. While the coefficients of prices for EAC borders and major cities are statistically significant, their magnitudes are low. This generally shows that the tariff-price-labor income effect was not very high after the adoption of the EAC-CET.

Age has a positive association with labor incomes while religion and marital status are negatively associated with labor incomes. Gender dummy is positive, an affirmation that males earn more labor incomes than females. The skill coefficient is positive in all the classifications, an indication that, generally, skilled workers make more than unskilled workers. The job formality dummy is positive in the models implying that across regions, formal workers earn more than informal workers. The coefficient for the sector is negative and statistically significant for EAC-border and non-bordering counties. This shows that workers in non-agricultural sectors earn more than those in the agricultural sector.

3.14. Robustness

In the household surveys, several households did not report their labor incomes. Non-reporting does not always imply they are not engaged in economic activities that generate some income. In

the sample, 816,043 households reported either working in formal or informal work. However, out of these; 116,151 (14.2%) stated they were doing informal jobs but did not provide any labor income while 221,973 (27.2%) stated doing formal jobs but did not have any labor income. From the same sample, 1,260,838 households were shown to be involved either in the agricultural or non-agricultural sector. However, out of these, 377,774 (30%) working in the non-agricultural sector did not report any labor incomes while 393,695 (31.2%) working in the agricultural sector did not report any labor incomes. In analyzing the various log model specifications, these values are treated as blanks or zeros and thus are not included in the analysis. Dropping these values might lead to the loss of significant information about the households. To test whether the findings of the study were sensitive to these dropped values, an approach in the trade literature, proposed by Santos Silva and Tenreyro (2006) is used to address the problem of many zero values. The approach involves estimating a Poisson Pseudo Maximum Likelihood (PPML) estimator. The estimator can take advantage of the information contained in the zero values (Yotov, Piermartini, Monteiro, & Larch, 2016). The estimator is also preferred since it addresses the problem of heteroscedasticity in log-linear transformed trade models. On PPML estimation, rather than transforming equation (3.14) in its log form, the equation is transformed to its multiplicative form as:

$$e_{jt} = \exp\left[P_{it} + Z_{jt}\right] \varepsilon_{ijt} \tag{3.18}$$

The same multiplicative transformations are done for equations (3.15), (3.16), and (3.17), such that:

$$e_{jsrt} = \exp\left[\beta_1 P_{irt} + \beta_2 Des + \beta_3 Sec + \lambda_w Z_{jt} + Y + \Phi_{At} + \Theta_{AD} + \eta_{AK}\right] \varepsilon_{jsrt} \tag{3.19}$$

$$e_{jsrt} = \exp\left[\beta_1 P_{irt} + \beta_2 Skill + \beta_3 Sec + \lambda_w Z_{jt} + Y + \Phi_{At} + \Theta_{AD} + \eta_{AK}\right] \varepsilon_{jsrt} \tag{3.20}$$

$$e_{jsrt} = \exp\left[\beta_1 P_{irt} + \beta_2 Skill + \beta_3 Des + \lambda_w Z_{jt} + Y + \Phi_{At} + \Theta_{AD} + \eta_{AK}\right] \varepsilon_{jsrt} \tag{3.21}$$

The results of this PPML for skilled and unskilled workers are highlighted in appendix 9. As expected, the coefficients on PPML are different from those on OLS due to the zero values accounted for in the PPML estimator. However, from appendix 9 the pattern of variations still shows that the coefficient for the price effect on labor incomes was statistically significant only for skilled workers. Further, in cases where it was significant, the coefficient was positive. This suggests that trade liberalization led to a decline in prices which in turn led to upward pressure on

the labor incomes of skilled workers. The PPML result in the last column of appendix 9 shows that price was significant for unskilled workers in strictly urban areas of the country. However, this effect is not observed in the wage equations. Thus, this shows the importance of accounting for those households who did not report their labor incomes in strictly urban areas. However, the general trend observed in the country is that skilled workers gain more than unskilled workers.

In appendix 10, it is shown that all workers, whether they are in the formal or informal sectors, gain from a reduction in domestic prices and more so, from an increase in labor income. Changes in results are observed in informal workers in strictly urban areas based on sensitivity analysis. In inclusion of those workers who do not report their income, PPML estimates show that informal workers in strictly urban areas also gained from a reduction in domestic prices. Finally, in the sector of work, the pattern of the effect of prices is the same for all the models except for rural workers in the agricultural sector. This is seen in appendix 11. By inclusion of workers who did not report their labor incomes, the coefficient on prices became statistically significant in the PPML model. This shows the importance of accounting for those households in the agricultural sector who did not report their labor incomes in rural areas. Generally, however, the PPML results show that even after accounting for households who do not report their labor incomes, the pattern of the influence of prices does not change. This confirms that the results are robust.

3.15. Summary of the findings

The study stacked observations from 2005 and 2015 to examine the effects of prices on labor incomes. By dropping observations that did not report labor income values, 25,047 observations for 2005 and 13,705 for 2015 were analyzed. Average real labor incomes in 2015 are observed to be higher than in 2005. One hundred and twenty-one commodities consumed by households are factored into the analysis. Commodity prices are observed to have declined within the two periods. The increase in real labor incomes could be attributed to the fall in commodity prices. The number of unskilled workers is found to have declined over the two periods while skilled workers were seen to increase. This is a likely attribution to the introduction of compulsory free primary education in the country in 2003. These statistics also coincide with the formality of workers, where generally for the two periods the number of formal workers in 2005 was fewer than those in 2015. In terms of labor income variations, rural labor incomes are observed to be lower than urban labor incomes. However, the average increase in labor incomes for the two periods is

observed to be higher for rural areas, compared to urban areas. The largest magnitudes of labor income increases are observed in workers in strictly urban households.

The empirical findings show that labor incomes for skilled workers were responsive to changes in prices. The coefficients were positive and statistically significant. This shows that skilled workers are the ones who mainly benefit from trade liberalization in the country. In terms of magnitude, the effect was more felt by skilled workers in the two major cities of the country, Nairobi and Mombasa. For formal versus informal workers, labor income increase was statistically significant for formal sector workers in urban and strictly urban areas. The magnitude was highest among formal sector workers in the country's major cities. Informal sector workers in the major cities also gained slightly from the EAC-CET. Finally, the regression of labor incomes of workers in terms of agricultural versus non-agricultural sectors shows that the labor incomes of workers in non-agricultural sectors were positively affected by changes in prices. In summary, the results show that trade liberalization under the EAC-CET reduced domestic prices of commodities in the country. The reduction led to an increase in labor incomes of skilled workers, those doing formal work, and those who are mainly in non-agricultural sectors of the country. The magnitude was high in strictly urban areas, followed by urban areas, and finally in rural areas. However, the magnitude of the effects was low which could be attributed to other factors that arise during the implementation of the EAC-CET. For example, Magani (2019) shows that non-tariff barriers, inward-looking trade policies, protectionist policies, redundant trading rules across the border, and increasing costs of trading arise from the implementation of the EAC-CET.

On the control variables, the gender dummy is positive and statistically significant for models where the price is significant. This shows that male workers typically earn more than female workers in Kenya. Marital status is negative in most of the models. This reflects the burden of sharing labor incomes among married households in the country. In summary, the skill, sector, and job formality dummies show that skilled, formal, and non-agricultural sector workers earn more than unskilled, informal, and agricultural sector workers in the country. The price effect was positive and significant for counties that border the EAC partner states and the two major cities in the country. These findings show that labor incomes were sensitive to transport costs and border clearance effects. The coefficients of price changes for non-EAC bordering and non-border counties were not significant. This implies that counties that were far from the EAC borders or far

from the major cities in the country did not experience a significant increase in their labor incomes after the adoption of the EAC-CET.

Sensitivity analysis shows that the price-labor income effect was sensitive to borders, clearances, and transport costs. Specifically, the price-labor income effect was high for bordering counties and the major cities of the country where most of the imports by air and ports are cleared. The effects at the EAC borders and major cities also suggest that the price-labor income effect was sensitive to transport costs. Specifically, the price-labor income effect was more pronounced where transport costs, regarding imports, are low in the country. Finally, sensitivity analysis on the effect of dropping observations that had no labor income values showed the conclusion remained the same. In particular, the magnitude of the price coefficient still shows that the influence is larger for skilled workers compared to unskilled workers. In terms of formality, prices significantly influence the labor incomes of both formal and informal workers in both rural and urban areas. Comparing workers in agricultural versus non-agricultural sectors, the consistency of results suggests that labor incomes in non-agricultural sectors were higher than those in agricultural sectors.

3.16. Conclusion

The main objective of this study was to observe how changes in prices caused by the adoption of the EAC-CET affected the labor incomes of households in Kenya. The change in prices due to the EAC-CET is defined as the period of trade liberalization in the study. In terms of labor income, rural, urban, and strictly urban areas were analyzed. The workers were classified into three broad classifications: skilled versus unskilled, formal versus informal, and agricultural versus non-agricultural sector workers. The 2005/2006 KIHBS and 2015/2016 KIHBS data were used for the analysis. Data for the two periods were stacked together, to compensate for the fact that prices may not vary significantly within one single survey. The data on these surveys were used to classify workers and extract the price values for commodities. One hundred and twenty-one commodities classified as agricultural or manufactured goods were used in the analysis. Much of the reduction in import tariffs and hence reduction of commodity prices was on manufactured goods. To empirically analyze the price labor income effect, a Mincerian wage equation that corrected for survey design and heteroscedasticity was estimated. Further, a sensitivity analysis accounting for dropped values in the models was conducted. The reclassification formed four groups: EAC

borders, non-EAC borders, major cities, and non-border counties. A PPML estimator was used for models which dropped labor income values due to log transformation. In each of the models analyzed, age, marital status, religion, and gender were used as control variables. Further, in each of the models, time-fixed effects were controlled by including the year dummy.

The effect of trade liberalization on labor income is observed to vary with the classification of workers in the country. Skilled workers gained more than unskilled workers. However, the skilled workers in urban areas gained more than skilled workers in rural areas. Male skilled workers also gained more than female skilled workers while skilled workers in non-agricultural sectors gained more than skilled workers in these sectors. Formal workers gained more than informal workers, although the significance of the difference in gains is only observed in urban and strictly urban areas. No significant gains are seen between formal and informal workers in rural areas. For the formal workers in urban areas, male and skilled workers gained more than female and unskilled workers. Workers in non-agricultural sectors gained more than workers in agricultural sectors. This is both in rural and urban areas, however, the magnitude was highest in urban areas. Male, skilled, and workers in formal sectors gained more than female, unskilled, and workers in informal sectors of the country. Finally, on EAC-borders, workers in the major cities and counties that border the EAC States gained more than workers in the other counties of the country. In these border classifications, males, skilled and workers in the formal sectors gained more.

In summary, labor incomes generally responded positively to changes in prices because of the introduction of the EAC-CET. Labor segmentation is relevant in the analysis of the price-labor income effects. While some types of workers in the country gained, others did not experience any significant effects. Workers in urban areas are seen to have gained more compared to workers in rural areas. Workers in the non-agricultural and formal sectors, together with the skilled, benefited more from the introduction of the EAC-CET. Likewise; workers in counties that border the EAC countries and in major cities of the country benefited more from the EAC-CET. Finally, in each of the models where the price effect is significant, the magnitude is quite small. This shows that trade liberalization as defined by the adoption of the EAC-CET did not have a very substantial effect on the labor incomes of households in the country. One of the reasons could be high transaction costs and market imperfections that hinder the pass-through of low import tariffs to the

prices of commodities. The positive effect, however, indicates that reduced prices of commodities, caused by trade liberalization resulted in an increase in labor incomes in the country.

3.17. Policy Implications

Based on the findings of the study, the following policy recommendations can be made: first is to continue to liberalize trade, through further reduction of import tariffs. The study found that trade liberalization led to a decrease in domestic prices of commodities, which in turn led to an increase in labor incomes. Therefore, it is recommended that the government continue to liberalize trade by reducing tariffs and other trade barriers. This can be done through different ways like; developing a phased plan for gradually reducing import tariffs and other trade barriers, specifying timelines and targeted sectors. Further, conducting impact assessments before and after each phase of tariff reduction to understand the effect on domestic prices and industries. Finally, engaging in international trade negotiations to seek reciprocal tariff reductions and better market access for domestic products.

The second is to invest more in education and training. The study found that skilled workers were the ones who benefited most from trade liberalization. Therefore, it is recommended that the government invest in education and training to help workers develop the skills they need to compete in the global economy. This intervention entails reducing the demand for unskilled workers by indirectly decreasing their supply (Wood, 1995). Some of the interventions include; increasing funding for education, particularly focusing on skills relevant to the global economy, such as technology, engineering, and languages, launching nationwide skills development programs, including vocational training and adult education courses, to enhance workforce adaptability, and finally partnering with private sector and educational institutions to align training programs with current and future industry needs.

The third recommendation is supporting small businesses and the informal sector. Small businesses are often the engines of economic growth, and they can be particularly vulnerable to the effects of trade liberalization. Therefore, it is recommended that the government provide support to small businesses, such as tax breaks, loans, and training. A number of actions can taken on this aspect, one is to implement tax incentives and provide easier access to finance for small businesses and entrepreneurs. Second is to establish training and development programs

specifically designed for small business owners and their employees. Finally create a support network that includes business advice, mentoring, and networking opportunities for small business owners.

Finally, there is a need to monitor the impact of trade liberalization. It is important to monitor the impact of trade liberalization on different groups of workers and businesses. This will help the government to identify any negative effects of trade liberalization and to take steps to mitigate them. Monitoring impact can be done using various criteria, for example; setting up a dedicated body or mechanism to regularly assess the effects of trade liberalization on different sectors, workers, and regions, conducting regular surveys and research to gather data on the economic and social impacts of trade liberalization, and developing a feedback loop where findings from monitoring activities inform ongoing and future trade policies. Overall, the study found that trade liberalization can have a positive impact on labor incomes. However, it is important to take steps to ensure that the benefits of trade liberalization are shared widely and that the negative effects are mitigated.

3.18. Limitations of the study and possible areas of further research

This study only observes the effects of the tariffs in terms of trade liberalization while ignoring other NTBs. As such, the effects of trade liberalization in the study are an underestimate of the whole effects of trade liberalization. Encompassing a broader definition of trade liberalization to include NTBs would perhaps produce larger magnitudes of the effects of trade liberalization in Kenya. However, we do not expect this limitation to affect the sign of the coefficients and consequently the findings and recommendations of the study. The non-inclusion of NTBs in the study is the main limitation of the study that would call for future analysis of trade liberalization in Kenya.

CHAPTER 4: EFFECT OF PRICE AND LABOR INCOME ADJUSTMENTS UNDER TRADE LIBERALIZATION ON HOUSEHOLD WELFARE IN KENYA

4.1. Introduction

One of the main reasons that trigger countries to open up their markets to other countries is to improve the welfare of their people. This is true, especially for developing countries like Kenya. It has been observed, however, that trade liberalization may not work for all countries and not for all groups within the countries (Siddiqui, 2015). Trade reforms advocating for more openness in Kenya have been undertaken since independence, but there is, however, a minimal assessment to establish how household welfare is being affected at the micro-level. The sparse research on micro-level household welfare in Kenya has mainly been attributed to the lack of detailed household data. Due to this, many studies have mainly concentrated on the macro-level analysis of welfare, where studies focus on the aggregate impact of the country implementing various trade reforms. Though these studies are essential as they show the overall impact of trade reforms on the country at large, they do not show the distributional impact of trade reforms on households in the country. As Gasiorek, Byiers, Rollo, and CUTS International (2016) points out, there is a need for an analysis at the household and product level to figure out the impact of trade policies on the poorest parts of the population and especially on which products.

From previous studies conducted for Kenya, it is not clear whether trade liberalization policies advocated by the government can improve the general well-being of the people and the overall standards of living in the country. Further, there is a concern about whether there is a variation in the impact in terms of income levels, education, geographical location, or other socio-demographic characteristics. There is also the concern of whether these differences imply that there will be an asymmetric impact caused by trade liberalization and trade reforms. According to Cho and Diaz (2011), in the event an economy benefits from opening up its markets, some economic agents may benefit while others may not. Knowing the particular channels through which households are affected by various trade reforms is vital. This is because it serves to address specific policies that can directly have an impact on households in Kenya.

In 2005 and 2015, the country conducted a countrywide household budget survey, where households could report their expenditure levels and the number of goods they consume. Using the Deaton (1989b) approach, one could get proxies of the prices of items that households consume and the amount of expenditure on these particular goods. By the same virtue, one could combine a price effect and an earnings effect to evaluate the distributional impact of trade reforms. Conveniently, the two periods 2005 and 2015, provide two critical periods for the country in terms of trade reforms. Together with Tanzania and Uganda, Tanzania formed a Customs Union (CU) in 2005, which streamlined a large number of tariffs for the country's products. In terms of analysis, 2005 forms a convenient base year, when adjustments in prices and labor incomes had not taken place, while 2015 is a ten-year period in which the CET has been in place, thus forming a sort of short to the long-run period for analysis of the impact of trade policy.

The welfare analysis of Kenya opening up to other Partner States is now more relevant than ever. This is because Kenya has begun to open up more to other African countries. In 2011, the country signed a treaty with African states to form the AfCFTA. The agreement advocates for countries to open up trade among themselves. The implication of opening up the markets could be that eventually, the Partner States may end up forming a CET among themselves. The question is, as the country is acceding to these treaties, are households gaining in terms of welfare? If so, should import tariffs be reduced further? This study aims to address these related questions by analyzing how the current EAC-CET impacts the welfare of households in Kenya.

An attempt to carry out an analysis of household welfare and trade reforms in Kenya was conducted by Omolo (2012). The author used a CGE model with time series data from 1970 to 2010. The CGE model is a powerful tool for analyzing the impact of policy changes. However, it has been heavily criticized due to its underlying assumptions. The model only estimates first-order impact but does not consider the second-order impact. Apart from the differences in the models being used between the current study and that of Omolo (2012), the current study is different in that it does not assume the income of households is the same over the years, as assumed by Omolo (2012). This difference is achieved since the study uses two household surveys, which have a 10-year gap, while Omolo (2012) used only one survey from 2005 and assumed income does not change over time.

4.2. Statement of the problem

There is a wide agreement in the literature that free trade creates welfare gains for countries through efficient reallocation of resources and reduction of prices. Under a perfectly competitive market, a reduction in prices has an impact on production, resource allocation, regions, income, and consumption (Cabalu & Rodriguez, 2007). In terms of production, some sectors in the economy will expand while others will contract. Households employed in the expanding sectors would gain from higher labor incomes while those in the contracting sectors would lose. In terms of prices, consumers would gain if their consumption basket were made up of products whose tariffs have been reduced. The assumption is that the reduction in import tariffs reduces import prices. However, market imperfections might prevent these transmissions from both production and consumption.

Market imperfections, notwithstanding, there are concerns about the distribution of gains or losses. In literature, it is not generally agreed on how the gains or losses from trade policies are distributed amongst various categories of households in a country. In terms of the effects of trade liberalization and distribution effects, the literature diverges in two main ways. The first is that households differ, specifically in terms of income levels, skills, geographical regions in the country, and other socio-economic characteristics. Secondly, markets differ in terms of; levels of integration, the number of firms involved in the market, and the types of commodities being traded.

Given the diversity of characteristics of households and the complexity of the market in Kenya, it is imperative to determine whether or not there are winners or losers after joining the EAC and eventually operating under the EAC-CET. In international terms, the concern would be developed or developing economies. While the economy might gain from increased openness, some economic agents in the domestic market might benefit while others might be hurt. Categorizing households broadly in terms of their geographical regions, one can ask whether it's rural or urban dwellers who get more affected by trade liberalization. Further, a concern is whether it is the poor or non-poor who benefit from liberalization. Similarly, on products, one would be concerned about whether trade liberalization affects agricultural and manufactured goods differently in the country, and how these differences are translated into household welfare. This study investigates the actual gainers and losers of trade liberalization by augmenting both the price and labor income effects.

This will enable us to observe the effect on the income and expenditure levels of households in Kenya. The main trade liberalization regime under investigation is the EAC-CET.

4.3. Research questions

The main research question of this study is: What are the price and labor income impacts under the EAC-CET on household welfare in Kenya? The specific questions are:

1) What is the impact of price and labor income adjustments under the EAC-CET on rural and urban households' welfare in Kenya?
2) What is the impact of social-economic factors on household welfare in Kenya?
3) What are some of the possible policy implications regarding the impact of import tariffs on household welfare in Kenya?

4.4. Objectives of the Study

The main research objective of this study is to investigate the price and labor income effects under the EAC-CET on household welfare in Kenya. The specific objectives are:

1) To analyze the distributional impact of import tariffs through prices and labor incomes on households in Kenya
2) To analyze the impact of social-economic factors on household welfare in Kenya
3) To give policy implications regarding the impact of import tariffs on Household welfare in Kenya

4.5. Significance of the Study

One of the aggressive ambitions of the Kenyan government is the reduction and eventual elimination of poverty in the country. It tries to achieve this through a range of policies that are oriented domestically, regionally, and internationally. By joining the EAC and eventually adopting the CET, the government's objective was to improve the welfare of its households. This study, by aggregating the price and labor income effects to analyze the impact of the EAC-CET on welfare, provides a basis for investigating the results of one of the measures the government has taken. The results show the winners and losers of the EAC-CET. Further, the results also show whether trade policies affect the poor and non-poor differently in Kenya. In doing regional and global negotiations regarding various trade policies, policymakers can use these results to formulate their policies.

It is expected that liberalized trade policy will reduce the domestic prices of goods that are part of the consumption basket of the poor in the country. This will improve household welfare. Nevertheless, the fall in domestic prices of goods would in some ways affect the wages of workers. Therefore, it would be quite unrealistic to assess the impact of liberalized trade on poor household welfare just from the information about a change in domestic prices. The realistic assessment of the impact of trade on household welfare would consider the cumulative impact of free trade on domestic prices and labor incomes of workers. By accumulating these effects, the study will help to evaluate the effectiveness of some of the policies that the government is undertaking. This is significant given that large proportions of households in the country are poor.

4.6. Theoretical review

The act of lowering tariffs for countries is a form of trade liberalization. The link between trade liberalization and welfare improvement is a highly argumentative subject. Some of the authors are of the view that liberalization stimulates economic growth, increases employment, and facilitates progress in improving welfare. Some scholars argue the exact opposite. This notwithstanding, a broad literature on trade liberalization and welfare has identified two general approaches to these connections: the indirect and direct approaches. The direct approach points to three pathways; the first is changes in border prices for poor households, the second is government revenue, and the last is labor income. On the other hand, the indirect approach is based on economic growth, whereby economic growth is associated with trading liberalization and then links this to evidence of growth in welfare improvement (Winters & Chang, 2000). The theoretical literature discussed is based on these two main approaches.

According to Marchand (2017), trade liberalization affects welfare in two direct ways. The first is the consumption effect and the second is the income effect. Accordingly, the consumption effect works through the expenditures of households. Thus, trade policies influence the prices of the consumption basket, which in turn influences the cost of consumption for the consumer. In contrast, the income effect occurs through earnings, whereby workers attached to sectors where prices have changed may also be affected. This depends on skill levels, industry affiliation, and the level of exposure to changes in trade policies. In general, households can operate as consumers or producers, or both. Participants in labor markets earn income that can be used to determine

household budgets. If a trade policy affects the prices of commodities in the consumption basket, it will also affect the labor incomes of the same households. Thus, to determine whether a household gains or losses from a particular trade policy, one needs to examine the magnitude and direction of the two effects.

Marchand (2017) shares the views of Gasiorek et al. (2016). The authors argue that trade effects can have both a "first effect" and a "second effect." The first effect of trade policies depends on how prices change. Thus, low prices arising from a reduction in import tariffs may lead to an increase in consumers' welfare as well as producers who are buying intermediate inputs. Similarly, if access to the export market is improved, domestic producers engaging in exporting will see their welfare increase further. However, increased competition in the export and domestic markets may reduce domestic prices in the long run, which may reduce the incomes of producers. A second effect relates to structural changes. In this aspect, welfare can be influenced through the expansion and contraction of different sectors/industries, which subsequently affect labor incomes and the employment of households. The effects on sectors/industries depend on their initial positions before changes in trade policies. For developing countries that often feature informal unskilled labor, structural changes that reduce demand for their labor are likely to increase their poverty status. The agricultural and rural industries also employ a large number of unskilled workers. Thus, there would likely be adverse welfare effects for these categories of households in a country after the introduction of a new trade policy.

The argument of Gasiorek et al. (2016) correlates with that of Nicita et al. (2014) who argue that most trade policies in developing countries are pro-poor. Therefore, trade policies are primarily designed to protect the poor rather than the rich. The argument is that these countries institute high tariff protections on agricultural products to cushion domestic farmers against cheaper imports. In such an argument, lowering tariffs or implementing trade liberalization policies that target agricultural products would reduce the welfare of low-income households in developing countries.

4.7. Empirical review

The empirical literature on the welfare of trade liberalization has been confined to measuring the channels discussed in the theoretical review: the consumption, income, government, and economic growth channels. The effects on each country vary, depending on country-specific characteristics

because of the heterogeneous characteristics of households (Winters et al., 2004). The approaches to analyzing welfare effects in terms of data are based on two directions. The first direction is based on using cross-sectional household-level data for a particular country while the other is based on macro-trade-level data for a country. The latter direction focuses on import and export aggregates. In terms of methodologies, some follow a macro approach, while others follow a micro approach. As arguments against macro approaches have been made regarding the difficulty in tracing distributional effects using these studies, this study will only concentrate on micro-level empirical studies. The micro-level studies reviewed take two forms of analysis. The first uses cross-sectional household-level data and applies the Deaton (1989b) approach to analyze welfare. The second is the CGE models approach, where the economy-wide effects of trade policy are analyzed.

The pioneering work on household welfare analysis using household survey data, which documents household expenditure, income, and consumption items, is that of Deaton (1989b). His seminal paper revealed three ways in which price fluctuations can influence household welfare. The first is the consumption channel where the measure of a household's exposure to fluctuations in prices is observed through its budget share of a commodity. The second is the production channel. This is where measures of household exposure to trade policies are based on the household's income shares that stem from the production of a particular product. Last, is the labor income channel in which a household's exposure to price changes occurs through its labor income. The share of labor income and its elasticity depend on price changes. By using the three channels; consumption, production, and labor income, Deaton (1989b) examined the effect of removing an export tax on Thailand's rice. Households were considered as either producers or non-producers. The households were both consumers and participants in the labor market. Doing these classifications, Deaton (1989b) show that households who participated in production experienced welfare gains at all levels of income, although the significant gainers were those in the middle-income distribution. The number of households, in terms of their share, at the high end of the income distribution, who were producers, was few. Thus, there were on average low welfare gains on the high end of the income distribution. On the lower end of the income distribution, there were many producers. However, the same producers made the largest number of consumers. Since rice constituted a large share of their budgets, not much of an impact on the removal of the export tax

was observed. The conclusion from the results was that more gains occurred among middle-income households. In contrast, general gains for the low and high end of the income distributions were approximately the same.

The work of Deaton (1989b) received several extensions in the literature. Porto (2006) extended the work of Deaton to the Argentine case to examine the widespread effect on households following changes in trade policies. The author considered both the tradeable and the non-tradeable sectors. The assumption was that prices of traded goods in the domestic markets would see their price change when trade barriers are removed and hence expansion of trade. Prices of non-tradable services on the other end may change since production levels change as a result of changes in the expansion of the tradable sector. The two effects on tradable and non-tradable sectors were expected to influence household welfare through income and consumption levels. Notably, the effects were expected to differ with the skill levels of laborers, their industry affiliation, and the importance of each product in the consumption basket (Porto, 2006). The analysis was conducted for Argentine families following the introduction of MERCOSUR. In contrast to the results by Deaton (1989b), it was observed that low-income households gained more from trade reforms than middle-income households. The impact on wealthy families was not statistically significant. The explanation given was that trade policies in Argentina offered protection to the rich over the poor before the trade reforms. Nonetheless, some protection was offered to the poor after the reforms (Porto, 2006).

The work of Porto (2006) was extended for the Mexican case by Nicita (2009) in terms of three dimensions. The first was taking account of both the adjustment in the expenditure basket and changes in household income when estimating welfare effects. The second was tracing the household's earnings effects taking account of the household’s heterogeneity and finally incorporating the geographical dispersion of the households. The results of distributional effects showed that all income groups benefited from trade liberalization. The gain for the rich was more substantial at 6% as compared to the poor who gained 2% from trade liberalization. The results further showed that those households considered the poorest lost more in terms of agricultural labor incomes and incomes. This is an implication that income inequality rose since the rich gained in absolute and relative terms.

Marchand (2012) also extended the work of Nicita (2009) and Porto (2006)to analyze the distributional effects of trade liberalization in India. The study classified areas geographically in terms of their abilities to transmit tariff reductions to prices faced by consumers. This was done taking into account the difference between households in rural and urban regions. The main reason for this segregation was that a large population of Indians lived in rural areas, and commodity markets differed from those in urban areas. The findings of the analysis showed that rural households were, on average, more protected from the effects of tariff reductions. There was a low pass-through of import tariffs into domestic prices in rural areas compared to those in urban areas. The welfare gain on the consumption and income channel was higher for urban as compared to rural dwellers.

Recent empirical studies of the welfare effects of trade policies have mostly considered both the expenditure and income channels. While some studies focus on individual channels, others combine them. Further, while some empirical studies focus on a particular set of goods like agricultural or manufactured goods, others focus on a combination of goods. Through the expenditure channel, Fajgelbaum and Khandelwal (2016) examined the distributional effects of global trade. Their argument is predicated on the idea that when global trade alters the relative costs of products that rich and poor households purchase differently, it has an impact on how those goods are distributed. Food spending proportions are typically higher in poor households than in wealthy ones. As a result, trade policies that raise food costs often affect poorer households more than wealthier households. Fajgelbaum and Khandelwal (2016) argument is that the profits from trade are primarily biased in favor of the poor. They explain this result by the fact that low-income people frequently focus their spending on highly traded yet inelastic goods.

In contrast to Fajgelbaum and Khandelwal (2016), Borusyak and Jaravel (2021) show that the expenditure channel is neutral. Their analysis focuses on both the expenditure and income channels. It shows that the distribution effects from the expenditure channel are neutral while there are gains through the income channel. The distributional effects observed are within the income deciles rather than across deciles. Having used the same dataset in the US, the results of Fajgelbaum and Khandelwal (2016) and Borusyak and Jaravel (2021) contrast due to the mechanical nature of the Almost Ideal Demand System (AIDS) model used for the two studies.

Borusyak and Jaravel (2021) relax the mechanical features of the AIDS model and find that the expenditure channel is neutral.

Marchand (2019) uses both the income and expenditure channels to examine the pro-poor bias of trade policies in India, adhering to the traditional unified framework for doing so. The study simulates to see what effect eliminating all tariffs would have on household well-being. According to the study's expenditure channel, India's existing trade policy is pro-rich in that eliminating all tariffs will help low-income households more than wealthy households. The trade policy was found to be neutral in rural areas and pro-poor in urban areas, according to the earnings channel. Regarding the commodities, it was found that the current protective structure favored the poor in the manufacturing industry. The old trade protection framework in India was regressive, as shown by the net welfare effect utilizing both the expenditure and earnings channels. Average welfare gains from the complete abolition of tariffs would be 16% for rural households and 15% for urban households.

Vo and Nguyen (2021) examined welfare in Vietnam through income and expenditure channels, highlighting vulnerability to poverty. The study demonstrated that trade liberalization enhanced household welfare across both income and expenditure routes. However, the recovery was brought about by a rise in labor demand in the export market. Nevertheless, after the 2008 global financial crisis, the advantages of trade liberalization shrank and lost their significance. This was the case due to the adverse impact on the demand market. Rural households experienced increased vulnerability as the difference between income and spending widened. Importantly, the analysis revealed that external influences would have a substantial impact on whether trade liberalization would help a specific nation.

Zhu et al. (2016) follow the conventional income and expenditure channels to analyze trade liberalization's effect on welfare for rural households in China. The study shows that the welfare of farmers in rural parts of China improved because the consumption effect dominated the negative income effect. The magnitude of the consumption effect caused by lowered prices outweighed the negative effect that arose from low agricultural prices. The study notes that much of the trade liberalization effects on welfare were felt mainly because markets in China are well integrated with international markets.

According to a study by Shuaibu (2017), Nigeria's poverty rates in urban and rural areas marginally decreased after the nation's import tariffs were lowered. Both agricultural and manufactured items showed the same marginal decreases. However, the simulation's outcomes with the import barrier completely removed indicated that the nation's poverty levels are declining. The tariff was transmitted through pricing, which then had an impact on poverty through the expenditure channel. Kareem (2018) focusing only on agricultural goods, found that the Economic Community of West African States (ECOWAS)-CET had a favorable impact on households in Nigeria. The expenditure channel was primarily where the gains came from. Particularly, the increases in spending outpaced the decline in their purchasing power. Distribution-wise, poorer families benefit more than wealthy households. Rural families saw greater welfare improvements than urban ones.

Using six Sub-Saharan African countries, Nicita et al. (2014) found that five out of the six had a pro-poor trade policy on the income channel. This suggests that, except for Ethiopia, the current trade policy, in terms of household income, favors poor households over wealthy ones. This result was linked to the fact that impoverished households get a much larger portion of their income from agricultural sales. Therefore, they benefit more from strong agricultural product protection than wealthy households do. According to Lederman and Porto (2016) low-income households typically derive a large portion of their income from the sale of goods. As a result, even if prices increase in the expenditure basket, the effect may be mitigated by the income effect.

In the Kenyan case, the concern of trade liberalization and household welfare has been extensively investigated. Among the studies using aggregated data are that of Omolo (2012), Gasiorek, Byiers, Rollo, and CUTS International (2016), Balistreri, Rutherford, and Tarr (2009) and Balistreri, Jensen, and Tarr (2015). They find a general positive welfare effect of trade liberalization. On the other end, Omolo (2012) observed that full trade liberalization (complete removal of tariffs) had a significant effect on welfare when compared to the trade reforms that followed the Doha agreement. Balistreri, Maliszewska, Osorio-Rodarte, Tarr, and Yonezawa (2016) also observe that there will be welfare improvements when Kenya opens up further its markets under the AfCFTA.

4.8. Summary of reviewed literature and research gap

Economic theory links trade liberalization with welfare through the consumption channel and the income channel. The consumption channel involves changes in prices faced by consumers, while

the income channel is the income obtained by consumers. If tariffs adversely affect domestic prices, the effect can be passed on to the consumption levels of households. The income channel involves labor incomes—factor returns—a sector whose consumer prices have been affected by tariffs would be expected to experience an effect on factor returns involved in its production. From the literature reviewed, these mechanisms only work well if markets can transmit the effects. However, market imperfections caused especially by high trade costs may prevent the transmission of these effects.

Empirical evidence has shown that trade policies have a significant effect on the welfare of households in different countries through expenditure and income channels. Some studies have combined both the expenditure effect and income effects to analyze the impact of trade policies. Among them are Deaton (1989b), Porto (2006), Nicita (2009), Marchand (2012), Marchand (2019), Borusyak and Jaravel (2021), Vo and Nguyen (2021), and Zhu et al. (2016). Others have focused on one form of the effects, for example, Fajgelbaum and Khandelwal (2016) focused only on the expenditure effects. In terms of the distributional effects of trade policies, literature shows the effects are country specific. In Indonesia, middle-income earners gained more (Deaton, 1989b). In Mexico, rich households gained more compared to poor households (Nicita, 2009). Porto (2006) shows that in Argentina, poor households benefited more from trade reforms than middle-income households, while the impact was insignificant for wealthy families. In India, Marchand (2019) shows that the gains from trade policies favor the poor. The same is observed in the US (Fajgelbaum & Khandelwal, 2016), in China Zhu et al. (2016) and in several sub-Saharan African countries (Nicita et al., 2014).

The Kenyan literature reviewed does not clearly show who gains or losses from trade policies. One cannot tell which groups of households are gaining more as the studies aggregates the welfare effects. Methodologically, the study by Omolo (2012) and that of Balistreri, Maliszewska, Osorio-Rodarte, Tarr, and Yonezawa (2016) are based on simulations that suffer from numerous simplifying assumptions that may sometimes not hold in developing countries characterized by market imperfections. Furthermore, from these studies, one cannot tell which groups of households have benefited more since the formation of the EAC. As Gasiorek, Byiers, Rollo, and CUTS International (2016) emphasize, not much work has been conducted in the EAC to show how trade, let alone regional integration, has had an impact on poverty and household welfare. This study

attempts to fill this gap in the literature by conducting a disaggregated analysis of trade liberalization under the setup of the EAC-CET to establish the effect of trade policies on the household welfare of different household groups. Significantly, the analysis of welfare in this study helps to understand which groups of households gain and which lose after an adjustment in trade policies in Kenya. The study adopts the approach of combining both the expenditure and income effects to compute a welfare estimate as done in Deaton (1989b), Porto (2006), Nicita (2009), Marchand (2012), Marchand (2019), Borusyak & Jaravel (2021), Vo & Nguyen (2021) and Zhu et al. (2016).

4.9. Theoretical framework

In a developing country, it is usually observed that households have a dual role in terms of consumption and production (Nicita, 2009). In such a case, welfare analysis has to take into account these dual roles of a household (Deaton, 2018). In this study, the interest is to study how changes in prices, caused by a change in tariffs, affect household welfare. The effects can be derived from an indirect utility function, in which a household's utility function is a function of income and prices (Deaton, 2018). Following the specification of Marchand (2019) a household is faced with an indirect utility function of the form:

$$U_h = f_h(Y_h, \boldsymbol{P}) \tag{4.1}$$

Where Y_h is income and $\boldsymbol{P} = (P_1, P_2, \ldots . P_n)$ is a vector of the price of n goods. Differentiating (4.1) results to:

$$dU_h = \frac{\partial U_h}{\partial Y_h} dY_h + \sum_{i=1}^{n} \frac{\partial U_h}{\partial P_i} dP_i \tag{4.2}$$

Equation (4.2), can be transformed by applying Roy's identity[8] to the second term of the equation. This yields:

$$dU_h = \frac{\partial U_h}{\partial Y_h} dY_h - \sum_{i=1}^{n} X_{ih} \frac{\partial U_h}{\partial Y_h} dP_i \tag{4.3}$$

Where X_{ih} is the amount of good i consumed by household h. Since households are assumed to play a dual role, their income is obtained from two components; labor income w_h and profits π_{ih} from selling good i, thus:

$$Y_h = wl_h + \sum_i \pi_{ih} \tag{4.4}$$

[8]Roy's identify is given by: $\frac{\partial U_h}{\partial P_i} = -X_{ih} \frac{\partial U_h}{\partial Y_h}$

Differentiating (4.4), results to:

$$dY_h = dwl_h + \sum_i d\pi_{ih} \quad (4.5)$$

Applying Hotelling's lemma[9] on the second term of the right-hand side of equation (4.5) results to:

$$dY_h = dwl_h + \sum_i Q_{ih} dP_i \quad (4.6)$$

Where Q_{ih} is the quantity of good i sold in the market by household h. Substituting (4.6), in (4.3) yields:

$$dU_h = \frac{\partial U_h}{\partial Y_h}(dwl_h + \sum_i Q_{ih} dP_i) - \sum_{i=1}^{n} X_{ih} \frac{\partial U_h}{\partial Y_h} dP_i \quad (4.7)$$

Equation (4.7) can be simplified by assuming the marginal utility of income $\partial U_h / \partial Y_h$ is one (Nicita, 2009), and converting the right-hand side terms into percentages, re-written in the form: re-written in the form:

$$dU_h = \frac{dw_h}{w_h} wl_h + \sum_i p_i Q_{ih} \frac{dP_i}{p_i} - \sum_i p_i X_{ih} \frac{dP_i}{p_i} \quad (4.8)$$

In the above formulation (4.8), the term $dU_h$is the approximation of the monetary value of the change in indirect utility for household h (Nicita, 2009). If we assume that income equals expenditure, equation (4.8) can be divided by the income of household h to obtain a money metric utility function of the form:

$$d\boldsymbol{W}_h = \frac{dU_h}{y_h} = \frac{dwl_h}{wl_h} . \frac{wl_h}{y_h} + \sum_i \frac{dP_i}{p_i} . \frac{p_i Q_{ih}}{y_h} - \sum_i \frac{dP_i}{p_i} . \frac{p_i X_{ih}}{y_h} \quad (4.9)$$

Where $d\boldsymbol{W}_h$ is the negative compensation variation of price changes (Marchand 2019). If it is negative, it implies a welfare loss. In such a case, it shows the amount by which households need to be compensated to have the same utility as they had before the price change. Equation (4.9) can be simplified to:

$$d\boldsymbol{W}_h = \theta_h^l \boldsymbol{d}wl_h + \Phi_{ih}^Q \boldsymbol{d}P_i - \Phi_{ih}^x \boldsymbol{d}P_i \quad (4.10)$$

Where θ_h^l is the share of income obtained from the labor market given by $\frac{wl_h}{y_h}$; Φ_{ih}^Q is the share of income of the household obtained from selling goods i, given by $\frac{p_i Q_{ih}}{y_h}$ and Φ_{ih}^x is the share of expenditure on goods i given by $\frac{p_i X_{ih}}{y_h}$. Finally, $\boldsymbol{d}wl_h$ and $\boldsymbol{d}P_i$ are changes in labor incomes and prices expressed in percentage terms. The first two terms on the right-hand side of equation (4.9)

[9] Hotelling Lemma is given by: $d\pi_h / dP_i = Q_{ih}$

define the welfare impact through income and enter positively into the welfare function. The last term is the welfare effect of price changes through the expenditure channel. The term is negative showing that, as prices increase, the net expenditure of a household for a given consumption basket increases, hence reducing welfare. Thus, the second and last term shows that a change in the price good i favors or harms the household depending on the exposure of the household's budget to that particular good (Nicita, 2009). Under trade policy analysis, the impact of a tariff on welfare will be determined by the tariff's prior impact on the prices of commodities and labor incomes of the households.

4.10. Empirical framework

To estimate the welfare equation (4.10), the components of the equations are estimated separately and thereafter aggregated. Thus, the first two terms of the right-hand side of equation (4.10) which are the income effect (Marchand, 2019) could be re-written as:

$$IE_h = \theta_h^l \boldsymbol{d} wl_h + \{\sum_i \Phi_{ih}^{Q_i} \boldsymbol{d} P_i + K_h\} \quad (4.11)$$

Where the first term on the right side of equation (4.11) is the proportion of income from labor. The second is termed *other incomes.* The component of other income comprises income from the sale of goods Q_i where $i = 1, \ldots . n$ and $K_h$is income collected from other sources like rentals, remittances, and transfers by household h. There was a need to capture the component of *other incomes* because in the household surveys, production, and hence sales data, would mainly be observed on agricultural goods. Thus, using this estimate alone to infer income from sales would understate the amount of income from a household. Some households would participate in the production and hence sell a particular good, but at the same time, they may have another business that gives them extra income besides the labor income. Thus, to broadly capture the income effect, all these components of incomes are empirically aggregated to form household income (Y).

The third term of equation (4.10) is the consumption effect of consumption goods x for each household h. Hence, the total consumption effect (Marchand, 2012), for the household would be;

$$CE_h = -\sum_i \Phi_{ih}^x \boldsymbol{d} P_i \quad (4.12)$$

Where $i = 1, \ldots . n$ is the number of goods x consumed by household h. Thus, combining equations (4.11), and (4.12), yields the welfare estimate of the form:

$$d\boldsymbol{W}_h = IE_h + CE_h \tag{4.13}$$

dW_h is the negative compensation variation of price changes (Marchand, 2019). If it is negative, it implies a welfare loss. In such a case, it shows the amount by which households need to be compensated to have the same utility as they had before the price change. The welfare measure of equation (4.13) is analyzed in terms of income deciles of households in the country. The lower-income deciles are categorized as poor households while the upper-income deciles are the rich households. Households are classified in terms of rural versus urban and county classifications in terms of the border to EAC countries and the major cities of the country.

To estimate equations (4.11-4.13), percentage changes in prices dp_i and labor incomes dw_h, the share of incomes and shares of expenditure on goods are first computed. The computation of shares of income and expenditure is directly estimated using data from the KIHBS. For percentage changes, this study follows Nicita's (2009)) approach. Changes in prices are given by the following equation:

$$\boldsymbol{d}P_i = \frac{\tilde{P}_{2005} - \tilde{P}_{2015}}{\tilde{P}_{2015}} \tag{4.14}$$

Where, $\tilde{P}_{2005}$ is an estimate of 2005 prices, $\tilde{P}_{2015}$ is the 2015 price estimate obtained from the tariff pass-through equation[10] given below:

$$ln\, p_{it} = \delta_0 + \delta_1\, ln\, p^c + \delta_2\, ln\, f_{it}^* + \delta_3\, ln(1 + \tau_{it}) + \gamma_{jt} + \varphi_c + \mu_t + \varepsilon_{ict} \tag{4.15}$$

Where p_{it} is domestic price of good i at time t, f_{it}^* is the foreign in price, τ_{it} is the ad valorem tariff rate, p^c is the domestic price of an import-competing good, which can be understood to be the domestic pressure (domestic demand) on domestic prices. This study uses the county population as a proxy for domestic pressure (domestic demand) on domestic prices. The term γ_{jt} represents the industry-specific trend, φ_c represents county fixed effects, μ_t represents time-fixed effects and ε_{ict} is an independent and identically distributed (*IID*) error term. Percentage change in labor incomes is found by the following equation:

$$\boldsymbol{d}wl_h = \sum_i \beta_1 dp_i \tag{4.16}$$

[10] Because this price is estimated with the tariff of 2005 included.

Where dp_i is the percentage change in price from equation (4.15) and $\beta_1$is the price-labor income elasticity obtained from the following labor income equation:

$$ln\, w_{ht} = \beta_0 + \beta_1 lnP_{it} + \lambda_w Z_{jt} + \varepsilon_{jsrt} \quad (4.17)$$

Where w_{jsrt} represents average labor income for household h at time t and P_{irt} is the price of a good i at time t. Import tariffs directly affect the price. Thus, the coefficient β_1 is the measure of how labor incomes respond when prices change. The symbol Z_{jt} represents individual characteristics. Among the characteristics are age, gender, marital status, and religion. Finally, the error term is ε_{ht} and is assumed to be independent and identically distributed (IID).

In estimating equation (4.13), only percentage gains or losses in welfare are observed. Positive values show welfare gains while negative values show losses. The losses show the amount by which households need to be compensated to have the same utility as they had before the price change (Marchand, 2019). To explore whether welfare varies with some classes or groups of households, the following model is estimated:

$$y = Z'\hat{a} + D'\acute{a} + u_c + e_{hc} \quad (4.18)$$

Where $y = \widehat{dw_h}$ is an estimate from the welfare equation (4.13), Z' is a vector of household characteristics among them, the age of the household head, the gender of the household head, and the size of the household. The term D' is a control variable for labor characteristics of the household head which include, skill levels, job formality, and sector. Finally, u_c are county fixed effects and e_{hc} is an assumed *IID* error term. Equation (4.18) is estimated for both rural and urban households.

4.11. Data types and sources

The estimation of welfare effects of the EAC-CET on equation (4.13) involves several variables that are first pre-estimated in equations (4.15-4.18). The first component of the welfare estimate in (4.13) is the income effect. This component is obtained by summing the wage effects and other incomes effect. These two parts of the income effects component are also separately computed. The first part, the wage effect, is computed by multiplying wage change by wage share. Wage change is obtained by multiplying the price-wage elasticity $\beta_1$from equation (4.17) by price change obtained from equation (4.14). Wage share is computed by dividing the total reported wages of the household by its total amount of income. The second part of the income effects, other income effects, is obtained by multiplying price change from equation (4.14) by other income shares. Other

incomes share is the ratio of total income and the difference between total income and wages. The second component of the welfare estimate (4.13) is the expenditure effect. The expenditure effect is computed by multiplying the price change (4.14) by the expenditure share. The expenditure share is obtained by dividing the total amount of household expenditures by the total amount of the household income. In all these computations, the key variables and their descriptions are summarized in table 4.1. The table also describes other variables used in analyzing different aspects of welfare that exclude income and expenditure effects.

Table 4.1: Summary of the variables used in the analysis

Variable	Description	Type of variable	Source
Welfare	A summation of the income effect and expenditure effect	Dependent variable (continuous)	KIHBS
Expenditure	A multiple of the price of the commodity with the amount of purchase of the commodity by a household.	Independent variable (continuous)	KIHBS
Wage	A summation of salaries, house allowances, medical allowances, other allowances from work, and average daily wages.	Independent variable (continuous)	KIHBS
Other income	Incomes from other sources except for wages. For example, rental incomes and remittances	Independent variable (continuous)	KIHBS
Total income	Wages plus other incomes	Independent variable (continuous)	KIHBS
Household size	The number of household members in a household unit.	Independent variable (continuous)	KIHBS
Per Capita Expenditure	Obtained by dividing total household expenditure by total household size.	Independent variable (continuous)	KIHBS

Gender	A dummy variable indicating whether male or female. 1= Male 0 = Female	Independent variable (Dummy)	KIHBS
Age	A continuous variable of households reporting an age of 13 and above.	Independent variable (continuous)	KIHBS
Skill	A dummy indicator of a worker who is either skilled or unskilled. 1 = skilled 0 = Unskilled	Independent variable (Dummy)	KIHBS
Formality	A dummy indicator of a worker doing either formal or informal work 1= Formal workers 0=Informal worker	Independent variable (Dummy)	KIHBS
Sector	A dummy indicator of a worker either in the agricultural or non-agricultural sector. 1 = Agricultural sector 0 = Non-agricultural sector	Independent variable (Dummy)	KIHBS

Source: Author's description

4.12. Descriptive Statistics

This study used the logarithm of Per Capita Expenditure (log PCE) to compare the standards of living in the study. The approach of using log PCE in literature has been used to measure welfare (Han et al., 2016) and the standards of living of households (Deaton, 2018). Per Capita Expenditure (PCE) is obtained by dividing total household expenditure by total household size. Although this study does not use PCE to analyze the welfare effect of the EAC-CET, it generally provides a descriptive analysis of PCE to show how the standards of living of households in the country changed during the two periods of the study. The analysis shows that, for two periods, the standards of living reduced for all the households in rural and urban areas as shown in table 4.1.

Table 4.2: Household average, size, expenditure, and Per Capita Expenditures by residence

2005	2015

Residences	Household size	Expenditure	Log PCE	Household size	Expenditure	Log PCE
Rural	5.347	135.871	2.706	4.200	118.000	2.762
Urban	3.885	176.878	3.295	3.464	161.493	3.100
Strictly Urban	3.497	986.367	3.901	2.820	310.413	3.491

Source: Author's computations with the available data

The average amount of expenditures as seen in table 4.1 reduced which is a reflection of an average decrease in real prices of commodities between 2005 and 2015. Average household size is highest in rural areas and lowest in major cities of the country. However, for the two periods of study, household sizes were generally reduced. Although the expenditure for households in major cities hugely decreased, the standards of living marginally decreased. This shows that on average, the household size in major cities has largely decreased. It also implies that average consumption levels in urban areas highly decreased between 2005 and 2015. This could be attributed to an average increase in the prices of commodities in these cities.

The standards of living were compared amongst the income deciles of households in the country. The results on household size and average expenditure are highlighted in table 4.2. On average, the poor households in the low-income deciles are characterized by large household sizes. Relatively rich households characterized by high-income deciles have on average lower household sizes. In terms of expenditures, on average, richer households are observed to have higher expenditures than poorer households.

Table 4.3: Household Per Capita Expenditures by Income Deciles in Kenya shillings

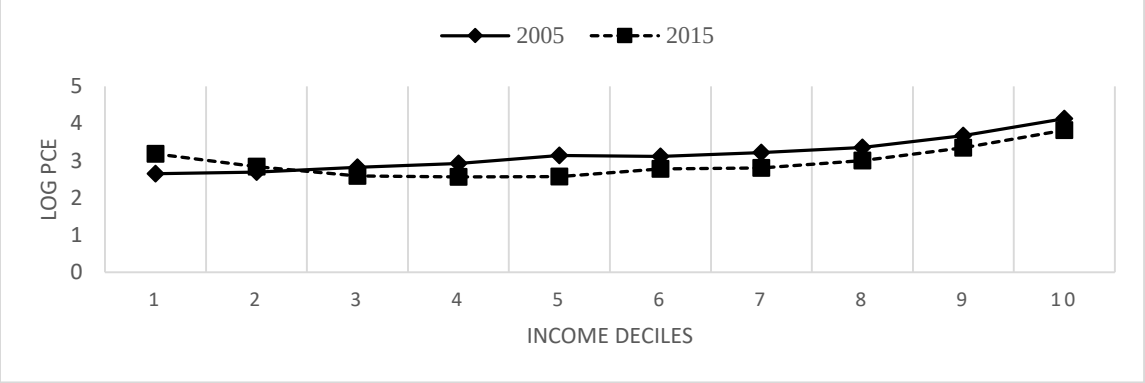
Income Deciles	2005		2015	
	Household size	Expenditure	Household size	Expenditure
1	5.380	145.615	3.785	156.566
2	5.295	125.832	4.376	109.417
3	4.854	123.878	4.704	119.524
4	4.529	134.770	4.492	81.341
5	4.106	215.299	4.330	105.929
6	4.126	145.332	3.845	92.514
7	3.946	199.712	3.678	91.275
8	3.473	166.672	3.318	94.208
9	3.673	201.791	3.211	168.761

10	3.350	565.755	3.056	438.376

Source: Author's computations with the available data

The low expenditures, together with large household sizes for poorer households imply that poorer households have low standards of living. This phenomenon is highlighted in figure 4.1. Although low, households in the least income deciles saw an average increase in their standards of living within the two periods. This was a result of a slight decrease in the average household size as seen in table 4.2. On average, however, the standards of living reduced for close to all households in the income deciles between 2005 and 2015. Larger reductions in the standards of living are mainly observed in the middle-income deciles, between 3 and 8. These households are mainly non-poor and non-rich households.

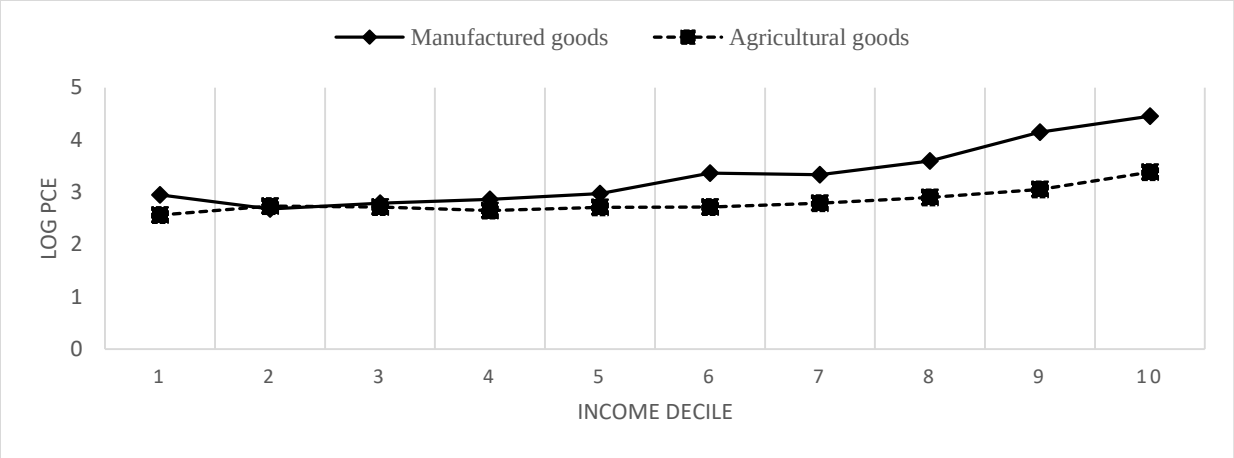
Figure 4.1: Household Per Capita Expenditures by Income deciles



Source: Author's computations with the available data

In terms of the contribution of certain goods, on average, per capita expenditure on manufactured goods is higher than per capita expenditure on agricultural goods as seen in figure 4.2. However, for poor households in low-income deciles, per capita expenditure on the two types of goods is averagely equal. Richer households in the country are observed to mainly spend more on manufactured goods compared to agricultural goods. This follows Engel's Law, which states that the percentage of income allocated to food, hence agricultural goods, decreases as income rises (Marchand, 2017).

Figure 4.2: Household Per Capita Expenditures by Income deciles and product categories



Source: Author's computations with the available data

4.13. Empirical results and discussion

4.13.1.Pass-through effects of the EAC-CET

The EAC–CET generally resulted in a decline in import tariffs for almost all product categories in this study. However, the magnitude of the reduction was not very large. Manufactured goods experienced a higher reduction in import tariffs than agricultural goods. Very large import tariff values are observed for agricultural products compared to manufactured products. Empirically, several steps were followed to estimate the welfare equation (4.13). The first step involved the computation of a tariff-pass-through equation that captured the effect of tariffs on domestic prices. The results are highlighted in table 4.4:

Table 4.4: Tariff Pass-through domestic prices

	Agric. goods	Man. goods	Rural areas	Urban areas	Major cities	EAC borders	Non-EAC borders	Non-border
Log foreign price	0.336***	0.185***	0.282***	0.327***	0.403***	0.151***	0.148***	0.157***
	(0.009)	(0.021)	(0.012)	(0.012)	(0.002)	(0.018)	(0.033)	(0.014)
Log (1+tariff)	-2.209***	0.839**	-1.826***	-1.855***	-1.080	-1.479***	-1.516***	-2.443***
	(0.167)	(0.343)	(0.175)	(0.185)	(0.273)	(0.350)	(0.281)	(0.167)
Log population	0.176***	0.359***	1.201***	1.117***	0.395	0.208***	0.086	0.213***
	(0.031)	(0.064)	(0.107)	(0.142)	(0.288)	(0.053)	(0.084)	(0.024)
Log exchange rate	0.261***	0.502***				1.632***	1.730***	1.493***
	(0.032)	(0.068)				(0.130)	(0.449)	(0.114)
Constant	1.669***	0.163	3.283***	3.297***	3.129**	-4.490***	-3.644	-3.649***
	(0.281)	(0.571)	(0.078)	(0.073)	(0.117)	(0.882)	(2.394)	(0.539)
Observations	6,621	3,106	4,526	4,868	333	2,802	1,244	5,348
R-Squared	0.155	0.062	0.112	0.131	0.142	0.393	0.306	0.408
Year FE	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
County FE	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Product cat. FE	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes

Notes: In each of the models we control for year, county, and product category fixed effects.

There was a near-one-to-one pass-through effect of tariffs on domestic prices of manufactured goods. The tariff values of manufactured goods were not only smaller before the EAC-CET, but they also experienced a greater reduction after the adoption of the EAC-CET. Likewise, manufactured goods are less affected by intermediary market power compared to agricultural goods. This enhances the pass-through effect. Prices categorized in terms of residence of households show that the magnitude of the effect of the EAC-CET on domestic prices for urban areas is higher than that in rural areas. Most commodities purchased in rural areas are agricultural goods that are highly protected by the EAC-CET. In urban and strictly urban areas, most commodities purchased are manufactured goods whose tariffs are relatively lower than those of agricultural goods. This explains why aggregate prices in these regions decreased by a larger magnitude than those in rural regions. External factors, such as foreign prices and exchange rates, push prices of manufactured goods higher than agricultural goods. This shows that most of the commodities imported, and hence more susceptible to the influence of external factors, are manufactured goods. Finally, in terms of EAC borders, the results show that after the formation of the EAC and allowing free movement of goods within the borders, prices of agricultural goods in Kenya slightly reduced due to cheaper imports from Uganda and Tanzania. The incomplete pass-through of tariffs on domestic prices for the different classifications in table 4.4 indicates a low demand elasticity or sellers are capturing a significant percentage of the rent from reduced prices at the border. This also suggests that there are significant uncompetitive domestic value chains in the country. For the effectiveness of households to maximize the advantages of trade liberalization, policies to boost domestic market competition and measures to lower transactional costs are crucial.

4.13.2.Price-Labor Income effects

The labor incomes of workers were classified into three major groups. The first group is skilled versus unskilled workers. Under this classification, workers who have at least completed their primary education are regarded to be skilled. The second classification was informal versus formal workers. Informal workers are those who indicated in the survey that they work in the informal sector (“Jua Kali”), either as employed or self-employed. Formal workers are those who indicated to work for; the national government, civil service ministries, judiciary, parliament, commissions, state-owned enterprise/institution, teachers service commission, county government, private sector

enterprise, international organization/NGO, local NGO, faith-based organization, and formal self-employed. The third classification was workers in the agricultural sector versus the non-agricultural sector. Workers in the agricultural sector were either: small-scale agriculture (employed), large-scale agriculture, pastoralists (employed, and self-pastoralist activities). All these workers were observed in terms of their residence, either rural, urban, or fully urban (Nairobi and Mombasa Counties). Prices may not vary significantly within one single survey to allow for the estimation of price-labor income elasticities (Nicita, 2009). Thus, observations in 2005 and 2015 were stacked together to better capture the effects of prices on labor incomes. The price-labor income effects of equation (4.17) are shown in table 4.5.

Table 4.5: Price-Labor Income effects

	All workers	Rural workers	Urban workers	EAC borders	Non-EAC borders	Non-borders	Major cities
Log price	0.079***	0.039**	0.099***	0.094***	-0.019	0.026	0.138***
	(0.014)	(0.018)	(0.018)	(0.022)	(0.036)	(0.017)	(0.039)
Log age	0.816***	0.926***	0.763***	1.218***	0.011	0.670***	0.387
	(0.136)	(0.171)	(0.196)	(0.211)	(0.365)	(0.163)	(0.536)
Marital status	-0.040**	-0.066***	-0.007	-0.028	-0.006	-0.065***	0.084**
	(0.017)	(0.025)	(0.018)	(0.030)	(0.053)	(0.019)	(0.033)
Religion	-0.059	-0.026	-0.093	-0.099	-0.152*	0.042	-0.086
	(0.040)	(0.047)	(0.061)	(0.062)	(0.079)	(0.044)	(0.125)
Gender	0.258***	0.142	0.426***	0.257**	0.481**	0.177**	0.470**
	(0.065)	(0.091)	(0.084)	(0.110)	(0.198)	(0.076)	(0.191)
Industry	-0.001	0.058	-0.069	0.044	-0.251**	0.058	-0.109
	(0.043)	(0.056)	(0.058)	(0.074)	(0.128)	(0.052)	(0.143)
Skill	1.557***	1.369***	1.756***	1.211***	0.881***	1.282***	1.944***
	(0.086)	(0.117)	(0.120)	(0.169)	(0.315)	(0.126)	(0.324)
Sector	-0.416***	-0.362***	-0.279**	-0.216**	0.067	-0.507***	-0.142
	(0.070)	(0.086)	(0.114)	(0.109)	(0.222)	(0.084)	(0.294)
Formality	0.287***	0.327***	0.264***	0.274**	-0.164	0.231***	0.413***
	(0.061)	(0.091)	(0.072)	(0.128)	(0.176)	(0.074)	(0.131)
Constant	3.322***	2.997***	3.449***	1.668**	6.973***	4.036***	3.639**
	(0.493)	(0.652)	(0.685)	(0.836)	(1.373)	(0.585)	(1.805)
Observations	24,291	10,148	14,143	7,212	2,769	13,421	889
R-squared	0.206	0.171	0.265	0.217	0.119	0.202	0.542

The price coefficient in all the models is the definition of trade liberalization. It is generally positive in all the categories of analysis showing that trade liberalization had a positive effect on labor incomes in the country. The positive effect signifies several factors, first, there is a possibility of increased demand for labor. Trade liberalization may open up new markets and increase international trade, this leads to an expansion of industries and higher demand for labor. With increased demand, employers may need to offer higher wages to attract and retain workers, thereby positively affecting labor incomes. The EAC-CET could have encouraged the expansion of

industries due to a reduction in tariffs for raw-materials. Second is an increase in the skill premium. Trade liberalization can have a differential impact on different sectors and occupations. Some industries may benefit more from international trade, particularly those that are export-oriented or have a comparative advantage. If these industries demand higher-skilled workers, it can create a skill premium where wages for skilled workers increase at a higher rate compared to low-skilled workers. This is reflected in the study where in each model, the dummy for skilled workers is positive. Finally, the increased labor income could be a result of inflationary pressure. Trade liberalization can increase the availability of imported goods, which can affect domestic price levels. If the influx of imports leads to higher overall price levels or inflation, it can put upward pressure on wages as workers demand compensation to maintain their purchasing power.

For the other variables in the model, labor incomes respond positively to age, where more experienced workers earn more. The gender dummy is positive and statistically significant, implying male workers earn more compared to female workers. Specifically, male workers gained more from trade liberalization compared to female workers. The formality dummy is positive and statistically significant showing formal workers gained more than informal workers while the dummy sector shows that workers in the non-agricultural sectors gained more than workers in the agricultural sectors of the country.

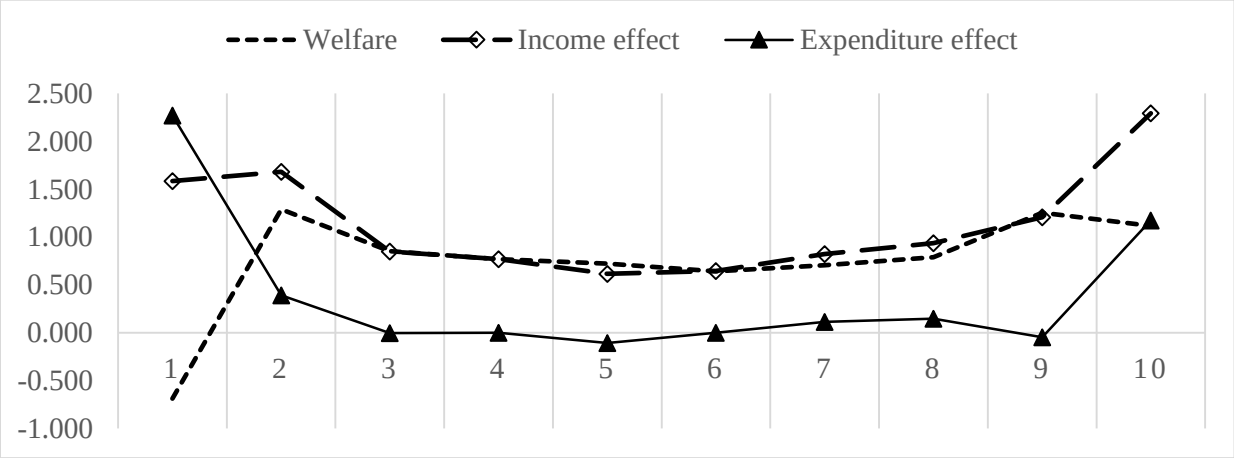
4.13.3.Price and labor income effects on welfare

The welfare measure in equation (4.13) is a summation of the income effect and expenditure effects. Welfare was observed in terms of income deciles and the residence of households, types of goods, and counties with their borders. As seen in table 4.3 expenditure effect is lower than the income effect. This is expected computationally since prices affect expenditure negatively and incomes positively. However, trade policies show that households benefited from lower expenditure due to lower prices (Kareem, 2018). It also implies that the income effect channel drove the welfare gains observed from the EAC-CET. Fajgelbaum and Khandelwal (2016) also made this observation. Borusyak and Jaravel (2021) show that the expenditure channel is neutral while the income channel is positive.

The poorest households in the least income decile had their expenditure effect exceed the income effect. As such, their welfare estimate is negative. The implication is that the positive income effect

caused by a price change in the two periods could not offset the negative expenditure effect for rural households. The implication of this is that trade liberalization under EAC-CET, which caused a reduction in average prices, did not significantly improve the welfare of the poorest households in the country. This is because, on average, their labor incomes are very low, compared to their expenditure. For the other households in the middle-income and upper-income deciles, the welfare estimates were positive. This implies that the welfare of these groups of households improved after the adoption of the EAC-CET. The welfare estimates are slightly higher for the top income deciles, implying that the trade policy favored the relatively well-off households in the country.

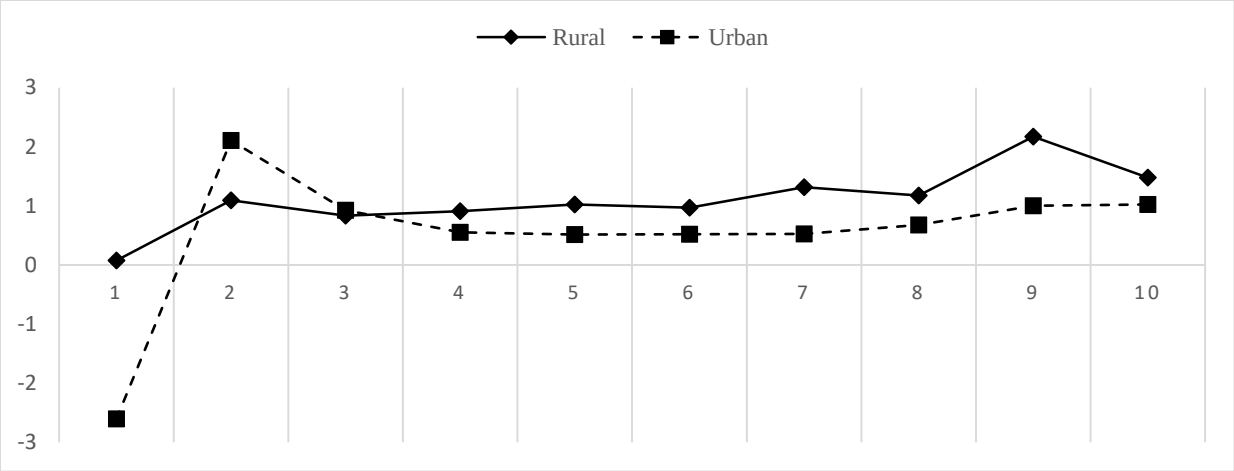
Figure 4.3: Income Deciles and Welfare



Source: Author's computations with the available data

To analyze the distributional effect of figure 4.3, households were split into rural and urban. The results highlighted in figure 4.4 show that rural households gained relatively more from the EAC-CET compared to urban households. Welfare results in table 4.4 were further analyzed in terms of rural and urban households. The exception is for the poor households in the lowest income decile. In this category, the poorest households in rural areas lost more compared to those in urban areas. However, the richest in both rural and urban areas gained an averagely equal proportion from the EAC-CET.

Figure 4.4: Residence and Welfare



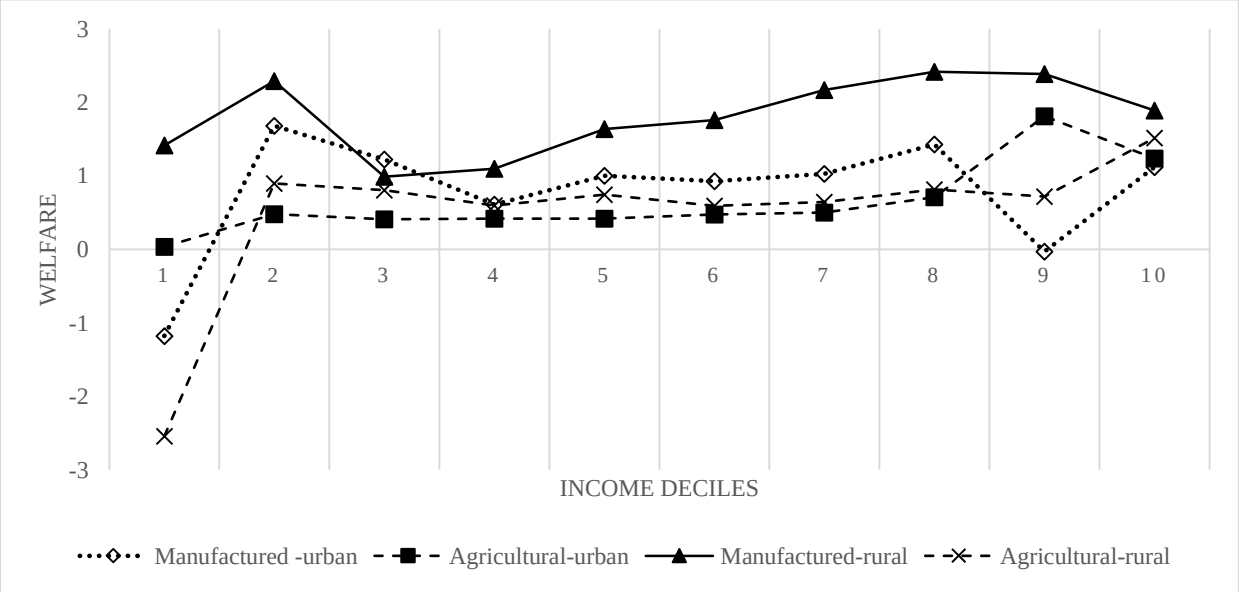
Source: Author's computations with the available data

The results in figure 4.4, have two implications: first is that the EAC-CET is pro-poor. This implies that the EAC-CET structure relatively favors poorer households compared to richer households (Marchand, 2019). This is because Kenyan households in rural areas are average poorer. This is compared to households in urban areas. Since most of the rural households are farmers, they happen to gain more from the EAC-CET because tariffs for most agricultural products on average remained the same while others increased. Nicita et al. (2014) also observe similar observations where poor households in developing countries in Africa gain more than the rich in Nigeria (Kareem 2018) and Madagascar Cameroon Burkina Faso, Cote d'Ivoire, and Gambia. The rationale is that most of these countries have a highly protective trade policy for agricultural products. Thus, domestic farmers are cushioned from fluctuations in prices that would be caused by cheaper imports. Lederman and Porto (2016) note that poor households tend to earn a significant share of their income from the sale of commodities, thus even if prices rise in the expenditure basket; the effect may be ameliorated by the income effect. However, (Marchand, 2012). Marchand (2019) argues that poor households in rural areas do not gain from trade liberalization policies because their markets are not well integrated with international markets. The same argument is supported by Nicita (2009) who also notes that high trade costs in the form of transport costs and transaction costs cause poor households not to gain significantly from trade policies.

Farmers in most rural areas in Kenya mainly produce maize and beans. As such, they highly benefited from the EAC-CET since average tariffs of maize increased under the classification of sensitive items in the EAC-CET. Further, maize importation is highly controlled by the

government to protect domestic farmers from cheaper imports. The second implication of the results in figure 4.4 is that the effect of the average reduction of prices of manufactured goods, due to the EAC-CET, was more felt in rural areas compared to urban areas. This is so because the average prices of manufactured goods in rural areas are on average lower than average prices in urban areas in Kenya for the sample of products analyzed. The analogy to this is that average income shares from manufactured goods are higher in rural areas compared to urban areas. Prices of manufactured goods in urban areas in Kenya would tend to be higher than in rural areas because of the cost of doing business in urban areas. The average log of price is 4.7 and 4.6 in urban and rural areas respectively for manufactured goods in this study. Indeed, welfare estimates analyzed by categorizing goods in terms of manufactured goods and agricultural goods show that more positive welfare estimates emanate from manufactured goods. Further, the larger of this effect is more from manufactured goods in rural areas as seen in figure 4.5.

Figure 4.5: Types of goods, residence, and welfare estimates



Source: Author's computations with the available data

Figure 4.5 generally shows that the EAC-CET mainly improved the welfare of households in the country through a reduction in the average prices of manufactured goods. Households in rural areas benefited because they were already facing relatively lower prices for manufactured goods compared to urban households. Further, the high protection of agricultural goods caused

households to lose from the gains of the EAC-CET. The losses emanating from agricultural goods are larger in urban areas and are higher compared to rural areas.

Finally, in terms of borders, counties on the EAC borders were the most beneficiaries of the EAC-CET as seen in table 4.4. This shows that cheaper imports from the EAC bordering countries Tanzania and Uganda helped to improve the welfare of households in counties that border these countries. The finding also implies that households in these counties gained more because of low transport costs facilitated by small distances between these counties and the neighboring countries. The EAC-CU also helped to facilitate easy cross-border trade as it allowed the free movement of goods and traders within the EAC borders. All these helped to improve the welfare of households in these counties compared to the other counties in the country. The welfare gains for regions closer to the borders relative to those that are far are also observed in other studies in the literature. In China Zhu et al. (2016) showed that farmers who were located in the coastal areas gained more from tariff liberalization compared to their counterparts in the inland provinces. In Mexico, Nicita (2009) showed that the states that were near the US borders benefited more from trade liberalization compared to the other states in the country.

Welfare gains in major cities were the least, this shows that other costs in major cities weakened the positive effect of the EAC-CET in major cities of the country. These costs are mainly in the form of transaction costs, transport costs, and costs of intermediaries.

Table 4.6: Border and welfare

Type of border	Income effect	Expenditure effect	Welfare
EAC-border counties	1.066	0.123	0.944
Non-EAC border counties	1.167	0.272	0.896
Non-border counties	0.984	0.289	0.695
Major cities	2.503	2.419	0.085

Source: Author's computations with the available data

Equation (4.8) was estimated to investigate whether the welfare estimates varied with other types of socio-demographic factors and labor characteristics. The results highlighted in table 4.4 show that; age was negatively associated with welfare, especially in rural areas. This implies that households headed by older persons in rural areas did not gain much compared to households

headed by younger households in rural areas. The analogy to this is that younger farmers in rural areas reap more from the EAC-CET compared to older ones.

Table 4.7: Demographic factors and welfare

	Aggregate	Rural households	Urban Households
Age	-0.037**	-0.106***	0.007
	(0.019)	(0.033)	(0.020)
Gender	0.111	-0.228	0.615*
	(0.344)	(0.658)	(0.342)
Household size	0.073	-0.554***	0.479***
	(0.092)	(0.184)	(0.093)
Skill	-1.202**	-1.963**	-0.537
	(0.476)	(0.858)	(0.503)
Sector	-0.260	-0.298	-0.843*
	(0.425)	(1.025)	(0.510)
Formality	0.191	-0.291	-0.068
	(0.491)	(1.061)	(0.449)
Constant	0.541	9.335***	-2.830**
	(1.292)	(2.625)	(1.136)
Observations	4,400	2,024	2,376
R-squared	0.016	0.037	0.036

Notes: *** p<0.01, ** p<0.05, * p<0.1 indicate statistical significance at 1%, 5%, and 10% respectively. Standard errors are in parentheses

Gender was positive for urban households, showing that households whose heads are male gained more from the EAC-CET compared to families headed by females. This comes about due to the labor income effect, where male workers tend to earn more than female workers. Household sizes in rural areas are larger than in urban areas as shown in table 4. The size is observed to matter in the effect of the EAC-CET on household welfare. In rural areas where household size is large, the welfare estimate was negative while in urban areas where household size was small, the welfare effect is positive and statistically significant. The unskilled workers in rural areas gained more compared to skilled workers. This is expected as most of the farmers who are in rural areas tend to be unskilled. As such, the gains observed for rural farmers in figure 4.4 tend to have mainly gone to the unskilled workers. The sector dummy is negative and statistically significant for urban households. This shows that workers in non-agricultural sectors in urban areas gained more

compared to workers in agricultural sectors in the same areas. Finally, the signs of the constant coefficient show that on average, rural households gained more from the EAC-CET compared to urban households.

4.14. Summary of the findings

The study used the logarithm of PCE to examine the levels of standards of living between households in rural and urban areas. Standards of living for households in urban areas generally decreased between the two periods of study (2005 and 2015). However, the standards slightly improved for rural households. Household sizes in rural areas are generally larger than in urban areas. Thus, the slight increase in PCE for rural areas shows that rural households' consumption increased because of the general reduction in prices in these areas. The decrease in standards of living in urban areas means that the amount of consumption per household in these areas decreased for the two periods. This could be attributed to a general increase in the prices of commodities in these areas. These results show that urban households face slightly higher prices which reduce their PCE compared to rural households. Poorer households are observed to have higher household sizes and lower PCE in comparison to richer households. However, for all income levels, standards of living decreased for the two periods of study. Since household sizes fell in all income levels, the decrease in standards of living is attributed to a decrease in consumption. This is due to the average higher commodity prices in 2015 compared to 2005.

Empirical analysis of welfare involved summing the income and expenditure effects of price changes as a result of the EAC-CET. The results show that the expenditure effect is lower than the income effect implying that households benefited from lower expenditure due to lower prices due to trade liberalization (Kareem, 2018). It also implies that the income effect channel drove the welfare gains observed in the EAC-CET. This observation was also made, by Fajgelbaum and Khandelwal (2016) and Borusyak and Jaravel (2021). For the poorest households, defined by the lowest income deciles, their welfare estimates were negative. This shows that the income effect could not offset the expenditure effect. This implies that they did not gain from the EAC-CET. The welfare estimates were positive for the other households in the middle-income and upper-income deciles. This implies that the welfare of these groups of households improved after the adoption of the EAC-CET.

The welfare estimates are slightly higher for the top income deciles. This implies that the EAC-CET favored the relatively well-off households in the country. Rural households benefited more from the EAC-CET compared to urban households. The richer households in rural areas gained more than those in urban areas. This showed that EAC-CET is pro-poor (Marchand, 2019). Since most rural households are farmers, they benefit more from the EAC-CET since tariffs for most agricultural products remained the same while others increased. Because most of the rural households are relatively poor compared to urban households, it implies the EAC-CET favored the poor relative to the richer households in the country. Similar observations where poor households in developing countries in Africa gain more than the rich are also observed in Nigeria (Kareem 2018), Madagascar, Cameroon, Burkina Faso, Ivory Coast, and Gambia (Nicita et al., 2014).

In terms of borders, counties on the EAC borders were the most beneficiaries of the EAC-CET. Cheaper imports from the EAC bordering countries, Tanzania and Uganda helped to improve the welfare of households in counties that border these countries. The finding also implies that households in these counties gained more because of low transport costs facilitated by small distances between these counties and neighboring countries. The EAC-CU also helped to facilitate easy cross-border trade as it allowed the free movement of goods and traders within the EAC borders. The positive welfare effect decreased as one moved away from the EAC borders. Similar border effects are also observed in Mexico (Nicita, 2009) and China (Zhu et al., 2016).

Finally, the study investigated the welfare effects while controlling for various socio-demographic and labor factors. The results show that younger farmers in rural areas reap more from the EAC-CET compared to older ones. Further, households whose heads are males gain more from the EAC-CET compared to families headed by females. This is due to the labor income effect, where male workers tend to earn more than female workers. In rural areas where household size is large, the welfare estimate was negative. However, in urban areas where household size was small, the welfare effect was positive and statistically significant. Unskilled workers in rural areas gained more compared to skilled workers while workers in non-agricultural sectors in urban areas gained more compared to workers in agricultural sectors in the same areas.

4.15. Conclusion

The main objective of this study was to investigate the price and labor income effects of the EAC-CET on household welfare in Kenya. Households were broadly grouped into rural and urban households. Under these broad categories, welfare estimates were observed according to the income deciles of households. The lowest deciles comprised the poorest households whilst the highest deciles were the richest deciles. Households were also categorized according to their places of residence. The counties were grouped to capture the effect of trade costs. As such, counties that bordered the EAC Partner States and those in the major cities of the country were presumed to face lower trade costs compared to those in the other counties. Finally, in all these groupings of households, welfare was also observed in terms of the types of products.

The welfare estimate was a summation of the income and expenditure effect of price changes. Specifically, it was the negative compensation variation of price changes (Marchand, 2019). In such a case, a negative value of the welfare estimate implies a welfare loss. It showed the amount by which households needed to be compensated to have the same utility as they had before the price change. The price change is the difference between the prices in 2005 and those in 2015. Empirically, the 2015 price estimate is obtained through a regression of domestic prices against foreign prices, the domestic price of an import-competing good, and tariffs. The tariff in the regression equation is the one that captures the effect of the EAC-CET. The labor income effect is obtained by multiplying the price-labor income elasticity by the price change.

Rural households benefited more from the EAC-CET in comparison to urban households. However, rural households in upper-income deciles gained more compared to those in lower-income deciles. On average, rural households are poorer compared to households in urban areas. Hence, the study shows that the EAC-CET is mainly pro-poor. This implies that the EAC-CET favors the poor in comparison to richer households. The EAC-CET still maintains high tariffs on agricultural products, especially the ones mainly traded in Kenya like maize, rice, and beans. Thus, relatively richer farmers gained more from the EAC-CET compared to the other households in the country. Controlling for household characteristics, however, shows that household sizes suppress the gains from the EAC-CET. Households in rural areas, characterized by large household sizes are worse off than households in urban areas. In urban areas, households whose heads are male benefited more compared to households that are headed by females. Finally, workers in non-

agricultural sectors in urban areas gained more compared to the agricultural sectors in the same residential areas.

4.16. Policy Implications

The study shows that, while there are broad benefits, certain segments of the population and economy are not experiencing these advantages. To address these disparities and maximize the potential of trade liberalization, a multifaceted policy approach is necessary. Firstly, the study highlights the need for targeted assistance to the poorest households, who have not benefitted significantly from trade liberalization. This is attributed to their consumption patterns, which largely involve domestically produced goods that have not seen substantial price reductions. To mitigate this, the government should implement direct aid programs, such as food subsidies or cash transfers, specifically tailored for these households. Regular assessments to identify the households most in need and collaboration with local community organizations could ensure efficient aid distribution and effective impact monitoring.

In parallel, the government must continue to advocate for the liberalization of trade. The study found that such liberalization leads to a decrease in the domestic prices of commodities, boosting welfare for households. A phased plan for the gradual reduction of tariffs and other trade barriers is recommended. This plan should include clear timelines, measurable goals, and regular policy reviews to align with evolving economic needs. Diplomatic efforts to foster reciprocal trade agreements are also crucial in this context. A flexible approach to trade policy is essential, given the variable impacts of trade liberalization. The study suggests that the effects can differ based on several factors, including the type of goods traded, the level of economic development (rural vs. urban), and labor market structure. A policy review committee should be established to evaluate the impact on different sectors and make timely adjustments. Rapid response mechanisms to global trade changes would allow for the agile adaptation of trade policies, factoring in regional and sectoral nuances.

Furthermore, the study underscores the need for infrastructural improvements, particularly in rural areas. Households in these regions, more reliant on agriculture, a sector that has benefitted from trade liberalization, face challenges such as poor infrastructure. This hampers their ability to capitalize on trade opportunities. Significant investment in rural infrastructure, focusing on

transportation, communication, and energy, is recommended. These initiatives could be bolstered through partnerships with international entities and the private sector. Finally, promoting county integration, especially in areas bordering the East African Community (EAC), is vital. Counties at the EAC borders emerged as significant beneficiaries of the EAC-CET. To enhance this benefit, the government should invest in cross-county infrastructure and facilitate inter-county trade and cooperation. This approach will not only foster regional development but also ensure a trickledown effect of the trade benefits.

In conclusion, while trade liberalization has been shown to positively impact labor incomes and overall welfare, its benefits are not uniformly distributed. The implementation of these multifaceted, targeted policies will be crucial in ensuring that the advantages of trade liberalization are more equitably shared, and its negative impacts are effectively mitigated. This comprehensive approach promises not only to bolster economic growth but also to enhance social equity and sustainability in the face of evolving global trade dynamics.

4.17. Limitations of the study and areas of further research

The scope of welfare estimation in this study is confined to only income and expenditure effects. In doing this, other ways that welfare could be affected like government revenues and the redistribution of revenue were not examined in this study. This is the main limitation of this study. The reduction of tariffs could have reduced government revenues through the reduction of tax revenues. This in turn would reduce the number of revenues allocated domestically to poor households. Analyzing these redistribution effects on welfare would be an interesting area for further research.

CHAPTER 5: SUMMARY, CONCLUSION, AND POLICY IMPLICATIONS

5.1. Summary

Analytically, to examine the effect of the EAC-CET on household welfare in Kenya, this study considers the combined effect of the EAC-CET on expenditure and income. Before analyzing the expenditure and income effects of the EAC-CET, the study first analyzes the pass-through effect of the EAC-CET on domestic prices and the effect of the EAC-CET on labor incomes in the country. Products are classified as either agricultural or manufactured. With these classifications, 121 products are analyzed. Households are observed in terms of their residential areas, specifically, households in rural and urban areas. In terms of labor income, workers are divided into three categories. The first is skilled versus unskilled workers; the second is formal compared with informal workers and finally workers in agricultural sectors vis-a-vis non-agricultural sectors. Finally, trade costs are analyzed by grouping counties in terms of borders with the EAC Partner States. These counties are also clustered around major cities which harbor the largest air and seaports in the country.

In terms of data and methodologies, household survey data are used in the estimation of the effects of the EAC-CET. To estimate the effect of the EAC-CET on domestic prices, a fixed effects model is estimated. For the labor income effect, a Mincerian earnings equation is estimated. In all the methodologies used in the study, the main econometric concerns are measurement errors. By aggregating the households into cohorts, there could be similarities in households across the surveys. Therefore, cohort-fixed effects on the equations may be correlated with the dependent variables. Similarly, the cohort effect may be unobserved, due to changes in the households' membership over the two household surveys; the effect may not be constant over the two periods. Thus, variables may be subject to errors. In such a case, the standard within estimator based on a pseudo panel may not be consistent. Deaton (1988) proposes using the error-in-variables technique to account for these errors. Nonetheless, as Verbeek and Nijman (1993) note, to ensure the consistency of this technique one would need the number of cross-sections that are available to tend towards infinity. Consequently, Verbeek and Nijman (1993) suggest that the size of the cohorts is reasonably large, approximately more than 100. As such, the bias in the within estimator will be small enough to warrant ignoring the measurement error problem. Cohorts for this study

are formed using all the households in a regional area (rural and urban). Thus, the problem of measurement error is minimized as the number of households per cohort is greater than 100. Further, for products, median rather than mean prices are used to minimize the effect of outliers. The last and largest price values are further dropped to reduce measurement errors. Finally, to further reduce the measurement errors, households below the age of 13 were dropped in all the estimations.

The study shows that agricultural products are characterized by higher tariffs compared to manufactured goods. The EAC-CET saw a larger reduction of tariffs on manufactured goods compared to agricultural goods. There was a significant pass-through effect of tariffs on the domestic prices of manufactured goods in the country. This was mainly attributed to the low degree of intermediary market power and the fact that most of the manufactured goods are consumed in urban areas. Further, urban areas are closely integrated with international markets. Further urban areas are less affected by significant trade costs like transport costs and transaction costs. There was an incomplete pass-through of tariffs under the EAC-CET to domestic prices of agricultural goods. The incomplete pass-through is attributed to various factors like a high degree of intermediary market power, a non-competitive retail market, and transport costs. Bergquist and Dinerstein (2020) show that Kenya has high degrees of intermediary market power which affects pass-through due to increased mark-ups (De Loecker et al., 2016). The anticompetitive conduct by firms and direct state intervention in markets also inhibits the pass-through effects of tariffs on domestic prices (Argent & Begazo, 2015). Finally, the imperfect pass-through is also attributed to the distortions that arise through the derogation of the EAC-CET. In terms of rural and urban prices, no significant pass-through is observed. This is mainly attributed to the high degree of market imperfections in the country.

The fact that tariffs under the EAC-CET are high for agricultural goods compared to manufactured goods implies that the EAC-CET is a pro-poor trade policy. This is because most of the agricultural products produced and consumed in the country are mainly from rural areas. These are characterized by higher levels of poverty compared to urban areas. The incomplete pass-through of tariffs to domestic prices of agricultural goods implies that poor households were made better off in comparison to richer households in the country after the introduction of the EAC-CET. Foreign prices and exchange rates exert upward pressure on both manufactured goods and

agricultural goods. Specifically, a depreciation of the Kenyan shilling significantly increases the prices of domestic prices. The effect is higher on manufactured goods compared to agricultural goods. This is because a large proportion of Kenya's imports are comprised of manufactured goods. Population, a dummy for an increase in demand, significantly increases the prices of manufactured goods compared to agricultural goods.

On labor income effects, skilled workers benefited significantly from the EAC-CET in comparison to unskilled workers. In urban and strictly urban areas, skilled workers gained more than those in rural areas. No significant difference in the effect of the EAC-CET is observed in formal versus informal workers in rural areas. However, in urban and strictly urban areas, formal workers gained more compared to informal workers. The largest effect was observed on workers in the major cities of the country, Nairobi, and Mombasa. In terms of sectors, workers in non-agricultural sectors benefited more compared to workers in agricultural sectors. This shows that the reduction of prices caused by the EAC-CET was more evident in non-agricultural commodities. Regarding the border effect, workers in major cities and those that share borders with the EAC countries generally gained more in comparison to workers in other regions of the country. Skilled workers and those doing formal jobs in these regions gained relatively more compared to unskilled workers and those doing informal work.

Gender is seen to be a significant factor in the influence of the EAC-CET on the labor incomes of workers in the country. Male workers are generally observed to earn more compared to female workers. The gender difference is mainly observed in urban areas where men earn an average of 40% more than female workers. High levels of experience proxied by age are seen to be significant for; skilled workers, those doing formal work, and those mainly in non-agricultural sectors of the country. Finally, marital status and religion do not appear to be significant drivers of the labor incomes of workers in the country. In terms of welfare, households in the upper-income deciles gained more from the EAC-CET compared to those in lower-income deciles. The effect was larger in rural areas compared to urban areas. This shows that households in rural areas, who are mostly farmers, gained more from the EAC-CET in comparison to urban households. The rationale for this is that the EAC-CET maintained high tariffs for agricultural products which are mainly traded in Kenya. As such, domestic farmers, mainly in rural areas benefited more from this tariff protection. This shows that the EAC-CET is pro-poor in its form. This implies that, the tariff

structure under the EAC-CET is predominantly benefiting poor households rather than richer households. Similar results are also observed in other African countries like Nigeria (Kareem 2018), Madagascar, Cameroon, Burkina Faso, Ivory Coast, and Gambia (Nicita et al., 2014).

Those counties on the EAC borders benefited the most from the EAC-CET. Cheaper imports from the EAC bordering countries, Tanzania and Uganda helped to improve the welfare of households in counties that border these countries. The finding also implies that households in these counties gained more because of low transport costs facilitated by small distances between these counties and neighboring countries. Controlling for socio-demographic factors and labor characteristics in the models, the study shows that younger farmers in rural areas gained more compared to older farmers. However, large household sizes in rural areas suppressed the gains from the EAC-CET in comparison to urban areas. Finally, households whose heads are male and work in non-agricultural sectors are observed to reap more compared to households whose heads are female and work in agricultural sectors in urban areas.

5.2. Conclusion

This paper investigates the effect of the EAC-CET on household welfare in Kenya through price and income channels. The study aimed to identify the actual gainers and losers of the EAC-CET. As such, the study analyzed the effect of the EAC-CET in three aspects. First, it examined the effect of the EAC-CET on domestic prices of both agricultural goods and manufactured goods. Secondly, the price effect because of the EAC-CET is regressed on the labor incomes of workers to analyze the effect of the EAC-CET on labor incomes in the country. Finally, the price-effect and labor-income effects are combined to form the welfare effects of the EAC-CET on households in the country. Two household surveys KIHBS 2005/2006 and KIHBS 2015/2016 are used for the analysis. The two surveys span the period when the EAC-CET was formed in 2005 and 10 years after its formation. The analysis uses 121 products for rural and urban households in 47 counties in 2005 and 2015. The Hausman and Breusch-Pagan tests lead to the estimation of a fixed effects model to analyze the pass-through effect of the EAC-CET on domestic prices in the country. The estimation of the effect of the EAC-CET on labor incomes is conducted using a Mincerian earnings equation. Finally, the welfare estimates are obtained by summing the expenditure and income effects of the EAC-CET. An OLS equation is estimated to examine whether socio-demographic

and labor characteristics have a significant moderating effect on the welfare effect of the EAC-CET in the country.

A significant pass-through effect of the EAC-CET on domestic prices of manufactured goods in the country is observed. The result is an incomplete pass-through effect on agricultural goods. Tariffs on agricultural goods are significantly higher compared to those on manufactured goods in the EAC-CET. Import shares of agricultural goods are smaller than those of manufactured goods. This shows that high tariffs on agricultural goods inhibit the importation of agricultural goods compared to manufactured goods. This incomplete pass-through also illustrates the significant impact of intermediary market power in the country. These segments of the market increase levels of markups, which end up eroding the effect of tariffs on domestic prices. Further, the derogations of the EAC-CET by member countries of the EAC inhibit the pass-through effects of tariffs on domestic prices in the country. Skilled workers and workers in the non-agricultural sectors in both rural and urban areas were the main beneficiaries of the EAC-CET. In rural areas, no significant difference in the EAC-CET on labor income is observed between formal and informal workers. However, in urban areas, formal workers gained more compared to workers in the informal sector. In all these categories of workers, male workers gained significantly more than female workers. Male workers earn significantly more than female workers in both rural and urban areas. The gender difference is mainly observed in urban households where men earn on average 40% more than female workers.

In summary, welfare analysis shows that rural households gained more compared to urban households. However, households in upper-income deciles gained more compared to those in lower-income deciles. The high protection of the EAC-CET for agricultural goods helps to favor poor households who are mainly in rural areas. These households are mainly farmers who produce agricultural produce for the country. The findings of this study are in line with the predictions of the SS model. Kenya as one of the developing countries in the world is predicted to specialize in the production of labor-intensive commodities and thus experience welfare gains through labor incomes (Won & Kennedy, 2005). Urban households also gained because of the pass-through effect of manufactured goods. However, the gains from the protection of the EAC-CET on agricultural goods resulted in rural households being relatively better off compared to households in urban areas. Generally, looking at prices in terms of rural and urban areas, no significant pass-

through effect of tariffs is observed. This confirms the assertion by Marchand (2012) who states that in developing countries, market imperfections and trade costs partially isolate households from the effects of trade policies. Finally, counties located within the EAC borders benefited the most from the EAC-CET. Cheaper imports from the EAC bordering countries, Tanzania and Uganda helped to improve the welfare of households in counties that border these countries.

5.3. Policy Implications

This study offers insightful revelations into how trade policies impact different segments of society. While there are overarching benefits of liberalization, certain areas require specific attention to ensure equitable distribution of these benefits. The study's findings lead to a series of recommendations aimed at maximizing the positive outcomes of trade liberalization while mitigating its challenges. First, the study illuminates the need for a targeted reduction in tariffs, especially on agricultural goods. The current tariff structure disproportionately affects rural households, as they primarily consume domestically produced agricultural products. Policymakers should therefore prioritize the reduction of tariffs on these goods. This strategy, crucial in a country where a large portion of income is spent on food, aims to lower food prices, thereby directly benefiting households, particularly the poorer ones. Implementing a phased reduction strategy with regular impact assessments would ensure that these measures effectively enhance rural household welfare. This move, aligned with broader regional trade policies like those of the EAC, would reinforce the pro-poor nature of these trade strategies.

Addressing market imperfections emerges as a crucial step. The study indicates that the imperfect pass-through of tariffs to domestic prices is largely due to market flaws, such as intermediary dominance and a lack of retail competition. Tackling these issues requires policies that foster market competition, support SMEs, and streamline logistics and transportation. These interventions are essential for ensuring that tariff reductions translate into tangible benefits for consumers. The third recommendation focuses on balancing consumer protection with support for domestic farmers. Lowering tariffs on essential imports can alleviate cost pressures on consumers. However, this should be coupled with measures to boost agricultural productivity, ensuring that domestic farmers are not adversely affected. Diversifying the economy could further alleviate dependence on agriculture, stabilizing domestic prices.

Further, the study points out the distortions caused by the derogation of the EAC-CET. To improve the pass-through of tariffs on domestic prices of agricultural goods, these distortions must be addressed with transparent and consistent trade policies. Such measures would correct market imbalances and enhance the effectiveness of the EAC-CET. A significant finding of the study is the differential benefit of trade liberalization on skilled versus unskilled workers. Policymakers must therefore focus on skill development, particularly in urban areas, to maximize the benefits of trade liberalization. Investing in education and vocational training will equip workers with the skills necessary to thrive in a liberalized economy. Infrastructure improvement, especially in rural areas, is another key recommendation. Given the study's finding that rural households stand to benefit more from the EAC-CET, enhancing infrastructure in these areas would enable them to capitalize on trade opportunities. This requires targeted investments in transportation, energy, and digital connectivity.

The need for a flexible approach to trade policy is also highlighted. Policymakers should develop a responsive framework that considers regional disparities, commodity types, and workforce variations. This flexibility can help shield households from international price shocks, particularly in the volatile sectors of food, fuel, and electricity. Continuous stakeholder engagement is vital for ensuring that trade policies are inclusive and reflective of the diverse needs of the Kenyan population. Continued liberalization of trade is recommended, with a focus on carefully monitoring its impacts. This approach involves balancing liberalization efforts with protective measures for vulnerable sectors to ensure that gains are distributed equitably across the country. Lastly, the study underscores the importance of addressing exchange rate volatility. Implementing monetary policies to stabilize the Kenyan shilling and closely monitoring international market trends will be crucial in mitigating the impact of foreign price changes on domestic markets.

In terms of the EAC and global shocks, the study's findings, conducted in the context of the various shocks that have impacted Kenya, offer valuable insights into how trade policies under the EAC framework can be leveraged for resilience and economic stability. The recommendations should aim to enhance the capacity of Kenya and its EAC partners to withstand global economic shocks while optimizing trade benefits within the region. A strategic approach to leveraging the EAC framework emerges as a pivotal aspect of future policy development. One of the primary recommendations is the targeted reduction of tariffs on agricultural goods within the EAC

framework. This strategy can be expanded to include harmonized tariff reductions across member states, particularly focusing on agricultural products that are key to the region's food security. Addressing market imperfections is another critical recommendation within the EAC context, this can be extended to include collaborative efforts to enhance market efficiency across the region. By reducing barriers to cross-border trade, such as cumbersome customs procedures and inconsistent trade policies, member countries can create a more integrated and competitive market environment. The study also highlights the need to support domestic farmers and diversify the economy in the EAC setting, this could involve collaborative agricultural programs aimed at increasing productivity and sustainability. Shared initiatives on agricultural research, technology transfer, and access to regional markets can provide a much-needed boost to farmers in Kenya and across the EAC. Additionally, diversifying into non-agricultural sectors and promoting industrialization within the EAC framework can open new trade opportunities, reduce dependency on agricultural exports, and create more robust economies capable of withstanding external shocks. Improving infrastructure, especially in rural areas, is essential for maximizing the benefits of EAC membership. Investments in transport, energy, and digital infrastructure can facilitate better access to regional markets, enabling rural communities to participate more fully in regional trade. These improvements would not only benefit Kenyan households but also contribute to the overall connectivity and efficiency of the EAC trade network.

5.4. Limitations of the study and areas of further research

This study has chiefly evaluated the effect of the EAC-CET on household welfare by focusing on the goods and trade-able sector of the economy because of data constraints. Trade in services would adversely affect the welfare of households. Further, the non-tradable sectors such as education and health would also be affected by trade policies and in turn, affect the welfare of households. Thus, the findings of the study only show marginal changes in welfare due to the EAC-CET. To gain a wider and aggregate welfare effect of the EAC-CET, future studies could consider the non-tradeable sector as well as the service industry.

Finally, the study only focused on the classical approach of gender, but did not factor in the heterodox approach. Thus, in future studies, there is a need to investigate how reducing or zero-rating import tariffs affect men and women differently in their roles as consumers, producers, and traders. This includes analyzing the differential access to resources and opportunities that men and

women have and how this shapes their respective experiences with trade liberalization. Further, there is a need to examine the barriers and facilitators to market connectivity for men and women. This involves understanding the social, cultural, and economic factors that determine how well individuals are connected to markets and what impedes this connection. All of these form potential areas for further research on trade liberalization and household welfare.

REFERENCES

Adao, R., Carrillo, P. E., Costinot, A., Donaldson, D., & Pomeranz, D. (2021). International Trade and Earnings Inequality: A New Factor Content Approach. *SSRN Electronic Journal*. https://doi.org/10.2139/ssrn.3811136

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., & Davis, D. R. (2012). Trade, firms, and wages: Theory and evidence. *Review of Economic Studies*, *79*(1), 1–36. https://doi.org/10.1093/restud/rdr016

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

Argent, J., & Begazo, T. (2015). Competition in Kenyan Markets and Its Impact on Income and Poverty A Case Study on Sugar and Maize. *World Bank Policy Research Working Paper*, *WP7179*. https://doi.org/10.2139/ssrn.2507248

Artuc, E., Porto, G., & Rijkers, B. (2019). Household Impacts of Tariffs: Data and Results from Agricultural Trade Protection. In *Policy Research Working Paper-World Bank*. https://doi.org/10.1596/1813-9450-9045

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

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

Attanasio, O., & Pavcnik, N. (2004). Trade Reforms and Wage Inequality in Colombia *. *Journal of Development Economics*, *74*(2), 331–366.

Baghdadi, L., Kruse, H., & Martínez-zarzoso, I. (2015). *an Estimation of Tariff Pass-Through in*

Tunisia. (October). Retrieved from https://erf.org.eg/wp-content/uploads/2015/12/963.pdf

Bajo-Buenestado, R., & Borrella-Mas, M. ´ A. (2022). The Heterogeneous Tax Pass-Through Under Different Vertical Relationships. *The Economic Journal*, *132*(January), 1684–1708.

Balistreri, E. J., Jensen, J., & Tarr, D. (2015). What determines whether preferential liberalization of barriers against foreign investors in services are beneficial or immizerising: Application to the case of Kenya. *Economics*, *9*. https://doi.org/10.5018/economics-ejournal.ja.2015-42

Balistreri, E. J., Maliszewska, M., Osorio-Rodarte, I., Tarr, D. G., & Yonezawa, H. (2016). Poverty and Shared Prosperity Implications of Deep Integration in Eastern and Southern Africa. *Poverty and Shared Prosperity Implications of Deep Integration in Eastern and Southern Africa*, (May). https://doi.org/10.1596/1813-9450-7660

Balistreri, E. J., Rutherford, T. F., & Tarr, D. G. (2009). Modeling services liberalization: The case of Kenya. *Economic Modelling*, *26*(3), 668–679. https://doi.org/10.1016/j.econmod.2009.01.010

Bastos, P., & Santos, N. (2022). Long-run effects of trade liberalisation on local labour markets: Evidence from South Africa. *The World Economy*, *45*(10), 3059–3079. Retrieved from https://doi.org/10.1111/twec.13281

Becker, D. (2018). Heterogeneous firms and informality: The effects of trade liberalization on labour markets. *Oxford Economic Papers*, *70*(1), 47–72. https://doi.org/10.1093/oep/gpx029

Benguria, F., & Ederington, J. (2018). Decomposing the Effect of Trade on the Gender Wage Gap. *SSRN Electronic Journal*. https://doi.org/10.2139/ssrn.2907094

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

Besedes, T., Lee, S. H., & Yang, T. (2021). Trade liberalization and gender gaps in local labor market outcomes: Dimensions of adjustment in the United States. *Journal of Economic Behavior & Organization*, *183*, 574–588. Retrieved from https://doi.org/10.1016/j.jebo.2020.12.020

Beyene, L. M. (2014). Implications of High Commodity Prices on Poverty Reduction in Ethiopia and Policy Options under an Agriculture-Led Development Strategy. *AGRODEP Working Paper 0007*, 38.

Bhagwati, J., Krishna, P., & Panagariya, A. (1999). *Trading blocs: Alternative approaches to analyzing preferential trading agreements*. Cambridge: MIT Press.

Bigsten, A., & Durevall, D. (2006). Openness and Wage Inequality in Kenya , 1964 – 2000. *World Development*, *34*(3), 465–480. https://doi.org/10.1016/j.worlddev.2005.08.005

Blyde, J., Busso, M., Park, K., Romero, D., & Bank, I. D. (2023). Short- and long-run labor market adjustment to import competition. *Review of International Economics*, (March), 1–18. https://doi.org/10.1111/roie.12677

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

Bond, E. W. (2021). Tariff pass-through in the middle products model. *International Journal of Economic Theory*, *17*(1), 20–30. https://doi.org/10.1111/ijet.12293

Borusyak, K., & Jaravel, X. (2021). The Distributional Effects of Trade: Theory and Evidence from the United States. *NBER Working Paper Series*. 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

Burfisher, M., Robinson, S., & Thierfelder, K. (2004). Regionalism : Old and New , Theory and Practice. *Agricultural Policy Reform and the WTO: Where Are We Heading?*, (March). Capri, Italy.

Burstein, A., & Vogel, J. (2017). International trade, technology, and the skill premium. *Journal of Political Economy*, *125*(5), 1356–1412. https://doi.org/10.1086/693373

Cabalu, H., & Rodriguez, U.-P. (2007). Trade-offs in Trade Liberalization: Evidence from the Philippine 2005 Tariff Changes. *Journal of Economic Integration*, *22*(3), 637–663. https://doi.org/10.11130/jei.2007.22.3.637

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. *The 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

Casabianca, E. J. (2016). Distributional effects of multilateral and preferential trade liberalisation: The case of paraguay. *Journal of International Trade and Economic Development*, *25*(1), 80–102. https://doi.org/10.1080/09638199.2015.1041418

Cavallo, A., Gopinath, G., Neiman, B., & Tang, G. (2021). Tariff Pass through at the Border and at the Store: Evidence from US Trade Policy. *American Economic Review*, *3*(1), 19–34. https://doi.org/10.2139/ssrn.3470793

Chao, C. C., Ee, M. S., Nguyen, X., & Yu, E. S. H. (2019). Trade liberalization, firm entry, and income inequality. *Review of International Economics*, *27*(4), 1021–1039. https://doi.org/10.1111/roie.12413

Cheong, J., Kwak, D. W., & Tang, K. K. (2018). The trade effects of tariffs and non-tariff changes of preferential trade agreements. *Economic Modelling*, *70*(August), 370–382. https://doi.org/10.1016/j.econmod.2017.08.011

Cho, S. W., & Diaz, J. P. (2011). The welfare impact of trade liberalization. *Economic Inquiry*, *49*(2), 379–397. https://doi.org/10.1111/j.1465-7295.2010.00296.x

Cruces, G., Porto, G., & Viollaz, M. (2018). Trade liberalization and informality in Argentina: exploring the adjustment mechanisms. *Latin American Economic Review*, *27*(1).

https://doi.org/10.1186/s40503-018-0061-1

Dai, M., Huang, W., & Zhang, Y. (2021). How do households adjust to tariff liberalization ? Evidence from China ' s. *Journal of Development Economics*, *150*(July 2019), 102628. https://doi.org/10.1016/j.jdeveco.2021.102628

Davis, D. R., & Mishra, P. (2007). Stolper-Samuelson is Dead: And Other Crimes of Both Theory and Data. *Globalization and Poverty*, (March), 87–108.

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. (1989a). Household survey data and pricing policies in developing countries. *World Bank Economic Review*, *3*(2), 183–210. https://doi.org/10.1093/wber/3.2.183

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

Deaton, A. (2018). *The Analysis of Household Surveys: A Microeconometric Approach to Development Policy*. Retrieved from International Bank for Reconstruction and Development / The World Bank website: https://openknowledge.worldbank.org/handle/10986/30394

Deaton, A., & Zaidi, S. (2002). Guidelines for Constructing Consumption Aggregates for Welfare Analysis. In *LSMS Working Paper*. Washington D.C.

Dix-Carneiro, R., & Kovak, B. K. (2017). Trade liberalization and regional dynamics. *American Economic Review*, *107*(10), 2908–2946. https://doi.org/10.1257/aer.20161214

Dornbusch, R. (1992). The case for trade liberalization in developing countries. *Journal of Economic Perspectives*, *6*(1), 69–85. https://doi.org/10.1257/jep.6.1.69

EAC. (2017). *EAC Customs Union Common External Tariffs 2017 Version*. Retrieved from

https://ugandatrades.go.ug/media/EAC Common External Tariff 2017 .pdf

Easterly, W. (2007). Globalization, Poverty , and All That Factor Endowment Versus Productivity Views. In *Globalization and Poverty*. Retrieved from http://www.nber.org/chapters/c0112

Elshennawy, A., & Said, M. (2010). The impact of trade liberalization on manufacturing employment and wages in Egypt 1990-2007. *International Research Journal of Finance and Economics*, *46*(25759), 138–159.

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

Erten, B., Leight, J., & Tregenna, F. (2019). Trade liberalization and local labor market adjustment in South Africa. *Journal of International Economics*, *118*, 448–467. https://doi.org/10.1016/j.jinteco.2019.02.006

Fajgelbaum, P. D., Goldberg, P. K., Kennedy, P. J., & Khandelwal, A. K. (2019). The Return to Protectionism. *The Return to Protectionism*, 1–56. https://doi.org/10.3386/w25638

Fajgelbaum, P. D., & Khandelwal, A. K. (2016). Measuring the unequal gains from trade. *Quarterly Journal of Economics*, *131*(3), 1113–1180. https://doi.org/10.1093/qje/qjw013

Fajgelbaum, P. D., & Khandelwal, A. K. (2022). The Economic Impacts of the US-China Trade War. *Annual Review of Economics*, *14*, 205–228. https://doi.org/10.1146/annurev-economics-051420-110410

Falvey, R. E. (1981). Commercial policy and intra-industry trade. *Journal of International Economics*, *11*(4), 495–511. https://doi.org/10.1016/0022-1996(81)90031-3

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*(C), 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

Francois, D. J., & Baughman, L. M. (2019). Estimated Impacts of Tariffs on the U.S. Economy and Workers. *Trade Partnership Worldwide, LLC*. Retrieved from https://tradepartnership.com/wp-content/uploads/2019/02/All-Tariffs-Study-FINAL.pdf

Frankel, J., Parsley, D., & Wei, S. (2012). Slow Pass-through Around the World : A New Import for Developing Countries ? *Open Econ Rev*, (23), 213–251. https://doi.org/10.1007/s11079-011-9210-8

Freund, C., & Órnelas, E. (2008). Does Regionalism Affect Trade Liberalization toward Non members? *The Quarterly Journal of Economics*, *123*(4), 1531–1575.

Gaddis, I., & Pieters, J. (2017). The Gendered Labor Market Impacts of Trade Liberalization Evidence from Brazil. *Journal of Human Resources*, *52*(2), 457–490. https://doi.org/10.3368/jhr.52.2.1014-6690R1

Gailes, A., Gurevich, T., Shikher, S., & Tsigas, M. (2018). Gender and Income Inequality in United States Tariff Burden. In *Economics Working Papers*. Washington D.C.

Gasiorek, M., Byiers, B., Rollo, J., & CUTS International, . (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/DP202-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.

Gignoux, J., & Suwa-Eisenmann, A. (2017). The Regional Impact of Trade Liberalization on Households in Egypt, 1999-2012. *Working Paper Series of the Economic Research Forum for Egypt and Arab Countries*, *1109*, 31. Retrieved from http://erf.org.eg/wp-content/uploads/2017/06/1109.pdf

Goldberg, P.K., & Pavcnik, N. (2016). The Effects of Trade Policy. In *Handbook of Commercial Policy* (1st ed., Vol. 1). https://doi.org/10.1016/bs.hescop.2016.04.002

Goldberg, Pinelopi Koujianou, & Pavcnik, N. (2005). Trade, wages, and the political economy of trade protection: Evidence from the Colombian trade reforms. *Journal of International Economics*, *66*(1), 75–105. https://doi.org/10.1016/j.jinteco.2004.04.005

Goldberg, Pinelopi Koujianou, & Pavcnik, N. (2007). Distributional effects of globalization in developing countries. *Journal of Economic Literature*, *45*(1), 39–82. https://doi.org/10.1257/jel.45.1.39

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

Hanson, G. H. (1997). Increasing Returns , Trade and the Regional Structure of Wages Author (s): Gordon H . Hanson Published by : Wiley on behalf of the Royal Economic Society Stable URL : http://www.jstor.org/stable/2235274 Accessed : 14-04-2016 05 : 18 UTC. *The Economic Journal*, *107*(440), 113–133.

Harrigan, J., & Reshef, A. (2015). Skill-biased heterogeneous firms, trade liberalization and the skill premium. *Canadian Journal of Economics*, *48*(3), 1024–1066. https://doi.org/10.1111/caje.12167

Hayakawa, K., & Ito, T. (2015). Tariff Pass-through of the World-wide Trade: Empirical Evidence at Tariff-line Level. *ERIA Discussion Paper Series*, (ERIA-DP-2015-34).

Hayakawa, K., Ito, T., & Mukunoki, H. (2022). Lerner meets Metzler: Tariff pass-through of worldwide trade. *Journal of the Japanese and International Economies*, *63*, 101173. https://doi.org/10.1016/j.jjie.2021.101173

He, Z. (2019). *Trade-and-real-wages-of-the-rich-and-poor-evidence-from-brazil-and-mexico*. (November).

Heckman, J. J., Lochner, L. J., & Petra, T. E. (2003). Fifty Years of Mincer Earnings Regressions. *NBER Working Paper Series 9732*. Retrieved from http://www.nber.org/papers/w9732

Helpman, E., Itskhoki, O., Muendler, M. A., & Redding, S. J. (2017). Trade and inequality: From theory to estimation. *Review of Economic Studies*, *84*(1), 357–405. https://doi.org/10.1093/restud/rdw025

Hillman, A. (2003). Chapter 27 Trade liberalization and globalization: A survey. *Readings in Public Choice and Constitutional Political Economy, I*, 497–510.

Jaravel, X., & Sager, E. (2019). What are the Price Effects of Trade? Evidence from the U.S. and Implications for Quantitative Trade Models. *Finance and Economics Discussion Series*, *2019*(068), 1–110. https://doi.org/10.17016/feds.2019.068

Juhn, C., Gergely, U., & Villegas-sanchez, C. (2013). Trade Liberalization and Gender Inequality. *The American Economic Review*, *103*(3), 269–273.

Kareem, I. O. (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

Karingi, S., Pesce, O., & Sommer, L. (2016). Regional opportunities in East Africa. In *WIDER Working Paper 2016 / 160*. Helsinki.

Kibua, T. N., & Tostensen, A. (2010). *Fast-tracking East African Integration*. Retrieved from http://ric.works.go.ug/rc/files/6.3_Fast-Tracking_East_African_Integration.pdf

KIPPRA, ODI, & UON. (2007). *Trade Policy Reforms and Poverty in Kenya : Processes and Outcomes*. Nairobi.

Kis-Katos, K., Pieters, J., & Sparrow, R. (2018). Globalization and Social Change: Gender-Specific Effects of Trade Liberalization in Indonesia. *IMF Economic Review*, *66*(4), 763–793.

https://doi.org/10.1057/s41308-018-0065-5

Kis-Katos, K., & Sparrow, R. (2015). Poverty, labor markets and trade liberalization in Indonesia. *Journal of Development Economics*, *117*, 94–106. https://doi.org/10.1016/j.jdeveco.2015.07.005

Kovak, B. K. (2013). Regional effects of trade reform: What is the correct measure of liberalization? *American Economic Review*, *103*(5), 1960–1976. https://doi.org/10.1257/aer.103.5.1960

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

Lawrence, R. Z., & Edwards, L. (2012). US Trade and Wages: The Misleading Implications of Conventional Trade Theory. *SSRN Electronic Journal*, (180). https://doi.org/10.2139/ssrn.1624879

Lederman, D., & Porto, G. (2016). The price is not always right: On the impacts of commodity prices on households (and countries). *World Bank Research Observer*, *31*(1), 168–197. https://doi.org/10.1093/wbro/lkv013

Levell, P., O'Connell, M., & Smith, K. (2017). The exposure of households' food spending to tariff changes and exchange rate movements. *IFS Briefing Note*.

Magani, A. G. (2019). *Common External Tariffs and Trade Efficiency : Lessons for Cross-listed Firms in the East African Community*. *3*(2), 43–51. https://doi.org/10.11648/j.ipa.20190302.12

Manda, D. K. (2002). Globalisation and the Labour Market in Kenya. In *Globalization and Poverty*. Retrieved from https://citeseerx.ist.psu.edu/viewdoc/download?doi=10.1.1.196.4456&rep=rep1&type=pdf

Manda, D. K., & Sen, K. (2004). The labour market effects of globalization in Kenya. *Journal of International Development*, *16*(1), 29–43. https://doi.org/10.1002/jid.1061

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*(1–306), 7–12. https://doi.org/10.1111/roiw.12433

McCaig, B., & McMillan, M. S. (2021). Trade liberalisation and labour market adjustment in Botswana. *Journal of African Economies*, *29*(3), 236–270. https://doi.org/10.1093/JAFECO/EJZ027

Melo, C., Moita, R., & Sunao, S. (2021). Passing through the supply chain: Implications for market power. *International Journal of Industrial Organization*, *79*, 102796. https://doi.org/10.1016/j.ijindorg.2021.102796

Mensah, I. (2019). Trade liberalisation and its impact on income distribution in Ghana. *Transnational Corporations Review*, *11*(3), 208–221. https://doi.org/10.1080/19186444.2019.1642058

Milanovic, Branko; Squire, L. (2005). Does Tariff Liberlaization Increase Wage Inequality? Some Empirical Evidence. *NBER Working Paper Series*, 65.

Mincer, J., & Polachek, S. (1974). Family Investments in Human Capital : Earnings of Women and Fertility. *Journal of Political Economy*, *82*(2), S76–S108.

Mishra, P., & Kumar, U. (2005). Trade Liberalization and Wage Inequality: Evidence From India. *IMF Working Papers*, *05*(20), 1. https://doi.org/10.5089/9781451860399.001

Moratti, M., & Natali, L. (2012). Measuring Household Welfare. In *Innocenti Working Papers, no. 2012-04*.

Nakamura, E., & Zerom, D. (2010). Accounting for Incomplete. *The Review of Economic Studies*, *77*(3), 1192–1230.

Ng'eno, N. K., Nyangito, H. O., Ikiara, M. M., & Ronge, E. E. (2003). *Regional Integration Study of East Africa : The Case of Kenya*. (9).

Nguyen, M. T., Dang, T. L., & Huynh, T. H. H. (2020). Trade Liberalization and Income Distribution

in Vietnam: Dynamic CGE Approach*. *Asian Economic Journal*, *34*(4), 404–429. https://doi.org/10.1111/asej.12224

Nicita, A. (2004). Who Benefited from Trade Liberalization in Mexico ? Measuring the Effects on Household Welfare. *World Bank Policy Research Working Paper*, (3265).

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

Onchari, D. G. (2019). International trade openness and its effect on unemployment and poverty in Kenya. Retrieved from Sematic Scholar website: https://www.semanticscholar.org/paper/INTERNATIONAL-TRADE-OPENNESS-AND-ITS-EFFECT-ON-AND-Üniversitesi/adc3bf4c2e92d5c8316e8b188482e78e3a0e8013

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

Parsley, D. C., & Wei, S. (2007). A Prism into the PPP Puzzles : The Micro-Foundations of Big Mac Real Exchange Rates Author (s): David C . Parsley and Shang-Jin Wei Published by : Oxford University Press on behalf of the Royal Economic Society Stable URL : https://www.jstor.org/stable/. *The Economic Journal*, *117*(523), 1336–1356.

Pavcnik, N. (2017). The Impact of Trade on Inequality in Developing Countries. *NBER Working Paper Series*, *23878*. https://doi.org/10.3386/w23878

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

Porto, G. G. (2006). Using survey data to assess the distributional effects of trade policy. *Journal of International Economics*, *70*(1), 140–160. https://doi.org/10.1016/j.jinteco.2005.09.003

Rojas-Vallejos, J., & Turnovsky, S. J. (2017). Tariff Reduction and Income Inequality: Some Empirical Evidence. *Open Economies Review*, *28*(4), 603–631. https://doi.org/10.1007/s11079-017-9439-y

Santos Silva, J. M. C., & Tenreyro, S. (2006). The log of gravity. *Review of Economics and Statistics*, *88*(4), 641–658. https://doi.org/10.1162/rest.88.4.641

Sebastian, E. (1993). Review on Openness, Trade Liberalization and Growth in Developing Countries. *Journal of Economic Literature*, *31*(3), 1358–1393.

Selwaness, I., & Zaki, C. (2015). Assessing the impact of trade reforms on informal employment in Egypt. *Journal of North African Studies*, *20*(3), 391–414. https://doi.org/10.1080/13629387.2014.997717

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

Shinyekwa, I. M. B., & Katunze, M. (2016). Assessment of the Effect of the EAC Common External Tariff Sensitive Products List on the Performance of Domestic Industries, Welfare, Trade and Revenue. In *Economic policy research centre (eprc)>research series*. Kampala, Uganda.

Shuaibu, M. (2017). The Effect of Trade Liberalisation on Poverty in Nigeria: A Micro–Macro Framework. *International Economic Journal*, *31*(1), 68–93. https://doi.org/10.1080/10168737.2016.1221984

Siddiqui, K. (2015). Trade Liberalization and Economic Development: A Critical Review. *International Journal of Political Economy*, *44*(3), 228–247. https://doi.org/10.1080/08911916.2015.1095050

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

Stolper, W. F., & Samuelson, P. A. (1941). Protection and Real WagesAuthor. *The Review of Economic Studies*, *9*(1), 58–73.

Tao, H., & Song, T. (2022). Trade liberalisation, imperfect pass-through and cost of living: evidence from Chinese cities. *Economic Research-Ekonomska Istrazivanja* , *36*(2). https://doi.org/10.1080/1331677X.2022.2142256

Vazquez, E., & Winkler, D. (2023). *Trade and Local Labor Market Outcomes in Mexico: Disentangling the Channels and the Role of Geography, Sectors, and Trade Types*.

Viner, J. (1924). The Most-Favored-Nation Clause in American Commercial Treaties. *Journal of Political Economy*, *32*(1), 101–129. https://doi.org/10.1086/253580

Vo, T. T., & Nguyen, D. X. (2021). Impact of Trade Liberalization on Household Welfare: An Analysis Using Household Exposure-to-Trade Indices. *Social Indicators Research*, *153*(2), 503–531. https://doi.org/10.1007/s11205-020-02499-1

Winters, L. A. (2002). Trade liberalisation and poverty: What are the links? *World Economy*, *25*(9), 1339–1367. https://doi.org/10.1111/1467-9701.00495

Winters, L. A., & Chang, W. (2000). Regional integration and import prices: An empirical investigation. *Journal of International Economics*, *51*(2), 363–377. https://doi.org/10.1016/S0022-1996(99)00010-0

Winters, L. A., McCulloch, N., & McKay, A. (2004). Trade liberalization and poverty: The evidence so far. *Journal of Economic Literature*, *42*(1), 72–115. https://doi.org/10.1257/002205104773558056

Won, K., & Kennedy, L. (2005). International Trade and Agriculture. In *International Journal of*

Sustainability in Higher Education (Vol. 6). https://doi.org/10.1108/ijshe.2005.24906dae.005

Wood, A. (1995). How Trade Hurt Unskilled Workers. *Journal of Economic Perspectives*, *9*(3), 57–80. https://doi.org/10.1257/jep.9.3.57

Yahmed, B. S., & Bombarda, P. (2020). Gender, Informal Employment and Trade Liberalization in Mexico. *World Bank Economic Review*, *34*(2), 259–283. https://doi.org/10.1093/wber/lhy020

Yotov, Y. V., Piermartini, R., Monteiro, J.-A., & Larch, M. (2016). An Advanced Guide to Trade Policy Analysis: The Structural Gravity Model. In *World Trade Organization and United Nations Conference on Trade and Development*. https://doi.org/10.30875/abc0167e-en

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

	Simple average ad valorem duty (Percent)			Share of Total Imports (%)		
Harmonized System (HS) Products	2004	2005	2015	2004	2005	2015
HS - 01 - Live animals	4.10	19.6	18.8	0.01	0.00	0.15
HS - 02 - Meat and edible meat offal	35.0	25.0	25	0.00	0.00	0.07
HS - 03 - Fish and crustaceans, mollusks and other aquatic invertebrates	15.0	25.0	25.0	0.06	0.04	0.41
HS - 04 - Dairy produce; birds' eggs; natural honey; edible products of animal origin.	28.3	35.4	42.5	0.06	0.02	0.89
HS - 05 - Products of animal origin	21.8	20.9	20.4	0.02	0.01	0.04
HS - 06 - Live trees and other plants; bulbs, roots and the like; cut flowers and ornamental foliage	9.20	10.4	14.1	0.13	0.09	0.17
HS - 07 - Edible vegetables and certain roots and tubers	35.0	25.0	25.0	0.08	0.08	1.64
HS - 08 - Edible fruit and nuts; peel of citrus fruit or melons	28.0	24.5	24.5	0.06	0.02	0.48
HS - 09 - Coffee, tea, mate and spices	14.7	25.0	25.0	0.22	0.06	0.55
HS - 10 - Cereals	16.9	19.7	16.4	2.54	1.08	14.12
HS - 11 - Products of the milling industry; malt; starches; inulin; wheat gluten	17.8	22.4	21.9	0.13	0.10	0.51
HS - 12 - Oil seeds and oleaginous fruits;	10.7	7.0	7.4	0.14	0.09	0.98
HS - 13 - Lac; gums, resins and other vegetable saps and extracts	2.90	0.00	0.00	0.01	0.01	0.07
HS - 14 - Vegetable plaiting materials and vegetable products	15.0	10.0	10.0	0.00	0.00	0.01
HS - 15 - Animal or vegetable fats and oils	17.1	13.7	13.9	2.42	3.15	2.94
HS - 16 - Preparations of meat, of fish or of crustaceans, mollusks or other aquatic invertebrates	24.2	25.0	25.0	0.01	0.00	0.03
HS - 17 - Sugars and sugar confectionery	12.7	17.9	14.2	0.71	0.33	3.45
HS - 18 - Cocoa and cocoa preparations	18.5	13.2	13.2	0.06	0.03	0.33
HS - 19 - Preparations of cereals, flour, starch or milk; pastry cooks' products	33.9	22.9	22.9	0.12	0.05	1.25
HS - 20 - Preparations of vegetables, fruit, nuts or other parts of plants	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
MT2 - 22 - Manufactures	51.30	62.30	61.50	59.80

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

Appendix 3: Breush and Pagan Lagrangian Multiplier test

```
Breusch and Pagan Lagrangian multiplier test for random effects

        lnprice[grouping,t] = Xb + u[grouping] + e[grouping,t]

        Estimated results:
                         |        Var     sd = sqrt(Var)
                ---------+-----------------------------
                 lnprice |    2.957783        1.719821
                       e |    .9926069        .9962966
                       u |    1.484274        1.218308

        Test:   Var(u) = 0
                                 chibar2(01) =  1800.76
                              Prob > chibar2 =   0.0000
```

Appendix 4: Hausman Test

.

	Coefficients			
	(b) fe	(B) re	(b-B) Difference	sqrt(diag(V_b-V_B)) S.E.
lnfprice	.0844543	.3489849	-.2645306	.013222
lntariff	-.3813618	-1.677959	1.296597	.1709996
logpop	.0710072	.2222012	-.151194	.0781143
lne	1.759211	1.759006	.0002046	.0460781

b = consistent under Ho and Ha; obtained from xtreg

B = inconsistent under Ha, efficient under Ho; obtained from xtreg

Test: Ho: difference in coefficients not systematic

chi2(4) = (b-B)'[(V_b-V_B)^(-1)](b-B)

= 447.18

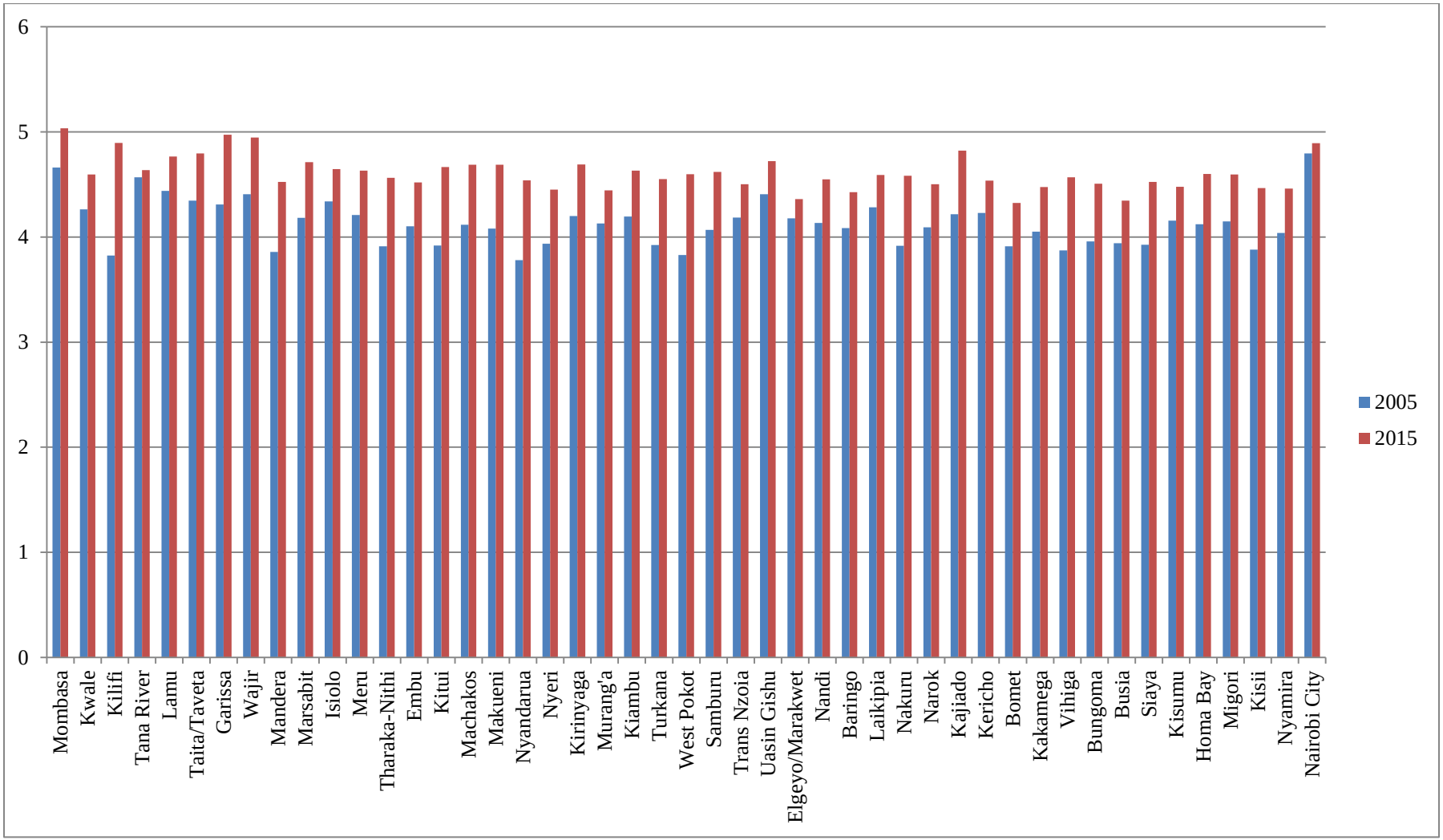
Prob>chi2 = 0.0000

Appendix 5: Overall, between and within variations of the variables

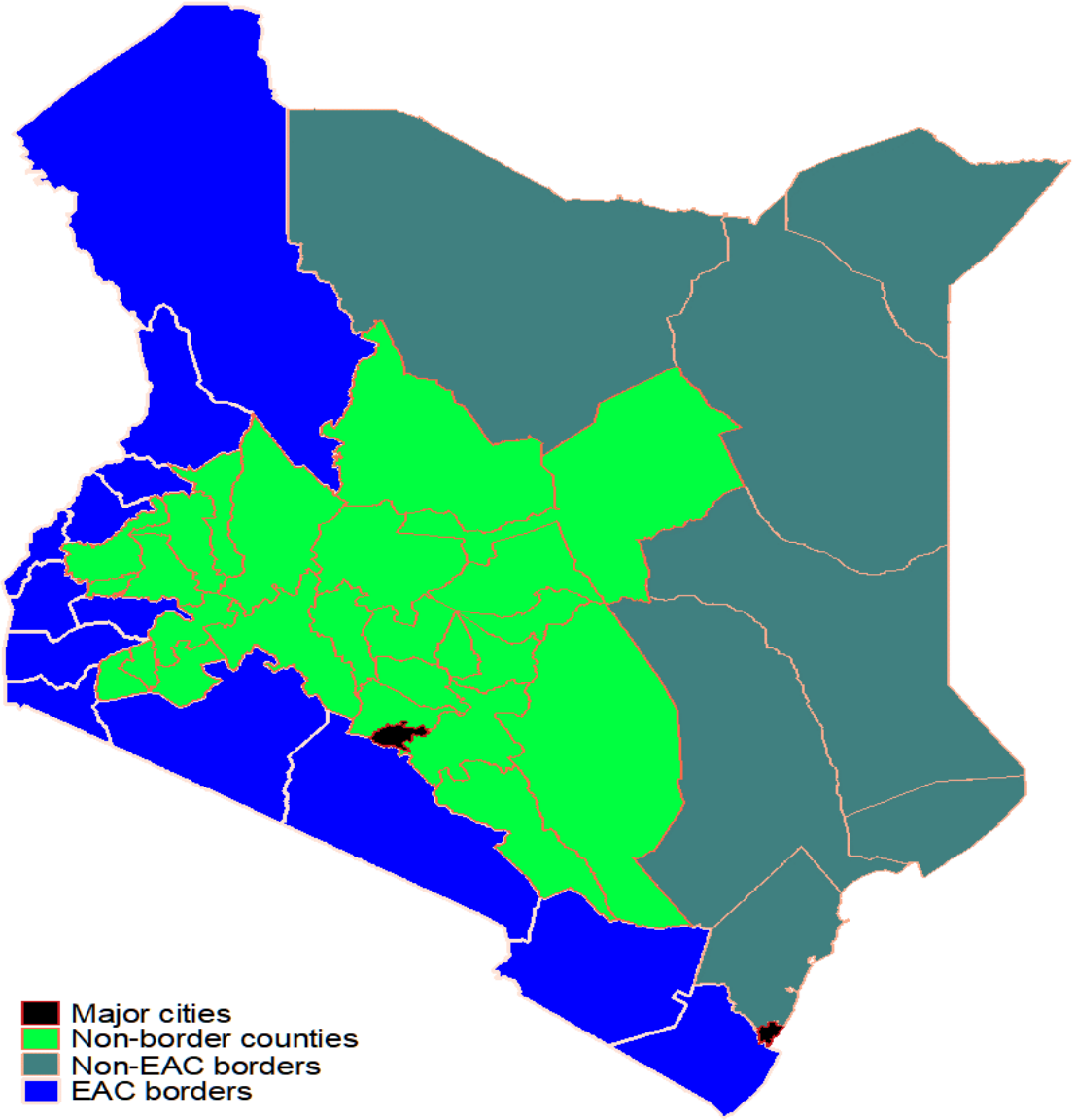
Variables	Variations	Mean	Std. Deviation	Min	Max	Observations
Log price	Overall	4.385068	1.399848	-2.22516	10.62006	N = 9727
	Between		1.321988	-2.22516	10.11865	n = 5934
	Within		0.646022	-0.17269	8.94283	T-bar = 1.6392
Log foreign price	Overall	4.50556	1.278555	1.515887	9.913351	N = 9727
	Between		1.227664	2.120024	9.913351	n = 5934
	Within		0.481578	2.789405	6.221716	T-bar = 1.6392
Log tariff	Overall	0.257498	0.087699	0.0000	0.590561	N = 9727
	Between		0.079488	0.0000	0.590561	n = 5934
	Within		0.040008	0.07379	0.441207	T-bar = 1.6392
Log population	Overall	8.915554	0.404257	8.333061	9.622499	N = 9727

	Between		0.389651	8.333061	9.622499	n = 5934
	Within		0.098981	8.755923	9.075184	T-bar = 1.6392
Log Exchange rate	Overall	4.49863	0.124203	4.371597	4.620059	N = 9727
	Between		0.062635	4.371597	4.620059	n = 5934
	Within		0.114767	4.374394	4.622856	T-bar = 1.6392

Appendix 6: Distribution of prices according to counties



Appendix 7: Regions of Counties according to EAC-Borders



Appendix 8: List of products

Name of Product	HS Code	2005 Code in KIHBS	2015 Code in KIHBS	2005 Tariff	2015 tariff	%Δ	Category
Wheat	1001	107	113	35.00	34.77	-0.65	cereals
Maize	1005	103, 104	00105-7	25.00	31.09	24.37	cereals
Wheat flour	1101	108	00114-16	60.00	50.00	-16.67	cereals
Maize flour	1102	105, 106	00108,10-11	35.00	50.00	42.86	cereals
Other flour	1102	112, 110, 113	00118-25	22.62	30.50	34.85	cereals
Rice	1006	101, 102	00101-4	35.00	75.00	114.29	cereals
Sorghum	1007	111	00120	15.00	25.00	66.67	cereals
Millet	1008	109	00117	15.00	25.00	66.67	cereals
Pasta	1902, 1003	121, 114	00126-7, 149	35.00	25.00	-28.57	cereals
Bread	1905	116-8, 120	00143-9	33.05	20.83	-36.97	cereals
Peas	2005, 0708, 0710,08 0713	304	00133, 00137-8	35.00	25.00	-28.57	cereals
Beans	0710.22	301	00129-32	35.00	25.00	-28.57	cereals
Ground nut	1202, 0802	305	00134,00136	21.82	24.96	14.37	cereals
Cereals				**30.96**	**34.01**	**17.23**	
Pork	0203	504	00204	35.00	25.00	-28.57	Meat and dairy
Chicken	0105, 0207	506,	00207	35.00	25.00	-28.57	Meat and dairy
Beef	0204, 0201-2	501-3, 505, 507-8	00201-6	35.00	25.00	-28.57	Meat and dairy
Offal	0206, 0208	601	00210, 00211	35.00	25.00	-28.57	Meat and dairy
Fresh fish	0301, 0302	701	00301,	15.00	25.00	66.67	Meat and dairy
Frozen fish	0303, 0304	702	00302,	15.00	25.00	66.67	Meat and dairy
Smoked fish	'0305	703	00303, 00304	15.00	25.00	66.67	Meat and dairy
Sausages	1601	602	00212,	35.00	25.00	-28.57	Meat and dairy
Bacon	203.29	603	00214,	35.00	25.00	-28.57	Meat and dairy
Fresh milk	401	801, 802	00401-2, 00404-6	60.00	60.00	0.00	Meat and dairy
Processed milk	402	803-6	00403, 407-9	54.39	60.00	10.32	Meat and dairy

Yoghurt	403	808, 809	00411,	60.00	60.00	0.00	Meat and dairy
Eggs	0407, 0408	811	00413,	35.00	25.00	-28.57	Meat and dairy
Meat and dairy products				**35.78**	**33.75**	**-5.68**	
Tomatoes	0702	404	00705	35.00	25.00	-28.57	Vegetables and fruits
Cabbages	0704	402, 406	00703, 00706	35.00	25.00	-28.57	Vegetables and fruits
Onions	'0703	401	00701-2	35.00	25.00	-28.57	Vegetables and fruits
Other vegetables	0709-12	411,13, 15-19	9, 00714	35.00	25.00	-28.57	Vegetables and fruits
Potatoes	0701.10,90	201,	00801,	35.00	25.00	-28.57	Vegetables and fruits
Sweet potato	0714.20.00	202	00802,	35.00	25.00	-28.57	Vegetables and fruits
Arrow root	0714.90.00	203	00803,	35.00	25.00	-28.57	Vegetables and fruits
Cassava	0714.10.00	204	00804,	35.00	25.00	-28.57	Vegetables and fruits
Cooking banana	0803.10,90	208	00725,	35.00	25.00	-28.57	Vegetables and fruits
Bananas	'0803	1001	00601,	35.00	25.00	-28.57	Vegetables and fruits
Dates	'0804	1003-7	00603-7,18	35.00	25.00	-28.57	Vegetables and fruits
Citrus	'0805	1002, 12	00602,12	35.00	25.00	-28.57	Vegetables and fruits
Apples	'0808	1008,11	00608,11	35.00	25.00	-28.57	Vegetables and fruits
Other fruits	0811-13	1023-24	00619-23	35.00	25.00	-28.57	Vegetables and fruits
Vegetables, tubers and fruits				**35.00**	**25.00**	**-28.57**	
Coffee	'0901	1303-4	1101	15.00	25.00	66.67	Beverages and tobacco
Tea	'0902	1305, 1306	1102	15.00	25.00	66.67	Beverages and tobacco
Cocoa	'1806	1301	01103,	35.00	25.00	-28.57	Beverages and tobacco
Water/mineral	2201, 2202	1401	01201,	25.00	25.00	0.00	Beverages and tobacco
Spirits	2207, 2208,	1501	01501-6,	80.50	25.00	-68.94	Beverages and tobacco
Wine	2204, 2205	1502	01601-3	23.43	23.25	-0.75	Beverages and tobacco
Beer	2203	1503	01701-3	30.00	25.00	-16.67	Beverages and tobacco
Cigarette	2402,	1601, 1604	01800,	30.00	28.30	-5.67	Beverages and tobacco
Tobacco	2401,	1602, 1603	01801,	20.00	25.00	25.00	Beverages and tobacco
Beverages and tobacco				**30.44**	**25.17**	**-17.29**	
Salt	2501	1701	01001,	25.00	25.00	0.00	Food accompaniments
Tomato sauce	210320	1702	01003,	35.00	25.00	-28.57	Food accompaniments
Other spices	910	1704	01014,	15.00	25.00	66.67	Food accompaniments

Baking powder	210230,	1705	01012,	20.00	25.00	25.00	Food accompaniments
Sugar	1701-4	1101-4	00901-4	36.99	36.79	-0.53	Food accompaniments
Margarine	1517	903	00503, 00504	32.50	25.00	-23.08	Food accompaniments
Cooking fat	1518	904	00506, 00508	35.00	25.00	-28.57	Food accompaniments
Cooking oil	1515	905	00507,	17.50	17.14	-2.06	Food accompaniments
Food accompaniments				**27.12**	**25.49**	**-6.02**	
Handbags, suitcases, travel bags	4202	3504, 3506, 3507	3402, 3403	25.00	25.00	0.00	Garments and footwear
Belts	4203	4208	6914	25.00	25.00	0.00	Garments and footwear
Women's skirts	6104	3908	7006	45.06	25.00	-44.52	Garments and footwear
Women's slip	6108	3903	7012	58.49	25.00	-57.26	Garments and footwear
Women's jackets, trousers, suits	6204	3909, 3912, 3914	07007, 07004-5, 07001-2	40.37	25.00	-38.07	Garments and footwear
Handkerchiefs, serviettes	6213	3025	3221	35.00	25.00	-28.57	Garments and footwear
Scarves, shawls	6214	3915	7011, 17, 7018	40.91	25.00	-38.89	Garments and footwear
Ties	6215	3810	7019, 6912	35.00	25.00	-28.57	Garments and footwear
Men's coat/jacket	6201, 6101	3801	06901-3	35.00	25.00	-28.57	Garments and footwear
Men's suit/trousers	6203, 6103	3802, 3803	06904, 06905	44.41	25.00	-43.71	Garments and footwear
Men's shirt	6205, 6105	3804	06906,	36.57	25.00	-31.64	Garments and footwear
Women's blouses	6206, 6106	3907	7008	35.05	25.00	-28.66	Garments and footwear
Men's inner pants,	6207, 6107	3805,3807-9	06908-9, 06903	42.11	25.00	-40.63	Garments and footwear
Women's inner pants	6208, 6212	3901, 3910	7010	38.69	25.00	-35.39	Garments and footwear
Footwear	6401-6	4301-6, 4401-5, 4501-3, 4601-5	07301-8, 401-8,501-8, 601-8	30.00	25.00	-16.67	Garments and footwear
Kitenge	5208.51	3904	7014	25.00	37.50	50.00	Garments and footwear
Garments and footwear				**36.98**	**25.78**	**-25.70**	
Exercise books	4802	3614	6402	19.58	10.00	-48.94	Stationaries and paper
Envelope	4817	3613	6401	35.00	25.00	-28.57	Stationaries and paper

Printed books	4901	3609	6201-6205	5.00	0.00	-100.	Stationaries and paper
Newspapers	4902	3610, 3611	6301-6303	0.00	0.00	0.00	Stationaries and paper
Pencils	9609	3612	6403	21.67	25.00	15.38	Stationaries and paper
Toilet papers, facial tissue	4803, 4818	3018	3220	35.00	17.50	-50.00	Stationaries and paper
Stationaries and paper				**19.38**	**12.92**	**-35.35**	
Umbrellas	6601	3508	3407	25.00	25.00	0.00	Household appliances
Needles	7319	4205, 4209	6704	30.00	25.00	-16.67	Household appliances
Cookers	7321	5010-11, 4904	8602, 8805-6	33.21	20.71	-37.63	Household appliances
Plates	8209	5004, 5003	8802	0.00	10.00	10.00	Household appliances
Razors	8212	3014	3202	25.00	15.00	-40.00	Household appliances
Other cutlery	8214	5008-9, 01-2	8801, 04, 08-9	25.00	20.00	-20.00	Household appliances
Refrigerators, freezer	8418	4901, 4902	8501	17.05	17.17	0.71	Household appliances
Batteries (dry cells)	8506	3509	9002	30.71	30.00	-2.33	Household appliances
Blender	8509	4915, -17	8608	23.33	25.00	7.14	Household appliances
Cellular	8517	5213	9101, 9103	15.00	1.43	-90.48	Household appliances
Televisions	8525	5225	9203	20.83	0.00	20.83	Household appliances
Radio	8526	5224	9205	15.00	0.00	-15	Household appliances
Motorcycle	8703	5217	11001	20.28	13.43	-33.79	Household appliances
Bicycles	8712	5218	12001	0.00	10.00	10.00	Household appliances
Spoons, forks and knives	8201, 8208, 8211, 8215	5005-7	8803	22.17	9.50	-57.14	Household appliances
Household appliances				**20.17**	**14.82**	**-26.55**	
Carpets	5701	5101	8409	25.00	25.00	0.00	Furniture and furnishings
Blankets	6301	5107	8402	26.00	25.00	-3.85	Furniture and furnishings
Curtains	6303	5104	8401	25.00	25.00	0.00	Furniture and furnishings
Wooden furniture	9403	4701-4714	8301-8315	35.00	25.00	-28.57	Furniture and furnishings
Mattress	9404	5109, 5113	8404	23.00	25.00	8.70	Furniture and furnishings
Broom	9603	2008, 2009	3508	23.21	25.00	7.69	Furniture and furnishings
Furniture and furnishings				**26.20**	**25.00**	**-2.67**	
Petroleum jelly	2712	3026	3205	30.00	25.00	-16.67	Chemical products
Perfumes	3303	3008	3212	10.83	5.00	-53.85	Chemical products

Makeups	3304	3027-29	3210-11, 3213	35.00	25.00	-28.57	Chemical products
Hair products	3305	3022-23, 3012,	3207	35.00	25.00	-28.57	Chemical products
Toothpaste	3306	3019	3223	25.00	25.00	0.00	Chemical products
Soap	3401	2001, 3017	3204, 3501	33.75	25.00	-25.93	Chemical products
Shoe polish /Cream	3405	2010	3511	27.00	25.00	-7.41	Chemical products
Candles	3406	2012	3510	25.00	25.00	0.00	Chemical products
Insecticide	3808	2004	3504	3.75	2.13	-43.21	Chemical products
Sanitary	9619	3002	3219	0.00	12.50	12.50	Chemical products
Chemical products				**22.53**	**19.46**	**-13.63**	
Notes: Product numbering like *6301-6303*, implies a list of products between 6301 to 6303, or *501-3* implies 501 to 503.							

Appendix 9: PPML Skilled vs. Unskilled

	Rural		Urban		Strictly Urban	
	Skilled	Unskilled	Skilled	Unskilled	Skilled	Unskilled
Price	0.00000	0.00011	0.00001***	0.00002*	-0.00001***	-0.00001
	(0.00001)	(0.00011)	(0.00000)	(0.00001)	(0.00000)	(0.00016)
Age	0.01754***	0.01628*	0.02616***	0.00357	0.06334***	0.03217***
	(0.00501)	(0.00905)	(0.00420)	(0.01075)	(0.00085)	(0.00887)
Marital status	-0.16625***	-0.06638	-0.06681***	0.05010	0.09292	0.15612**
	(0.02712)	(0.06825)	(0.01937)	(0.03813)	(0.09033)	(0.07291)
Religion	-0.15627***	-0.08381	-0.18926***	0.02561	-0.01027	-0.46686***
	(0.04876)	(0.10991)	(0.05292)	(0.09372)	(0.13253)	(0.10961)
Gender	0.22831*	0.84397***	0.33764***	0.47059**	-0.25155***	0.42880
	(0.12976)	(0.29472)	(0.08464)	(0.18961)	(0.08827)	(0.70083)
Industry	-0.02166	-0.03286	-0.29265***	-0.06568	-0.21761	-0.36721***
	(0.05138)	(0.07941)	(0.08577)	(0.09934)	(0.16906)	(0.01853)
Formality	0.39131***	0.99412***	0.79332***	0.10424	0.44438***	0.71708
	(0.11206)	(0.37835)	(0.07368)	(0.24212)	(0.08410)	(0.54356)
Sector	-0.40021***	-0.8403***	-0.57396***	-0.28373	-0.81301***	0.80385
	(0.10179)	(0.22614)	(0.10838)	(0.24921)	(0.29598)	(0.52486)
Year	-0.27169	0.68985	-0.50121***	0.79907***	-0.03388	1.59589*
	(0.16583)	(0.55210)	(0.09978)	(0.28132)	(0.04899)	(0.81928)
Constant	8.54683***	6.41798***	8.57518***	6.92715***	7.11543***	6.42558***
	(0.23537)	(0.54866)	(0.18996)	(0.35867)	(0.10897)	(0.33929)
Observations	9,824	3,298	11,067	3,778	632	270
R-squared	0.085	0.160	0.179	0.039	0.203	0.366
Robust standard errors in parentheses, *** p<0.01, ** p<0.05, * p<0.1						

Appendix 10: PPML Formal vs. informal

	Rural		Urban		Strictly Urban	
	Formal	Informal	Formal	Informal	Formal	Informal
Price	0.00001	0.00001	0.00000***	0.00001**	0.00002	0.00017***
	(0.00001)	(0.00002)	(0.00000)	(0.00000)	(0.00001)	(0.00001)
Age	0.02601***	-0.00346	0.02355***	0.01053*	0.04859***	0.07472***
	(0.00541)	(0.00646)	(0.00437)	(0.00603)	(0.00608)	(0.00462)
Marital status	-0.10497***	-0.04692*	-0.06604***	0.03649*	0.09168	0.08087
	(0.03039)	(0.02554)	(0.02099)	(0.02041)	(0.08842)	(0.07016)
Religion	-0.16510***	-0.08142	-0.16087***	-0.08812	-0.17968***	0.11618
	(0.05354)	(0.05018)	(0.05782)	(0.06274)	(0.00474)	(0.19244)
Gender	0.31880**	0.32553***	0.33536***	0.21630**	-0.29954***	0.00133
	(0.15570)	(0.10274)	(0.11457)	(0.08420)	(0.09948)	(0.14778)
Industry	-0.10566*	-0.01885	-0.39250***	-0.14586**	-0.19470***	-0.41213
	(0.06228)	(0.05802)	(0.10809)	(0.06599)	(0.01229)	(0.46630)
Skill	1.16931***	0.03234	1.96716***	0.35628**	1.97471***	1.22942***
	(0.19319)	(0.34404)	(0.19419)	(0.16413)	(0.19794)	(0.01982)
Sector	-0.33278***	-0.09097	-0.49483***	-0.29131**	0.07141	-1.20175***
	(0.12218)	(0.13732)	(0.11528)	(0.12119)	(0.39927)	(0.29130)
Year	-1.16637***	2.05041***	-0.99974***	0.95805***	-0.28028**	0.28120*
	(0.16723)	(0.24716)	(0.12148)	(0.12874)	(0.10881)	(0.14955)
Constant	7.83343***	6.79965***	7.72740***	7.26391***	6.57125***	4.95496***
	(0.29630)	(0.20719)	(0.27052)	(0.25953)	(0.56135)	(0.10890)
Observations	6,369	6,753	7,056	7,789	437	465
R-squared	0.184	0.177	0.236	0.098	0.197	0.331

Robust standard errors in parentheses, *** p<0.01, ** p<0.05, * p<0.1

Appendix 11 : PPML Agricultural vs Non-Agricultural

	Rural		Urban		Strictly Urban	
	Agricultural	Non-Ag	Agricultural	Non-Ag	Agricultural	Non-Ag
Price	-0.00002	0.00005**	0.00002**	0.00001***	0.00042***	-0.00002*
	(0.00001)	(0.00002)	(0.00001)	(0.00000)	(0.00005)	(0.00001)
Age	0.00652	0.02434***	0.00448	0.03313***	-0.00204	0.06928***
	(0.00765)	(0.00615)	(0.00654)	(0.00452)	(0.01528)	(0.00139)
Marital status	-0.1126***	-0.14043***	-0.07122*	-0.04434**	0.05600	0.06528
	(0.03444)	(0.03374)	(0.03910)	(0.02190)	(0.11501)	(0.08233)
Religion	-0.09636	-0.20298***	-0.12331	-0.18154***	-0.86334**	-0.01119
	(0.06285)	(0.05457)	(0.08186)	(0.05773)	(0.40533)	(0.11792)
Gender	0.10970	0.38950**	0.04077	0.46759***	0.13152	-0.41876***
	(0.12636)	(0.19326)	(0.14079)	(0.08454)	(0.91002)	(0.11012)
Industry	0.04894	-0.05284	0.02832	-0.34239***	-0.05823***	-0.21112
	(0.07664)	(0.06258)	(0.06908)	(0.09490)	(0.00249)	(0.15871)
Formality	0.55842***	0.33902***	0.82694***	0.69576***	1.57088***	0.36322***
	(0.18655)	(0.11818)	(0.13066)	(0.07990)	(0.10114)	(0.05554)
Skill	1.19415***	0.81167***	1.37897***	1.36065***	-0.31973	2.16973***
	(0.18266)	(0.25732)	(0.21536)	(0.17930)	(0.25962)	(0.60561)
Year	0.02465	-0.36332*	-0.6014***	-0.38918***		-0.22812***
	(0.23085)	(0.19182)	(0.20868)	(0.11541)		(0.03784)
Constant	6.81531***	7.51409***	7.25738***	6.84603***	9.55075***	5.05365***
	(0.29202)	(0.30926)	(0.42629)	(0.28097)	(2.64372)	(0.72240)
Observations	7,235	5,887	5,615	9,230	158	744
R-squared	0.053	0.134	0.129	0.211	0.658	0.295

Robust standard errors in parentheses, *** p<0.01, ** p<0.05, * p<0.1

Appendix 12: Effect of trade liberalization (PPML results for border counties)

	EAC border counties	Non-EAC border counties	Non-border counties	Capital city
Price	0.000034***	0.000041***	0.000005***	0.000001
	(0.000013)	(0.000009)	(0.000001)	(0.000047)
Age	0.027562***	0.000834	0.019754***	0.062517***
	(0.002197)	(0.003620)	(0.001694)	(0.008701)
Marital status	-0.063135***	-0.092106***	-0.097645***	0.101975***
	(0.011196)	(0.021515)	(0.007572)	(0.035152)
Religion	-0.159817***	-0.325923***	-0.065781***	-0.033890
	(0.035235)	(0.050571)	(0.025221)	(0.150943)
Gender	0.397797***	0.608161***	0.271137***	-0.150060
	(0.048200)	(0.079642)	(0.032890)	(0.188696)
Industry	-0.279336***	-0.257696***	-0.122342***	-0.224499
	(0.056860)	(0.093338)	(0.038406)	(0.157443)
Skill	1.297993***	0.250814***	1.411048***	1.640439***
	(0.066437)	(0.082558)	(0.042733)	(0.194581)
Formality	0.665531***	0.249498***	0.676538***	0.404589***
	(0.046268)	(0.069179)	(0.033898)	(0.144034)
Sector	-0.564398***	-0.243780***	-0.622637***	-0.632921***
	(0.047495)	(0.084861)	(0.034084)	(0.225418)
Year	-0.389791***	0.220102***	-0.574331***	-0.021471
	(0.053575)	(0.075356)	(0.034347)	(0.149998)
Constant	6.978331***	8.930822***	7.112516***	5.465705***
	(0.130010)	(0.284463)	(0.097577)	(0.692902)
Observations	8,471	3,492	16,004	902
R-squared	0.160	0.105	0.182	0.213

Appendix 13: Test for Heteroscedasticity

Rural prices

```
. quietly xtreg lnprice lnfprice lntariff logpop lne if resid==0, fe

. xttest3

Modified Wald test for groupwise heteroskedasticity
in fixed effect regression model

H0: sigma(i)^2 = sigma^2 for all i

chi2 (2776)  =     0.00
Prob>chi2 =      1.0000
```

Urban prices

```
. quietly xtreg lnprice lnfprice lntariff logpop lne if resid==1, fe

. xttest3

Modified Wald test for groupwise heteroskedasticity
in fixed effect regression model

H0: sigma(i)^2 = sigma^2 for all i

chi2 (2965)  =     0.00
Prob>chi2 =      1.0000
```

Strictly urban areas' prices

```
. quietly xtreg lnprice lnfprice lntariff logpop lne if resid==2, fe

. xttest3

Modified Wald test for groupwise heteroskedasticity
in fixed effect regression model

H0: sigma(i)^2 = sigma^2 for all i

chi2 (193)  =      0.00
Prob>chi2 =      1.0000
```

Agricultural prices

```
. quietly xtreg lnprice lnfprice lntariff logpop lne if ind==1, fe

. xttest3

Modified Wald test for groupwise heteroskedasticity
in fixed effect regression model

H0: sigma(i)^2 = sigma^2 for all i

chi2 (3764)  =  1.4e+36
Prob>chi2 =      0.0000
```

Manufactured goods' prices

```
. quietly xtreg lnprice lnfprice lntariff logpop lne if ind==0, fe

. xttest3

Modified Wald test for groupwise heteroskedasticity
in fixed effect regression model

H0: sigma(i)^2 = sigma^2 for all i

chi2 (2170)  =     0.00
Prob>chi2 =      1.0000
```

EAC-border counties

```
. quietly xtreg lnprice lnfprice lntariff logpop lne if border==1, fe

. xttest3

Modified Wald test for groupwise heteroskedasticity
in fixed effect regression model

H0: sigma(i)^2 = sigma^2 for all i

chi2 (1702)  =     0.00
Prob>chi2 =      1.0000
```

Non-EAC borders'counties

```
. quietly xtreg lnprice lnfprice lntariff logpop lne if border==2, fe

. xttest3

Modified Wald test for groupwise heteroskedasticity
in fixed effect regression model

H0: sigma(i)^2 = sigma^2 for all i

chi2 (791)  =      0.00
Prob>chi2 =      1.0000
```

Non-border counties

```
. quietly xtreg lnprice lnfprice lntariff logpop lne if border==3, fe

. xttest3

Modified Wald test for groupwise heteroskedasticity
in fixed effect regression model

H0: sigma(i)^2 = sigma^2 for all i

chi2 (3248)  =     0.00
Prob>chi2 =      1.0000
```