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Original Paper

Effect of the East African Community Common External Tariff on Household Labor Income in Kenya

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Abstract

This study investigates how changes in prices caused by the adoption of the East African Community Common External Tariff affected the labor incomes of households in Kenya. Households in rural, urban, and fully urban areas are analyzed. Workers are classified as skilled versus unskilled, formal versus informal, and agricultural versus non-agricultural sector workers. Data from the Kenya Integrated Household Budget Surveys 2005/2006 and 2015/2016 are used in the analysis. Data from these surveys were used to categorize workers and extract the price values for commodities. One hundred and twenty-one commodities classified as agricultural or manufactured goods are analyzed. Much of the reduction in import tariffs and hence reduction in commodity prices is on manufactured goods. A Mincerian wage equation that is corrected for survey design and heteroskedasticity is estimated. Further, a sensitivity analysis using a Poisson Pseudo Maximum Likelihood model is estimated. The price-labor income effect is observed to vary with the classification of workers in the country. Skilled, formal, and non-agricultural workers gained compared to their counterparts. Workers in counties that border the EAC countries and those in the major cities in the country gained more than other workers in other counties in the country. However, in all parts where gains are experienced, the magnitude is small. This shows that generally, the Common External Tariff did not have a very significant effect on labor incomes in Kenya.

Keywords

labor income, common external tariff, east african community, prices, workers

JEL: F12, F13, F14, F15

1. Introduction

According to economic theory, a change in the price of a commodity affects the returns on the factors of production involved in its production. The changes 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 the chemicals sector (Francois & Baughman, 2019). Such shifts in labor within sectors due to tariff changes may influence the labor incomes paid to workers. Further, households that live in various regions of a country typically experience the varied effects of international trade on their labor incomes. 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 policies 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). Cheaper imported inputs after trade liberalization 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). Nonetheless, for poor countries where farmers highly depend on agricultural incomes, having a protective tariff structure would see an increase in their income (Nicita, Olarreaga, & Porto, 2014). These contrasting views on the effect of adjusting import tariffs show that adjusting a tariff structure like the East African Community-Common External Tariff (EAC-CET) would have an ambiguous effect on labor income in a developing country.

The effects of trade liberalization on labor incomes in developed nations have been extensively studied. However, little has been done for developing countries. As Engel, Kokas, Lopez-Acevedo, & Maliszewska (2021) point out, not much is known about how trade liberalization has affected the local labor markets in Sub-Saharan nations. There are few studies on import tariff adjustment and labor incomes for sub-Saharan African countries. Recent studies like McCaig & McMillan (2021) for Botswana, rely on aggregate levels of income rather than segmenting the types of workers. Their study mainly focused 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 reveal a possibility of labor

income inequality amongst different workers in developing countries. 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.

Previous work in Kenya, like that of Manda (2002), Bigsten & Durevall (2006), and Omolo (2012) do not capture the aspect of a Common External Tariff (CET). Further, the emphasis on the labor characteristics of workers when analyzing the impact of liberalization on labor income is minimally placed. This study contributes to the literature by answering the question of who gains and who loses, from trade policies, in the labor market. The "who" aspect of the labor market involves categorizing workers based on their forms of work. The first form 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 informal 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. 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. This is through broader regional integration policies like the African Continental Free Trade Area (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. As a result of some trade policies, some sectors of the labor market may be adversely affected.

The structure of the paper is as follows. In the next section, we briefly highlight the context of import tariffs, the EAC-CET, and the labor market in Kenya. Section 3 briefly explores the literature on tariffs and labor incomes. Sections 4 and 5 outline the methodology and the data used. This is followed by Section 6 which discusses the findings of the analysis and finally, section 7 concludes and provides policy implications as well as areas of future research.

2. Background of the Study

2.1 Import Tariffs, the EAC-CET, 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 et al., 2019). Imported inputs are less expensive relative to domestically produced inputs due to the lower cost of inputs (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 lead 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.

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 1.

Figure 1. 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 factors like regional effects, demographic groups, and individual characteristics 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 agricultural imports 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. 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.

2.2 The Labor Market in Kenya

The majority of labor-income employees in Kenya are from the private sector, as seen in Figure 2. 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 2, the market structure is highly dominated by the private sector (70%), hence a lesser degree of regulation.

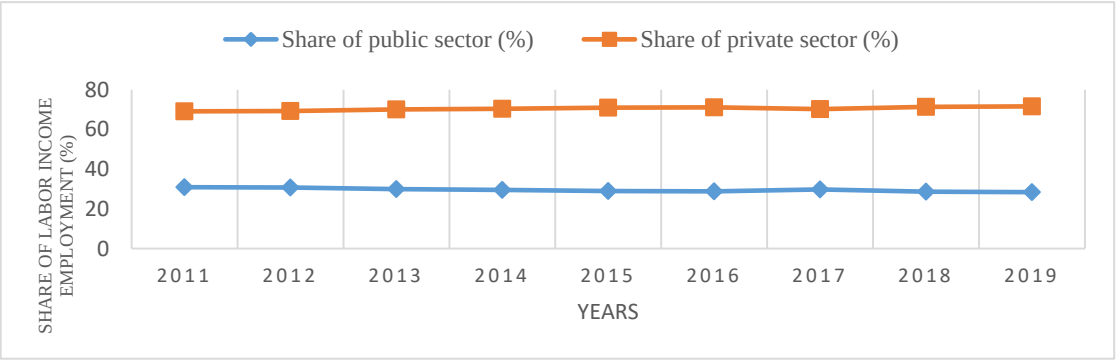

Figure 2. Categories of Labor Income Employment in Kenya

Source: Kenya National Bureau of Statistics (KNBS)

Informal employment mainly characterizes Kenya's labor income employment as seen in Figure 3. 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.

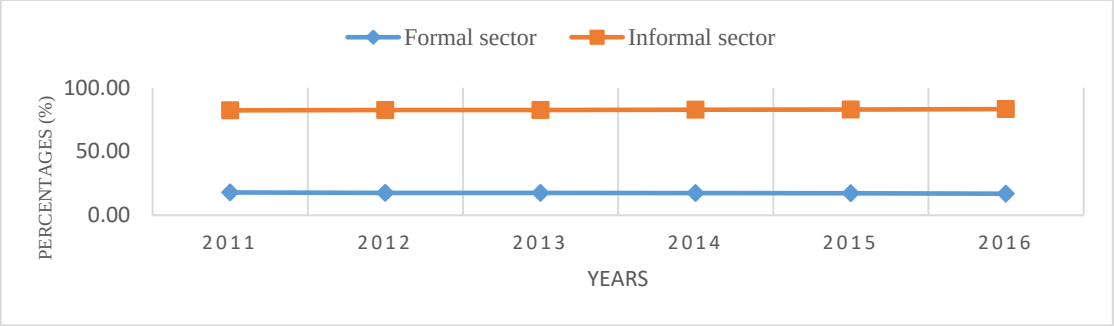

Figure 3. Share of Formal and Informal Sector Labor Income Employment in Kenya

Source: Kenya National Bureau of Statistics (KNBS)

As the study focuses on employment in the goods sector rather than the service sector, Table 1 gives a review of labor income employment in the 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. The highest share of labor income employment in the country is mainly in the agriculture and manufacturing sectors. These two are the dominant sectors in terms of employment in the goods sectors.

Table 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	15.41	8.84	15.13	14.90	15.40	12.02	13.72	13.30	13.44	12.71
Mining and quarrying	0.51	0.53	0.51	0.23	0.82	0.22	0.80	0.33	0.81	0.32
Manufacturing	14.11	13.90	15.84	6.12	16.43	5.61	15.22	5.84	15.14	5.53
Wholesale and retail trade	10.80	11.11	11.00	6.32	11.52	5.90	11.14	6.20	11.12	6.22
The total share of employment	40.81	34.24	42.40	27.50	44.13	23.71	40.70	25.54	40.33	24.70

M (Male) F (Female)

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

Generally, the labor market in Kenya is mainly dominated by the informal sectors. In terms of employment in goods sectors; agriculture, manufacturing, wholesale and retail trade are the dominant sectors. Finally, the share of private employment is higher than the private sector.

3. Literature Review

3.1 Theoretical Review

Import tariffs 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 would be affected by a rise in the relative prices of goods. Thus, a rise in the relative price of an import item as a result of a higher tariff will lead to an increase in the factor returns of import-competing commodities. Three main theories explain how trade liberalization affects labor incomes; the Specific Factor (SF) model, the Stolper Samuelson (SS) model, and the Factor Endowment (FE) model. According to the SF model, developed by Viner (1924), 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. According to the SS model, developed by Stolper and Samuelson (1941), 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. Following these arguments, it would be expected that trade liberalization in a developing country such as Kenya should be inherently pro-poor (Note 1) 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 labor-intensive commodities and thus experience more labor incomes (Won & Kennedy, 2005).

The SS theorem has however received criticism based on the types of products produced and traded. 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. Finally, the FE model argues that globalization affects income in two ways: factor endowments and productivity of factors. The argument is that globalization increases 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 terms of productivity of factors

of production, the differences observed in per capita income within countries may be due to 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.

3.2 Empirical Review

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. 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. Artuc et al. (2019) combined household surveys with data from 54 low- and lower-middle-income countries. They show that the unilateral removal of agriculture tariffs would increase household income by 2.5%. Nonetheless, the effects of import tariffs differ between and within countries. Additionally, heterogeneity is seen among households and wage workers. Of the 54 countries, 45 saw income increases from the relaxation of import tariffs, while 9 saw 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, & 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.

Country case studies show varying results depending on the main point of interest. Specifically, heterogeneity in terms of; rural versus urban workers, formal versus informal, skilled versus unskilled, and male versus female workers.

Mensah (2019) finds that trade liberalization negatively affects the incomes of rural households in comparison to urban households in Ghana. Lowering import taxes has a substitution effect that lowers the demand for domestic goods. This eventually affects domestic farmers' income. Demand for labor and land also decreases. However, Chao, Ee, Nguyen, & Yu (2019) note that the incomes of urban households are negatively affected compared to rural households in China. In terms of formality, Selwaness & Zaki (2015) and Yahmed & Bombarda (2020) show that formal workers gain more compared to informal workers. After episodes of trade liberalization, firms found it more profitable to shift from informal sectors to formal sectors. The most productive sectors with legal workers boosted their exports to foreign markets while the least productive firms that employ informal workers were put out of business. However, Cruces, Porto, & Viollaz (2018) show that informal workers are the ones who gain more. Businesses switch out formal for informal employees to mitigate the effects of trade shocks. As such, industries that would be subject to deeper tariff cuts would see a rise in informality. For example, in Argentina, the increase in labor informality was a result of industry tariff reduction (Cruces et al., 2018). The effect was large for industries with a high percentage of small-size enterprises. However, a

decline in overall national tariffs decreased overall informality in the manufacturing sector. In South Africa, workers saw a considerable fall in both formal 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.

For skill levels, 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). Harrigan & Reshef (2015) and Burstein & Vogel (2017) also demonstrate that skilled workers gain more from trade liberalization policies compared to unskilled workers. 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 (Harrigan & Reshef, 2015). 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 (Burstein & Vogel, 2017). This lowers the skill premium elsewhere and raises it in nations that have a competitive advantage in skill-intensive industries. However, Mishra & Kumar (2005), Kis-Katos & Sparrow (2015), and Marchand (2017) find that it is the unskilled workers who gain more from trade liberalization. The creation of jobs and increases in pay for unskilled workers are associated with declines in import levies of intermediate goods. Amiti & Cameron (2012) also shows that decreasing input tariffs reduce skill premiums in firms importing intermediate inputs. 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.

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. Helpman, Itskhoki, Muendler, & 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 & Turnovsky (2017) demonstrate that households in the lowest income quintile suffer the greatest, whilst those in the second-richest quintile benefit the most. Inequality in terms of gender shows that 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 industries (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. Although variations are observed between men and women, Juhn, Gergely, & 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. 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, & 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.

The majority of the studies reveal that there is uncertainty on how trade liberalization affects labor income. For Kenya, Manda & Sen (2004) and Bigsten & Durevall (2006) provide two contrasting views on the effect of trade liberalization on labor income in the country. While Manda & Sen (2004) find openness to cause more income inequality between highly skilled and less skilled workers, Bigsten & 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; 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, with the release of the Kenya Integrated Household Survey data for 2015 and 2005 one can evaluate trade liberalization on household labor income. This is because the surveys capture disaggregated wage data at the household level.

4. Research Methodology

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

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

By repeated iterations of equation (1) from period 0 and assuming rk_t is a small faction (Mincer &

Polachek, 1974), then a logarithmic transformation of (1) results to:

$$lnE_t = lnE_0 + \sum_{j=o}^{t-1} ln(1 + r_j k_j) \quad (2)$$

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:

$$lnE_t = lnE_0 + \sum_{i=o}^{s-1} ln(1 + r_i k_i) + \sum_{j=s}^{t-1} ln(1 + r_j k_j) \quad (3)$$

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) becomes:

$$lnE_t = lnE_0 + rs + \sum_{j=s}^{t-1} ln(1 + \Omega k_j) \quad (4)$$

This yield:

$$lnE_t \approx lnE_0 + rs + \Omega \sum_{j=s}^{t-1} k_j \qquad For\ small\ values\ of\ r, \Omega, and\ k \quad (5, \text{Note 2})$$

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: $k_{s+y} = \Phi\left(1 - \frac{y}{T}\right)$

Where $y = t - s \geq 0$, and $\Phi \in (0,1)$. Thus, net potential earnings w_t of post-schooling investment is obtained by subtracting post-schooling investment from gross earnings (5):

$$lnE_t - \Phi\left(1 - \frac{y}{T}\right) \approx lnE_0 - \Phi\Omega - \Phi + rs + \left(\Phi\Omega + \frac{\Phi\Omega}{2T} + \frac{\Phi}{2T}\right)y - \left(\frac{\Phi\Omega}{2T}\right)y^2 \quad (6)$$

Where T is the last year of working in life. Equation (6) can be summarized to be the Mincerian earnings equation:

$$w_t \approx \beta + rs + \theta y - \alpha y^2 \quad (7)$$

Where $w_t = lnE_t - \Phi\left(1 - \frac{y}{T}\right)$ is potential net incomes, and $\beta = lnE_0 - \Phi\Omega - \Phi$, $\theta = \left(\Phi\Omega + \frac{\Phi\Omega}{2T} + \frac{\Phi}{2T}\right)$ and $\alpha = \left(\frac{\Phi\Omega}{2T}\right)$ are constants. The equation implies that the earnings of an individual will increase by the number of investments in training and education. Empirically, apart from individual characteristics like investments in schooling noted in equation (7), 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 (7) can broadly be rewritten as:

$$w_{jt} = w_{jt}(P_{it}, Z_{jt}) \quad (8)$$

Where w_{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 (8) 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. Log-linearizing the earnings equation (8) and

transforming it to have a variation of labor incomes amongst skilled and unskilled workers results to:

$$ln\, w_{jsrt} = \beta_0 + \beta_1 lnP_{irt} + \beta_2 Des + \beta_3 Sec + \lambda_w Z_{jt} + Y + \varepsilon_{jsrt} \quad (9)$$

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). 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;

$$\beta^* = \left(e^{\beta} - 1\right) \times 100 \quad (10)$$

Estimation of the effect of price on formal against informal workers and agricultural versus non-agricultural workers, similar earning equation (9) are estimated while changing the dependent and dummy variables.

5. 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 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.

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. The number of unskilled workers declined for the two periods, while skilled workers increased as seen in Table 2. 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 2. 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
Fully 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
Fully 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
Fully 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

6. Empirical Results and Discussion

6.1 Skilled Versus Unskilled Workers

Table 3 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 fully 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 richer households (Nicita et al., 2014). 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 & 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, & Yu (2019) argue that the labor income gap can be caused by a shift in capital and labor. In particular, 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 & 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 & 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 study thus support the H-O model's theoretical predictions. The results also conform to the theoretical arguments of Chao, Ee, Nguyen, & 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. Trade liberalization has a positive impact on firm entry (Caliendo, Feenstra, Romalis, & Taylor, 2015). However, the magnitude is higher for developed countries compared to developing and emerging countries.

Table 3. Skilled vs. Unskilled Workers

	Rural		Urban		Fully 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.

Generally, 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 non-tariff changes (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, & 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 fully 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 statistically significant and positive for both skilled and unskilled workers in the nation's fully urban regions. This suggests that people holding formal occupations in the nation's largest cities, whether they be skilled or unskilled, earn more than those holding informal jobs. The magnitude is greatest for unskilled people in formal employment because they make over 150% more than unskilled workers in informal employment. When it comes to skilled workers, those who work in formal employment earn 68% more than those who engage in informal employment. These statistics illustrate the significant wage gaps between skilled and unskilled laborers engaged in both formal and informal employment in the nation's major cities. 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.

6.2 Formal Versus Informal Workers

The reduction of prices under the EAC-CET saw an increase in labor incomes for formal workers as seen in Table 4. For formal workers in fully 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 & 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 fully 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 & 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 fully 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. 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 workers. 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, Redding, & Weinstein, 2019). A lot of domestic firms in Kenya employ informal workers as seen in Figure 3 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 4. Formal vs. Informal Workers

	Rural		Urban		Fully 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.

The gender coefficient for formal workers is statistically significant 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%. 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.

6.3 Agricultural Versus Non-agricultural Workers

The price effect in both rural and the two major cities in the country was more pronounced in the non-agricultural sectors as seen in Table 5. 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 5. Agricultural vs. Non-Agricultural Sector Workers

	Rural		Urban		Fully 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.

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 earn more than unskilled workers in the country.

6.4 Workers on the East African Community Borders

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 a 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 1. The results of the analysis are shown in Table 6.

Table 6. 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.

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.

6.5 Robustness Checks

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 & 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 (8) in its log form, the equation is transformed to its multiplicative form as:

$$e_{jt} = \exp\left[P_{it} + Z_{jt}\right] \varepsilon_{ijt} \tag{11}$$

The same multiplicative transformations are done for equations (9) such that:

$$e_{jsrt} = \exp\left[\beta_1 P_{irt} + \beta_2 Des + \beta_3 Sec + \lambda_w Z_{jt} + Y + \Phi_{At} + \Theta_{AD} + \eta_{AK}\right] \varepsilon_{jsrt} \tag{12}$$

The results of this PPML for skilled and unskilled workers are highlighted in Appendix 2. As expected, the coefficients on PPML are different from those on OLS due to the zero values accounted for in the PPML estimator. However, 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 2 shows that price was significant for unskilled workers in fully 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 fully urban areas. However, the general trend observed in the country is that skilled workers gain more than unskilled workers.

In Appendix 3, 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 fully urban areas based on sensitivity analysis. In the inclusion of those workers who do not report their income, PPML estimates show that informal workers in fully 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 4. 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.

7. Conclusion and Policy Implications

The objective of the study was to examine the effects of the EAC-CET on labor incomes in Kenya with an aim of identifying the potential gainers and lossers of trade polcies in a developing country. Housekols suvery data for 2005 and 2015 was used in the analysis while estimating a Mincerian earnings equations. The study shows that labor incomes respond to reductions in the prices of

commodities in the country. The EAC-CET triggered a reduction in prices and hence an increase in labor incomes. 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 due to 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.

Using four different forms of trade policies, policymakers could attempt to increase the real labor incomes of households in the country through the price mechanism. First, to increase the level of pass-through of low import tariffs to domestic prices, there is a need to minimize transaction costs involved in trade. The low reduction in prices implies that import tariffs in EAC are still very high. Therefore, the second form of intervention would be a need to advocate for a further reduction in import tariffs. This is more so for agricultural commodities. Artuc et al. (2019) show that the unilateral elimination of agricultural tariffs increases household income by 2.5% in developing countries. Third, since Kenya is bound under the EAC agreement and cannot adjust its tariff structure, there is a need to leverage the EAC clause that allows for duty remission schemes and stay of applications. The country can use this clause to request duty remission for commodities whose prices significantly affect the real labor incomes of households in the country. Commodities that have been seen to positively affect the real labor incomes of households are manufactured commodities. For these commodities, duty remission schemes may be requested for intermediate inputs used in the production of such commodities. Although this would be a short-run intervention. In the long run, policymakers may consider the complete elimination of tariffs on inputs used in the production of manufactured goods. In addition to reducing standard trade costs, such as transportation, exercise duties, and border clearance fees, policymakers could target other hidden costs, such as intermediaries and cartel costs. Intermediaries exist in the form of brokers who end up colluding to form cartels. These economic agents take advantage of information asymmetry, where buyers are unaware of the exact import tariff, price, or source of the commodity. As such, domestic prices may be inflated. Thus, policymakers could address this by increasing consumer awareness about the exact prices and import tariffs of commodities in the country.

In the classification of workers, some levels of inequalities are observed. Some workers gain while others do not. For example, males gain more than females. Thus, there is a need to adopt policies to address these inequalities. The government can adopt policies to fill the information gap. The unskilled,

informal, and female workers could be disadvantaged because they cannot access information about trade policies in the country. There is thus a need to do intensive civic education for the many unskilled households in the country to help them reap the benefits of trade policies. The information gap illustrates that an unskilled household in the country might not be aware that they can cheaply import and sell commodities in the country. As unskilled workers are observed not to significantly gain from trade liberalization, one of the recommendations based on trade literature is to decrease the number of unskilled workers relative to skilled ones in the country. The government can achieve this by improving education and training levels. This intervention entails reducing the demand for unskilled workers by indirectly decreasing their supply (Wood, 1995). The aspect of reducing demand for unskilled workers could be achieved by increasing the use of more advanced technologies. However, more training in new technologies would also be needed to limit the supply of unskilled workers.

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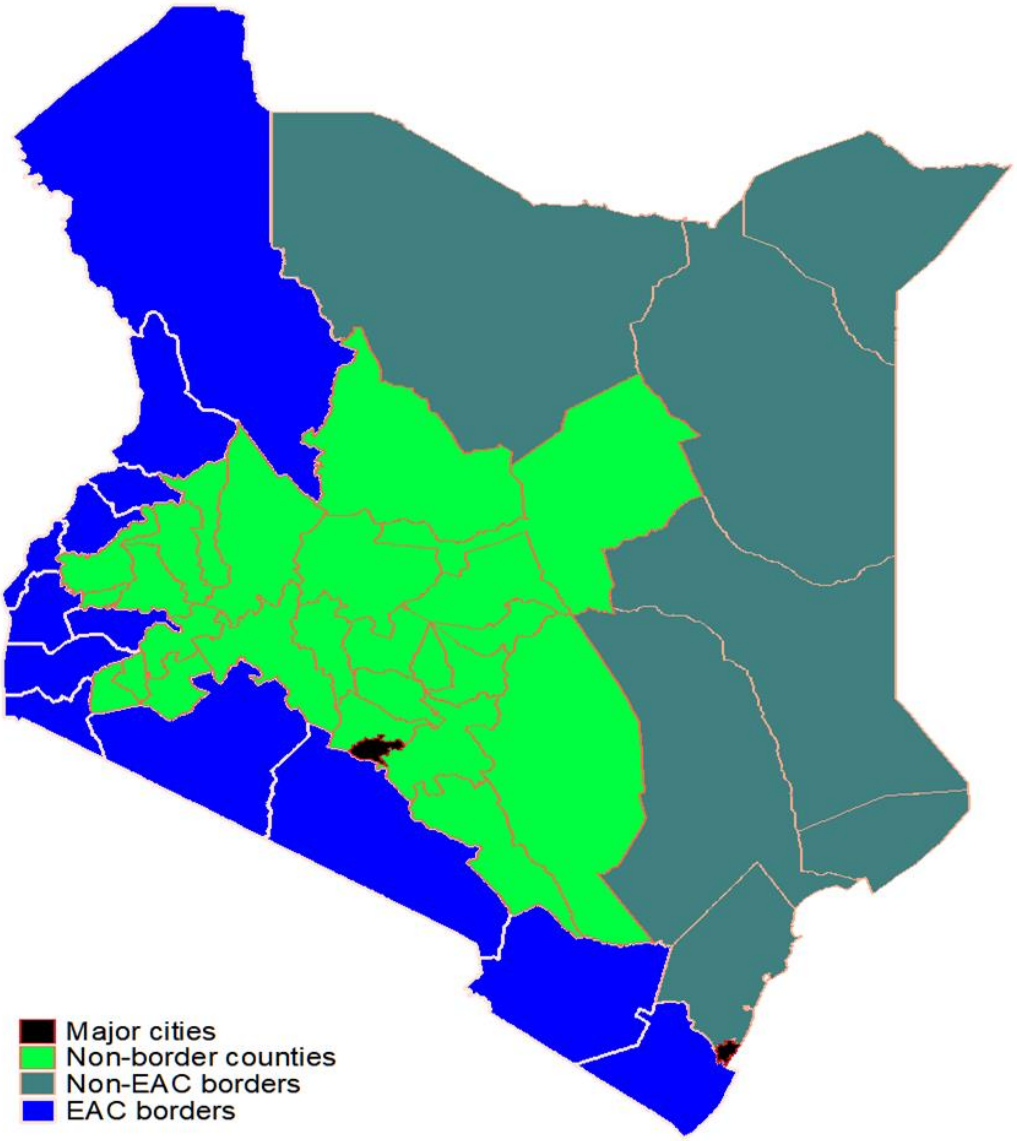
Notes

Note 1. A trade policy is pro-poor, according to Nicita, Olarreaga, & Porto (2014), if the protection framework that is put in place favors poor families more proportionally than rich households.

Note 2. The *equality* symbol changes to a symbol of *roughly equal* because if x is close to zero then $ln(1+x) \approx x$

Appendices

Appendix 1: Regions of Counties according to EAC-Borders



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

Appendix 2. PPML Skilled vs. Unskilled

	Rural		Urban		Fully 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 3. PPML Formal vs. informal

	Rural		Urban		Fully 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 4. PPML Agricultural vs Non-Agricultural

	Rural		Urban		Fully 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 5. 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

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