

# **Panel Data Analysis of Import Tariff Policy on Economic Growth and Industrial Output in Developing Economies.**

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## **Abstract**

This paper is focused on interpreting the effects of import tariff policy on domestic economic growth in the small market economies of developing nations. There have been several previous studies that have investigated the effect of tariff policy on domestic consumers and producers of already established economies. In addition, there have also been many studies assessing the effects tariffs from developed countries have on developing countries. However, few reports have been done on how tariffs impact the domestic producers of a developing nation. It is widely accepted that open and free trade is the best method for facilitating growth and innovation across highly developed economies. However, for non-developed economies there is still a case to be made that tariff rather than free trade offer the most benefit. The argument made is that by protecting domestic firms from foreign competition, they can grow to a level that can compete with the large firms of developed economies.

**Key Terms:** Trade Policy, Economic Development, Tariffs, Import-Export, Economic Growth, Industrial Output.

## 1.0 INTRODUCTION

This paper is focused on interpreting the effects of import tariff policy on domestic economic growth in the small market economies of developing nations. There have been several previous studies that have investigated the effect of tariff policy on domestic consumers and producers of already established economies. In addition, there have also been many studies assessing the effects tariffs from developed countries have on developing countries. However, few reports been done on how tariffs impact the domestic producers of a developing nation.

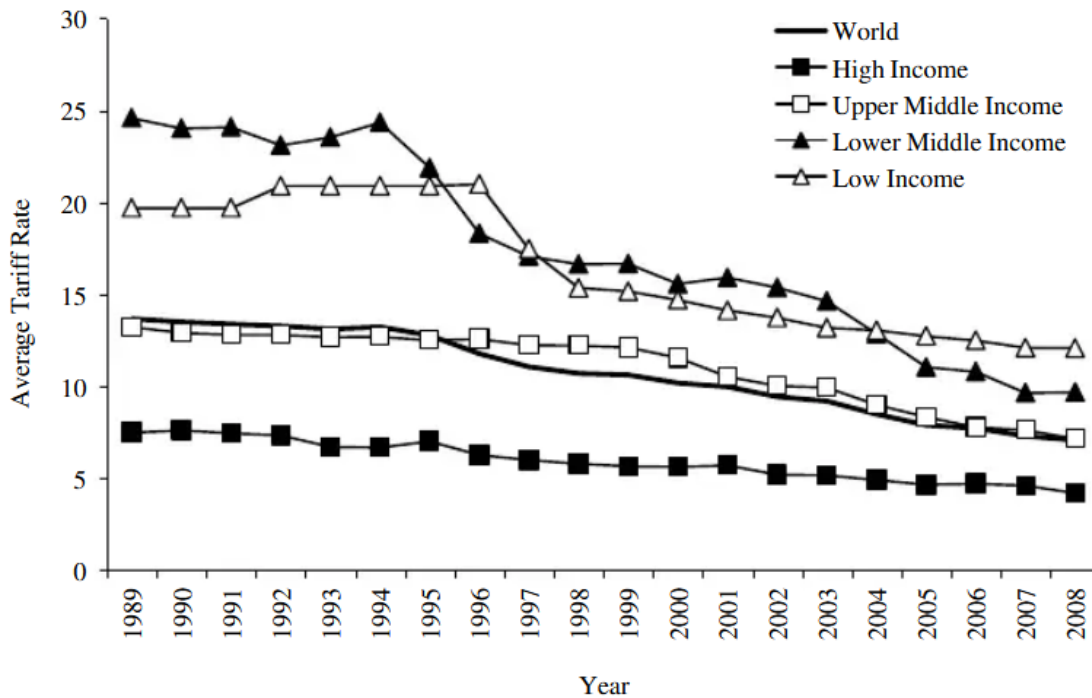
It is widely accepted that open and free trade is the best method for facilitating growth and innovation across highly developed economies. However, for non-developed economies there is still a case to be made that tariffs rather than free trade offer the most benefit. The case to be made is that by protecting domestic firms from foreign competition, they can grow to a level that can compete with the large firms of developed economies. Like America in the early-mid 19<sup>th</sup> century, developing countries rely primarily on agricultural and natural resources exports as their main source of income generation. However, growth of domestic industry and investment is crucial for reducing poverty, while creating the skilled job opportunities necessary for a middle class. A contrary argument can still be made that tariffs by restricting the access domestic firms have reaching foreign markets hinders growth. There is also the argument to be made that tariffs, by reducing competition and taxing foreign goods, increases inflation and negatively impacts consumers. This paper seeks to discover the relationship between tariff and growth focusing on 7 developing sub-Saharan African countries and to see if tariffs do support domestic firms in infant economies.

This study has been broken down into 7 sections. The section immediately following the introduction is the 2<sup>nd</sup> section and discusses the trends of tariffs and growth over the past few decades. Section 3 is the literature review which goes over the previous research that has been done by other researchers on similar topics regarding tariffs. Section 4 discusses the data used in this study and Section 5 goes over the regression models run. Section 6 goes over the regression results and finally Section 7 is the conclusion to this paper.

## 2.0 TREND

Figure 1 shows the trend of tariff rates from 1989 to 2008 of countries by income level. Countries are divided into four income groups. Tariff rates for all income groups have decreased but rates from lower-middle income countries have decreased the most, from near 25% on average to about 10%. High income countries have decreased their tariffs the least as they have consistently been low, less than 10% since 1989. Generally, we can observe that high-income countries have the lowest average tariff rate while low-income countries have the highest. A large reason for decreasing tariffs has to do with increased amounts of Preferential Trade Agreements (PTA) and the expansion of the World Trade Organization (WTO).

**Figure 1. The Decline of Tariff Rates in Countries of Various Income Level, 1989-2008**



Source: Kwon, 2013.

### 3.0 LITERATURE REVIEW

Tariff policy and protectionism has been around for centuries around the world and for many decades in the mid-late 1800's and early 1900's, tariff policy was a stand-in for good foreign policy. However, after World War II a stance of trade liberalization and world governance combined with large economic growth around the world swung the conventional view of tariffs from one side to the other. Still there is disagreement among economists on the relationship between tariff implementation and a country's economic growth (Baldwin, 2004). As Kwon (2013) suggests, this discrepancy of a strong positive relationship between tariffs and growth in the early 20<sup>th</sup> century combined with the negative relationship between tariffs and growth in the late 20<sup>th</sup> century, makes finding that true effects of tariffs on growth difficult and confusing. Baldwin (2004) points out that this is due to how broadly a researcher defines openness and this greatly effects the conclusion the researcher can draw. Baldwin's conclusions from his study is that most studies find a strong positive relationship between "outward-looking" policies and growth and that empirical studies have demonstrated a positive casual connection between openness and economic growth. He points out that the implications of the findings suggest that governments should reduce their tariff levels but also insists that the evidence does support any claims that by reducing tariffs a country will necessarily see increased economic growth as a result.

Cheong et al. (2017) also looked at openness and growth by looking at the effectiveness of Preferential Trade Agreements (PTA) that countries sign. PTA's are designed to primarily reduce tariffs and increase trade between countries and since the 1990's the number of PTA's in effect have increased dramatically (Cheong et al., 2017). Cheong et al. (2017) found that PTA's have a significant positive effect on trade flows and forming a Free Trade Agreement (FTA) can increase trade flows by 6% to 22%. The conclusion of their results suggest that PTA's do exactly what they are designed to do which is to increased trade. However, with this finding they show that tariffs also do what they are designed to do. Cheong et al. (2017) found that a 1% increase in prices due to tariff hikes can result in a deduction of 2.3% in bilateral trade flows. In other words, tariffs which are designed to reduce foreign competition do exactly that. The findings of Cheong et al. (2017) are supported by the finds of Edwards (1997) who examined openness, productivity, and growth in 93 countries and found that countries that are more open tended to experience much faster growth than closed countries.

From studies like the ones above there has developed a widely adopted belief that trade liberalization is the only way that developing countries can induce economic growth (Kwon, 2013). However, Kwon (2013) finds that tariffs and growth relationships may be contingent on other factors in conjunction with tariffs. This is consistent with the thoughts of Baldwin (2004) who found that tariffs and non-tariff barriers are often insignificant on their own. Indeed Kwon (2013) found that higher tariffs when combined with domestic investment and labor, results in higher economic growth according to his regression analysis.

This study follows the footsteps of the previous studies by looking at tariffs and growth but adds to the debate by looking at the effects tariffs of developing economies have on their domestic economies. Previously, most research in this area has been done on large, developed economies or have looked at how the trade policies of large economies effect the economies of small market countries. In addition, this study adds an in depth focus on the major claim of protectionist that tariffs support growth of infant industries in developing economies.

#### 4.0 DATA

This study uses annual panel data from 2004 to 2020. All data for this study was obtained from the World Bank’s World Development Indicators (WDI). Data was collected on 7 Sub-Saharan countries on the west coast of Africa: Benin, Cameroon, Cote d’Ivoire, Gabon, Ghana, Nigeria, and Togo. These countries are characterized by their agricultural economic base and their global low-income status. The summary statistics of the data are displayed below in Table 1.

**Table 1: Data Summary Statistics**

<b>Data</b>	<b>Obs</b>	<b>Mean</b>	<b>Std. Dev.</b>	<b>Min</b>	<b>Max</b>
<b>GDP/Capita Growth</b>	119	1.58	3.05	-7.60	11.32
<b>Tariff (Mean applied)</b>	101	9.52	3.29	0.52	17.84
<b>Domestic investment</b>	119	545.83	692.13	58.13	3395.64
<b>Labor Force Participation</b>	119	63.37	9.73	48.20	82.87
<b>Openness (Trade/GDP)</b>	119	0.61	0.21	0.21	1.13
<b>Industry (% of GDP)</b>	119	26.26	12.06	14.64	61.74

<b>FDI (logFDI/GDP)</b>	113	6.07e-10	7.47e-10	1.77e-11	3.50e-9
<b>Agriculture (% of GDP)</b>	119	0.20	0.09	0.03	0.43
<b>Economic Size (GDP/Capita)</b>	119	2408.84	2497	406.56	10809.68
<b>Compulsory Education</b>	119	8.81	1.86	6	11

The data for growth is defined as the average annual GDP per capita growth by country. Tariff is the mean applied tariff on all foreign goods entering a country in a given year and represents the average annual duty or fee charged on all imported goods. Domestic investment is measured by gross fixed capital formation, as a measure of total domestic capital inputs invested in the economy, divided by population of the given country on an annual basis. Labor force participation is simple, the labor force participation rate for a given country and year. Openness was calculated by adding exports and imports for a country in any given year, together to calculate their level of trade, divided by that country's GDP for that same year. This is a good measure for openness because it shows a country's total trade as a percentage of its economy. Industry is a country's total industrial output in a year divided by that country's GDP. FDI stands for foreign direct investment. For this model, FDI data obtained from WDI was logged and then divided by GDP to account for the economic size of a nation. The variable for agriculture is the agricultural production a country as a percentage of its GDP. The final 2 variables are economic size, which is measured by GDP per capita, and compensatory education.

## 5.0 METHODOLOGY

This study used the model produced by Kwon (2013) as a starting point for this research. In this paper's model, a different measure of domestic investment and a control for agricultural production was added as the countries of focus rely heavily on agriculture as a main source of income and agriculture is also one of the largest exporting producers for these countries. In addition, a measure for secondary education was replaced due to unreliable data for this variable. Also, this studied has added an additional regression model to examine the effects of tariffs not just on growth but on industrial output as well. This is because the pro-tariff argument does not

only state that it can be good for growth but specifically that it is good for infant industry. The model for regression 1, tariffs on economic growth is displayed as follows:

$$(GROWTH) = \ln(TARIFF) + \log(LABOR) + \ln(OPEN) + (INOUT) + (FDI) + (AGPRO) + (EDU) + (GDPC) + \varepsilon$$

Where *GROWTH*, the dependent variable, is the average annual GDP per capita growth rate. *TARIFF* is the average duty or fee charged on all imported goods. *LABOR* represents the total labor input of a country. *INOUT* is total industrial output divided by GDP. *OPEN* is the variable measuring a country's trade openness or willingness to trade with other nations (Sum of imports and exports divided by GDP). *FDI* is the variable for foreign direct investment ((log FDI)/GDP) and *AGPRO* is the variable for agricultural production. Variable *EDU* is the education variable as a measure of human capital. When controlling for education and human capital in African countries it is difficult due to a lack of available data. For the final variable *EDU* compulsory education data was used as the measure of this variable.

The model for regression 2, tariffs on industrial output, is displayed below:

$$(INOUT) = \ln(TARIFF) + \log(DOMINV) + \log(LABOR) + \ln(OPEN) + (AGPRO) + (GDPC) + \varepsilon$$

The variables in this regression equation are the same as in the primary equation except that *INOUT* (industrial output) is now the dependent variable. Variables *FDI* and *EDU* have been dropped and replaced by two new variables. The first of these added variables is *DOMINV*, this is the total domestic capital inputs invested in the economy. The second of these variables is *GDPC* which stands for GDP per capita. This variable is used to adjust for a nation's wealth. This second regression has been done to investigate the specific protectionist claim that tariffs support domestic business and boost output. Industrial output, the data measure for variable *INOUT*, is a great measure for analyzing this effect.

## 6.0 RESULTS

Statistically significant results were found for *TARIFF* in both regression models. In the first regression, it was found that tariffs do have a negative impact on economic growth while in the second regression it was found that tariffs had a positive effect on industrial output. The regression results for regression 1 are displayed in Table 2 below:

**Table 2: Regression 1 Results**

<b>Tariffs and Economic Growth Regression Results</b>	
<b>N=95, R2=0.37</b>	
<b>ln(TARIFF)</b>	<b>-1.64***</b>
<b>ln of Mean Applied Tariff</b>	<b>(0.48)</b>
<b>log(LABOR)</b>	<b>6.97</b>
<b>log of Labor Force Participation</b>	<b>(7.50)</b>
<b>ln(OPEN)</b>	<b>3.30***</b>
<b>ln of Trade Openness Variable</b>	<b>(1.24)</b>
<b>INOUT</b>	<b>0.03</b>
<b>Industrial Output % of GDP</b>	<b>(0.04)</b>
<b>FDI</b>	<b>-2.30e9***</b>
<b>log of FDI percent of GDP</b>	<b>(5.95e8)</b>
<b>AGPRO</b>	<b>19.88***</b>
<b>Agricultural % of GDP</b>	<b>(6.21)</b>
<b>EDU</b>	<b>-0.05</b>
<b>Compulsory Education</b>	<b>(0.23)</b>
<b>_cons</b>	<b>-8.37</b>
<b>constant</b>	<b>(15.27)</b>
* Represents statistical significance at 10%	
** Represents statistical significance at 5%	
*** Represents statistical significance at 1%	

The results of the first regression show a -1.64 beta for *TARIFF*. This result is significant at 1% confidence interval and the finding is consistent with most previously done studies on tariffs



and growth as the tariff coefficient is negative meaning; as tariff rates rise, economic growth (GDP per capita growth) decreases. As was expected *AGPRO* had the highest effect on economic growth with a coefficient of 19.88. This finding was expected because agriculture is currently such an important part of these countries income generation and is one of their largest exports. This finding was also significant at 1%. Interestingly, *INOUT*, the measure for industrial output, was found to have coefficient next to zero and was not statistically significant. Conventional wisdom would have assumed that increasing industrial output would increase economic growth. An expected result is that openness, the measure of how much a country trades with others compared to its GDP, proved to also have a positive relationship with economic growth with a beta value of 3.3 and was significant at 1% which is consistent with the findings of previously established studies. Additionally, *FDI* was significant at 1% significance and had a negative impact on the sample country's economic growth.

Next in regression 2, this studied the effect of tariffs on industrial output to see if the claim that tariffs increase domestic firms output by protecting them from foreign competition is true. The results of regression 2 are displayed below in Table 3.

**Table 3: Regression 2 Results**

<b>Tariffs and Industrial Output Regression Results</b>	
N=95 , R2=0 . 90	
<b>ln(TARIFF)</b> <b>ln of Mean Applied Tariff</b>	2.42*** (0.73)
<b>log(DOMINV)</b> <b>log of Domestic Investment</b>	4.73 (1.723)
<b>log(LABOR)</b> <b>log of Labor Force Participation</b>	18.18* (9.41)
<b>ln(OPEN)</b> <b>ln of Trade Openness Variable</b>	2.09 (1.39)
<b>AGPRO</b> <b>Agricultural % of GDP</b>	-19.37** (8.97)

<b>GDPc</b> <b>GDP per Capita (economy size)</b>	0.004*** (0.001)
<b>_cons</b> <b>constant</b>	-27.89 (18.53)
<p>* Represents statistical significance at 10%</p> <p>** Represents statistical significance at 5%</p> <p>*** Represents statistical significance at 1%</p>	

This regression found that tariffs had a sizeable positive impact on industrial output and this finding was significant at 1%. The coefficient for tariffs in this regression was 2.42. This shows that tariffs can increase the output of domestic firms for these developing nations with agricultural reliant economies. The study found that agricultural production had a negative effect on industrial output. The coefficient for *AGPRO* was a large -19.37 and this was significant at 5%. This could be due to competition for resources between agriculture and industry such as labor. The variable *LABOR* also had a large effect on industrial output with beta coefficient equal to 18.18, significant at 10%. Domestic investment also had a high positive coefficient of 4.73 but was not significant at the 10% threshold. The final significant variable from this model was economic size measured by *GDPC* with a significance level of .99. However, the coefficient was small at 0.004 showing a small positive effect on industrial output.

## 7.0 CONCLUSION

In summary, this study looked at how tariffs effect economic growth and industrial output in developing countries. This study focused on 7 Sub-Saharan countries on the west coast of Africa who rely heavily on agriculture as a main source of their income.

A limitation of this study is that when using developing countries, specifically African countries, there can be more incomplete or inaccurate data reported than would be from a developed country. For example, data for education attainment and enrollment in both primary and secondary education was plagued with missing data. Because of this, those measures for education

that were used in other studies could not be used in this study and was therefore replaced by compensatory education in duration years.

Based on previous research, it was expected that there would be a negative sign for the tariff coefficient for regression 1 (tariff and growth). This assumption was proven correct by the regression results in conjunction with previous research. However, this study still investigated to see if the assumptions of protectionist were true, that tariff help domestic firms and industry to grow. Under this assumption, it would be expected that the tariff coefficient in regression 2 would have a positive sign (tariffs and industrial output). Again, the results produced what was expected. The regression results showed a strong relationship between tariffs and industrial output that was statistically significant at the 1%. However, there are still questions to be answered.

How can tariffs increase industrial output while at the same time reducing growth? The answer may reside in agricultural production which seems to work in opposition with industrial output, possibly due to competing for labor. It may be the case that tariffs have a more negative impact on agriculture than benefits it possess on industrial output, leading to a net loss of growth. It can be said from this study that if a developing country wishes to grow their GDP per capita they should pursue a strategy of tariff reduction and support their agriculture industry. However, if developing countries wish to move from an agricultural economy to an industrialized economy then they should take a strategy of higher tariffs to support domestic industrial firms in conjunction with increasing domestic investment and infrastructure. A country may want to shift to an industrial economy through this method, even if it means limiting total economic growth, if the country wishes to hedge against the unpredictable factors of nature that the agricultural industry relies on. Additionally, with the possibility of increased floods and droughts that could come from climate change as some suggest, industrial output would be less impacted by these effects.

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