

**TEST OF SIGNIFICANCE OF DOMESTIC PRODUCTION  
PROTECTION POLICY IMPLEMENTATION ON PRIVATE  
INVESTMENT GROWTH IN RWANDA 2015-2019**

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**ABSTRACT**

The study entitled "Test of significance of domestic production protection policy implementation on Private Investment growth in Rwanda 2015-2019" was conducted for testing if, there is a correlation between domestic production protection policy implementation and Private Investment growth in Rwanda and whether this correlation is statistically significant or not. The study used only secondary quantitative data. The information analyzed is for the range period from 2015 to 2019 (5 years). Data analysis was used linear regression analysis after the performance of MDS (Multidimensional scaling). Tested indicators are Rwanda's exports, imports, GDP (Gross Domestic Product), and FPC (Foreign Private Capital) inflows in Rwanda. The MDS analysis has shown that information used was not related and this gives an opportunity for the next step of the linear regression test where the findings show that one-unit change of X1 to X3 or exports, GDP, and Imports lead to 0.070; 0.039 and -0.141 change times of Total FPC Inflows; however, this correlation is not statistically significant. In the other case, if all factors remain null or zero, Total FPC inflows will be equal to 383.938 units. Meaning that domestic investments for both foreigners and domestic investors cannot be stopped however their increase or growth needs a correlation with multiple factors. While the test of correlation also was used via analysis of collinearity diagnostic where findings show that the fraction of the highest eigenvalue to the lowest eigenvalue (3.945/.001) is 3,945 as this is greater than 1,000 meaning that there is a correlation between tested variables. Thus, the conclusion stated that there is a correlation between domestic production protection policy implementation on Private Investment growth in Rwanda, but this correlation is not statistically significant. Thus, it suggested that policymakers in charge of growing private investment inside the country should not only rely on domestic production protection policy but take under consideration all possible factors (all these which are not part of this study) because however this policy is not in place, private investment should exist and grow.

**1.0 INTRODUCTION**

As reported by (the Rwanda Ministry of Trade, 2010) the country (Rwanda) has clear development of the economy. Political and social spheres in Rwanda are bringing about tremendous changes and challenges in the investment environment. It is one among the rapidly developing countries growing, as it experiences a 7% GDP growth rate counted from last 10 years (since 2010) and is backed by a strong policy framework (NISR, National Account, 2020).

However, the country's economy is growing fast; the industry sector remains small due to the country's geographical location and competition in the region (international market). Rwandan firms are dominated by SMEs (98%) and they are also suffering from limited finance access, capacity building, and raw materials (Ministry of Trade and Industry, 2017). Rwandan economy is still dominated by agriculture, the trade cost increased by 20% the price and this is in addition to limited access to serviced land. The Rwandan trade balance is still negative (deficit) (Ministry of Trade and Industry, 2017).

To recover the trade deficit, Rwanda has adopted the development of made in Rwanda for becoming a middle-income country by 2035 and higher income in 2050 (Ministry of Trade and Industry, 2017). Government targets from 2017 to 2024 were developed in the National Strategy for Transformation One (NST1) which targets to achieve a GDP average growth rate of 9.1% to achieve 4,035 US\$ GDP per Capita (MINECOFIN, 2017). To achieve NST 1 targets need as a tool for the development of domestic massive or boosted domestic private and public investments and increased domestic savings (MINECOFIN, 2017).

The key sectors under this pillar are Public Finance Management (50% of the economic transformation allocation), Transport (17%), Energy (10%), Private Sector Development and Youth Employment (9%), Agriculture (9%), Environment and natural resources (3%), Urbanization and rural settlement (2%), Financial Sector Development (0.5%) and ICT (0.3%) (NISR, Foreign Private Capital Census Report 2017, 2017).

Real GDP growth reached 6.1% in 2017 and 7.2% in 2018, supported by strong growth in services (4.1%) and industry (1.5%), particularly manufacturing. The key drivers of spending in 2018 were household consumption (5.8% of GDP) and investment (2.9%) (NISR, Households Living Conditions Survey (EICV5, 2016/2017), 2018).

As reported by International finance institutions and development private sector is important to achieving national, regional, and international economic development targets as it facilitates to generate of income, and provide job, goods, and services toward the achievement of people's improved living conditions (IFC, 2011).

To ensure the economic security of the country, Rwanda has developed more economic measures which include the promotion and protection of domestic production vis-a-vis international production. This makes strong reliance on the domestic market and international competition. It was launched as made in Rwanda policy. In different economic sectors agriculture, industry or manufacturing, services, and construction use of local products reforms was applied and the private sector innovate and increase production to making a market or existing demand satisfied. This led to increased domestic production resulting from new investments and expansion of existing private domestic investments as well as foreign investments inside the country. Thus. This study intends to assess the significance of

domestic production protection policy implementation on Private Investment growth in Rwanda.

## 2.0 STATEMENT OF THE PROBLEM

To promote and protect domestic production, Rwanda launched made in Rwanda Policy. The target is to increase local manufacturing production and make them competitive in the regional and international markets (John, 2017).

Starting from the 2015 launch campaign of made in Rwanda, Rwandan industries production experienced a growth rate of 7% per year and exports increased 69% (559 million USD in 2015 to 944 million USD in 2017). Imports decreased by 4% (1.849 billion USD in 2015 to a little more than 1.772 billion USD in 2017). This makes the trade deficit reduced by 36% as learned from Rwanda Central Bank statistics (UNCTAD, 2019). With the promotion and protection of domestic production, privates (private sector production) are increasing but not at a great speed. There are still problems that should be handled to make this sector the leading of the Rwandan economy. In the domestic market, people are still criticizing local products in all sectors of the economy based on quality, value, competitiveness, safety, and self-reliance. So far, consumption of domestic products seems to be less compared to imports consumption and this is limited by the policy itself not limited by the success of private investment and production.

Thus, this study intends to test the significance of domestic production protection policy implementation on Private Investment growth in Rwanda from 2015-2019. And at the end of the study, the researcher will come up with suggestions that can be implemented for making domestic production self-marketed and not being protected by government policies as the next step following the role played by the last.

## 3.0 MADE IN RWANDA POLICY

Made in Rwanda policy was born from Vision 2020 pillars which include good governance and an efficient state, skilled human capital, productive private sector, advanced infrastructure, and modernized livestock and agriculture all competent in the national, regional, and global market (RDB, 2017). Made in Rwanda policy was designed to increase with high-speed production of local industries necessary for economic growth to become competent on the Global market and later made the country (Rwanda) reduce the imports burden in favour of locally made products (Fred, 2017). Made in Rwanda stands for increasing domestic investments, consumption, increasing exports, innovation, and technology.

## 4.0 OBJECTIVES OF THE STUDY

This study is aimed at testing the significance of domestic production protection policy implementation on Private Investment growth in Rwanda, and specifically the following intend to be achieved:

1. To evaluate the main types of domestic production protected in different economic sectors;

2. To assess the change that happened in private investment after domestic production protection; and
3. To test the significance of domestic production protection policy implementation on Private Investment growth.

## 5.0 HYPOTHESIS OF THE STUDY

Here are two study hypotheses at which, the study intends to assess the validity:

**H0:** There is no significant correlation between domestic production protection policy implementation on Private Investment growth in Rwanda.

**H1:** There is a significant correlation between domestic production protection policy implementation on Private Investment growth in Rwanda.

## 6.0 THEORETICAL REVIEW

### 6.1 Production Theory

Production theory defines the reasons behind production decisions and the nature of goods or services produced. This theory defines the production function  $Q=F(K, L)$  where the output is in function with capital and labor. This theory guides private investors in deciding what to produce, the costs required, and whom for production, time, or period products should be availed. It is in that context that made in Rwanda is succeeding in increasing domestic production in Rwanda (Sickles, 2019).

Producers use factors of production (the classic economic resources include land, labor, and capital (Thompson, 1981)) for producing goods and services required by the society once this is associated with effective domestic production policies (mainly protectionism), there are no hindrance economic production increases. The measure of domestic production growth is the status of the balance of payment or the status of imports (Thompson, 1981).

### 6.2 Protectionism theory

Protectionism theory is a tool for ensuring domestic economic production mainly for developing countries where the population likes external products compared to national products due to price, quality, etc (Michaels, 2008). In Rwanda, protectionism was applied to foreign products (the most known is second hands cloths) and this was promoted to domestic companies for producing restricted goods and services later these resulted in an increase in domestic production and a reduction of imports. There is a need to import only important goods and services mainly inputs of production which are not available in Rwanda. As developed by Adam Smith there is a need of producing what your economic system is lacking (Comparative advantage) (Trading Without America, 2007). Thus, with protectionism countries manage the domestic markets against international competition and ensure that domestic resources are utilized for domestic market satisfaction.

### 6.3 Investment theory

Both theory of investment (1) the accelerator theory of investment, (2) the internal fund's theory of investment, and (3) the neoclassical theory of investment is important in the case of testing the significance of domestic production protection policy implementation on Private Investment growth in Rwanda 2015-2019. To implement the development of domestic production, the government of Rwanda informed the general market and producers about restricted products that need to be produced inside the country. It is in that context that investors facilitated access to factors of production mainly financial means.

Made in Rwanda policy also show to investors the opportunities in different domains, and the investors chose where to invest based on the expected profit. Meaning that government shows opportunities and facilities for investments, but investors have the right to choose which production category or nature to invest in (Mueller, 1976).

As defined by neoclassical theory, the market determines production in association with the price of output, increase in government purchase,s and reductions in personal income tax (Precious, 1987). In Rwanda domestic investment (both for nationals and foreigners) is increasing year by year and discouraging imports from outside. Rwandans were encouraged to use first need domestic products and alternatively foreign products.

## 7.0 EMPIRICAL REVIEW

Reference to the study conducted by Tejvan Pettinger (November 15, 2015) in the assessment of the effects of protectionism (protection of domestic production of the country), especially in the UK and the rest of the world, find that the main effect of this policy is fall in trade, higher prices for some goods and availability of different forms of subsidiaries to protected industries. The results of protectionism are the development of infant industries, job creation, and extension of domestic production (Tejvan, 2015).

Johnson et al, (1997) also assessed policy reform, adjustment costs, and investment: and demonstrated how local investors respond to economic reforms. They concluded that investors analyze each new and existing reform as an opportunity for investment (Johnson et al, 1997).

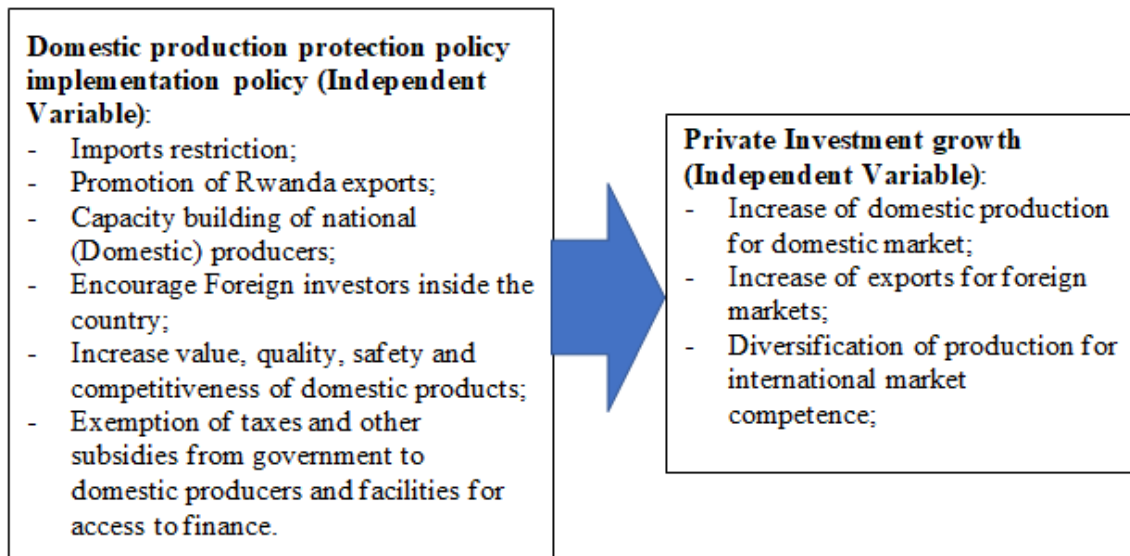
According to European Union (2019), a good climate of investment is created by the government for both private, public, domestic, and foreign investors. It is in that context governments (mainly in Africa) need to ensure good political conditions, environmental conditions, and favorable policies which could show more potential to the investors (European Commission, 2019).

Jonathan, (1999) in his assessment made of 1,200 projects implemented in 61 countries using economic rates shows that policies are taken by the government affect the productivity of investments. Countries that experienced undistorted policies are or riskier be unproductive investments and vice versa (Jonathan, 1999).

As reported by KT Press, (2019), made in Rwanda combine a set of government measures and interventions for promoting the private sector in the country. The outputs are clear where exports increased 11% in three years (2015-2017) and increased by 17% starting 2018 to 2019 (Edmund, 2019).

## 8.0 CONCEPTUAL FRAMEWORK

**Figure 8.1: Conceptual framework of the study**



**Source:** Made by the researcher, March 2020

After the 1994 Rwandan Genocide against Tutsi, the country started its period of reconstruction and creation of unity among people. Reconstruction was made starting from the economy. To ensure economic security, the country has promoted domestic production and ensured the protection of this product against imports. This is because the domestic market also prefer to buy foreign products for example on the market of cloths more people were buying second hands from Europe and the USA rather than clothes produced in Rwanda, it is in that context the country stopped imports of second hands to promote the market of cloths made in Rwanda. Later the out output of this protectionism is the increase of exports based on the innovation of domestic investors and foreigners who are working on the land of Rwanda (all of their products are made in Rwanda), this also makes domestic market satisfied however the price remain high on most products.

Further improvements are going, measures are under implementation and production is increasing, as stated in NST1, the country nee to continue to promote Made in Rwanda brand working with the private sector to recapture at least USD 400 Millions of imports by 2024 (Republic of Rwanda, 2018).

## 9.0 METHODOLOGY

### 9.1 Source of data and data collection techniques

This study used secondary data only. Secondary data were collected from different dissemination tools mainly National Institute of Statistics Reports which complied using administration data collection systems such as national statistical yearbook version 2015-2019. Secondary data also were collected from National Bank reports called National



Account which included information on GDP. The researcher has visited the websites of these institutions (NISR and BNR) in addition to Private Sector Federation (PSF) reports and chose only specific information with respect to the indicators analyzed in the next section (Section 10). Information analyzed is the quantity in money of private investments from 2015-2019 and the value of domestic production from 2015 to 2019 mainly in terms of exports. Protectionism of domestic production value was counted as a limitation of imports.

### 9.2 Data analysis

This study will use a linear regression model for testing the correlation between both variables, such as the independent variable (economic policy reform) to the dependent variable (private sector investment). In statistics, linear regression is a linear approach to modeling the relationship between a scalar response (or dependent variable) and one or more explanatory variables (or independent variables). The case of one explanatory variable is called simple linear regression (Cohen, 2003).

$$y_i = \beta_0 + \beta_1 X_{i1} + \dots + \beta_p X_{ip} + \varepsilon_i = X_i^T \beta + \varepsilon_i, \quad i = 1, \dots, n$$

From the above equation  $X_i^T$  express the transpose, and  $X_i^T \beta$  represent the inner product between vector  $x_i$  and  $\beta$ . Often these  $n$  equations are stacked together and written in matrix notation as:

$$Y = X\beta + \varepsilon$$

From the above, it's detailed as follows:

$$y = \begin{pmatrix} y_1 \\ y_2 \\ \vdots \\ y_n \end{pmatrix}$$

$$y = \begin{pmatrix} y_1^T \\ y_2^T \\ \vdots \\ y_n^T \end{pmatrix} = \begin{pmatrix} 1 & x_{11} & \dots & x_{1p} \\ 1 & x_{21} & \dots & x_{2p} \\ \vdots & \vdots & \ddots & \vdots \\ 1 & x_{n1} & \dots & x_{np} \end{pmatrix}$$

$$\beta = \begin{pmatrix} \beta_0 \\ \beta_1 \\ \beta_2 \\ \vdots \\ \beta_p \end{pmatrix}, \varepsilon = \begin{pmatrix} \varepsilon_1 \\ \varepsilon_2 \\ \vdots \\ \varepsilon_n \end{pmatrix}$$

**Source:** (Draper, et al, 1979)

For this case, the rate as the growth of private sector investment will be analyzed as being impacted or correlated to the rate of GDP growth, inflation rate, GNI index, unemployment

rate, domestic credit rate, population growth rate, and house price rate, consumer price index, etc.

Before testing the significance of domestic production protection policy implementation and private investment growth through their variables there is a need to test first if there are similarities or no similarities among those variables, in such case Multidimensional scaling was offered a great contribution.

Multidimensional scaling: is a set of data analysis techniques for the analysis of similarity or dissimilarity data. It is used to represent similarity or dissimilarity data between objects by a variety of distance models. MDS represents a set of objects as points in a multidimensional space in such a way that the points corresponding to similar objects are located close together, while those corresponding to dissimilar objects are located far apart (Shepard, 1957).

Distance Models are models used to represent similarity or dissimilarity data in MDS. Although there are other distance models, the Euclidean distance and Mahalanobis distance models are the most popular ones used in MDS (Shepard, 1957).

Similarity and Dissimilarity: The term similarity is used to indicate the degree of "likeness" between two objects, while dissimilarity indicates the degree of "unlikeness".

The distance metric of Minkowski provides a general way to specify the distance in a multidimensional space. Here below is a demonstration:

$$d_{ij} = \sum_{k=1}^n [x_{ik} - x_{jk}]^r$$

Where n is the number of dimensions;  $x_{ik}$  is the value of dimension k for stimulus i and  $x_{jk}$  is the value of dimension k for stimulus k (Kruskal, 1964).

With  $r = 2$ , the metric equals the Euclidean distance metric while  $r = 1$  leads to the city-block metric.

A Euclidean metric is appropriate when the stimuli are composed of integral or perceptually fused dimensions such as the dimensions of brightness and saturation for colors. The city-block metric is appropriate when the stimuli are composed of separable dimensions such as size and brightness (Kruskal, 1964).

Mahalanobis distance is also called quadratic distance. It measures the separation of two groups of objects. Suppose we have two groups with means  $(\bar{X}_i)$  and  $(\bar{X}_j)$ , Mahalanobis distance is given by the following formula:

$$d_{ij} = ((\bar{X}_i - \bar{X}_j)^T S^{-1} (\bar{X}_i - \bar{X}_j))^{1/2}$$

The data of the two groups must have the same number of variables (the same number of columns) but not necessarily have the same number of data (each group may have a different number of rows) (Coxon, 1982).



As the obtained Mahalanobis distance is greater than 0, Group1≠Group 2

In general, the center of the observations will differ from the origin and we are interested in the distance of observations from their centers  $\bar{x}_i$  and  $\bar{x}_j$ .

MDS is designed for the visualization of observed (dis)similarity data by distance models. MDS is used to represent similarity or dissimilarity data between objects by a variety of distance models. Although there are other distance models, the Euclidean distance and Mahalanobis distance models are the most popular ones used in MDS (Coxon, 1982).

MDS represents a set of objects as points in a multidimensional space in such a way that the points corresponding to similar objects are located close together, while those corresponding to dissimilar objects are located far apart (Coxon, 1982).

## 10.0 INTERPRETATION OF FINDINGS AND ANALYSIS

### 10.1 Domestic production in Rwanda from 2015 to 2019 by kind of activity

Rwanda has a small but growing private sector. If unleashed, it has the power to transform the country, delivering broad-based and inclusive economic growth, resulting in many more and better-paid jobs for Rwandan People. At present the private sector mainly consists of small enterprises that are constrained in activities that provide low returns to investment and do not generate many jobs; and there are only a few, large competitive businesses. The large industries or enterprises in the country are owned by foreigners. Rwanda has preferred to protect this sector as a tool for achieving economic security perspectives and satisfying the need for jobs and the domestic market.

The government of Rwanda expects to achieve objectives and targets of NIST1 with a contribution of the private sector, it is in that context the government developed mechanisms to develop the capacity of the Private Sector, joint business initiatives created by the Private Sector Federation, incentives to attract investments and promotion of Made in Rwanda products, as well as promotion of foreign private investments in the country. Here below is a description of domestic production as described by the Country's GDP from 2015-2019:

**Table 10.1: Gross Domestic Product by Kind of Activity at current prices (in billion Rwf)**

GDP (in billion Rwf)	ISIC4	2015	2016	2017	2018	2019
<b>Total GDP</b>		<b>5,968</b>	<b>6,672</b>	<b>7,601</b>	<b>8,190</b>	<b>9,003</b>
<b>Total GDP Growth</b>	%	-	12	14	8	10
<b>Agriculture, Forestry &amp; Fishing</b>	<b>A</b>	<b>1,670</b>	<b>1,956</b>	<b>2,352</b>	<b>2,378</b>	<b>2,484</b>
Food crops	AA	992	1,209	1,504	1,343	1,395
Export crops	AB	110	129	172	186	147
Livestock & livestock products	AC	193	224	260	302	267
Forestry	AD	354	371	391	521	557
Fishing	AE	21	24	25	30	29
<b>Industry</b>	<b>B-F</b>	<b>1,013</b>	<b>1,092</b>	<b>1,201</b>	<b>1,329</b>	<b>1,529</b>
Mining & quarrying	B	132	137	182	204	139

GDP (in billion Rwf)	ISIC4	2015	2016	2017	2018	2019
<b>Total Manufacturing</b>	<b>C</b>	<b>352</b>	<b>389</b>	<b>451</b>	<b>482</b>	<b>544</b>
<i>Of which: Food</i>	CA	104	120	160	158	175
<i>Beverages &amp; tobacco</i>	CB	102	109	113	120	128
<i>Textiles, clothing &amp; leather goods</i>	CC	20	23	28	34	28
<i>Wood &amp; paper; printing</i>	CD	17	18	17	20	25
<i>Chemicals, rubber &amp; plastic products</i>	CE	36	37	44	49	60
<i>Non-metallic mineral products</i>	CF	22	25	28	32	40
<i>Metal products, machinery &amp; equipment</i>	CG	24	30	30	38	34
<i>Furniture &amp; other manufacturing</i>	CH	27	24	28	32	35
Electricity	D	57	81	89	95	103
Water & waste management	E	33	37	39	39	56
Construction	F	440	450	442	508	482
<b>Services</b>	<b>G-T</b>	<b>2,857</b>	<b>3,155</b>	<b>3,524</b>	<b>3,914</b>	<b>4,349</b>
<b>Trade &amp; Transport</b>	<b>G-H</b>	<b>699</b>	<b>761</b>	<b>805</b>	<b>962</b>	<b>1,137</b>
Maintenance and repair of moto vehicles	GA	24	28	29	33	36
Retail trade and Wholesales	GB	450	476	489	566	499
Transport	HA	226	257	286	363	435
<b>Other Services</b>	<b>I-T</b>	<b>2,158</b>	<b>2,395</b>	<b>2,719</b>	<b>2,952</b>	<b>3,211</b>
Hotels and Restaurants	I	107	124	138	152	169
Information and Communication	J	92	93	96	107	95
Financial Services	K	174	181	217	239	269
Real Estate activities	L	485	551	607	671	708
Professional, scientific and technical activities	M	169	190	233	251	291
Administration and support services activities	N	241	279	369	363	293
Public administration and defense, compulsory social security	O	283	329	356	396	429
Education	P	156	166	167	177	189
Human health & social work activities	Q	136	140	153	156	157
Cultural, domestic & other services	R-T	313	342	382	441	360
<b>Taxes less subsidies on products</b>		<b>427</b>	<b>470</b>	<b>523</b>	<b>568</b>	<b>641</b>

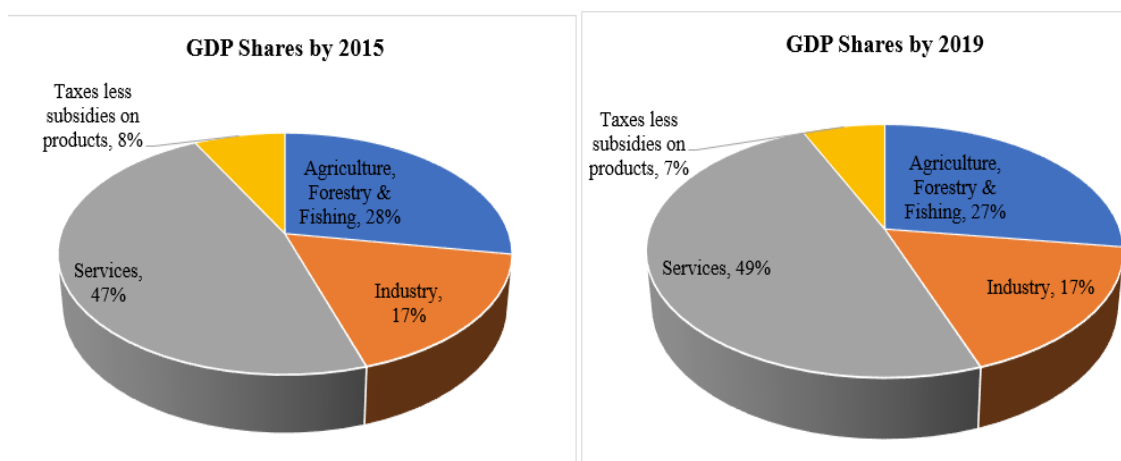
**Source:** National Institute of Statistics of Rwanda (NISR, National Account, 2020)

Table 10.1 shows that GDP of the country was increased 12% from 2015 to 2016, 14% from 2016 to 2017, 8% from 2017 to 2018 and 10% from 2018 to 2019. This growth of GDP was resulted from national effort of encouraging domestic investments and production. With a comparison of 2015 to 2019 (general after 4 years) GDP of Rwanda was increased 1.5 times (9,003 billion Rwf divided 5,968 billion Rwf) meaning 2019 GDP is 50% more to Rwandan GDP of 2015.

Analysis of the 1st year of the study (2015) with a comparison to the last year of the study (2019) service sector is dominant in both periods as the first sector with a big share to total GDP. In 2015 Service sector share in total GDP was 47% while in 2019 was 49%. For other economic sectors agriculture, Forestry and Fishing share to GDP was 28% in 2015 and 27% in 2019, share of industry total GDP was 17% in 2015 and this was not changed also for 2019, and share Taxes less subsidies on products to total GDP was 8% in 2015 and 7% in

2019. Currently with vision of the country, there is a target to become a country with a knowledge-based economy liberated from agriculture-based economy (dominated by substance agriculture).

**Figure 10.2: GDP Shares, by 2015 and 2019**



Rwanda needs to become a middle-income country from a country with agriculture (subsistence) to a knowledge-based economy. It is in that context that innovations and investments (where the role of private investors is emphasized) are being developed in industry and service sectors and the share of agriculture is reduced over the years 28% in 2017 to 27% in 2019. This gives place to a rise in the share of Services from 47% in 2017 to 49% in 2019 and industry from 17% to 17% in the same period.

**10.2 Performance of private investments**

Private sector investments are explained by the capital available in 2017 (Murangwa, 2017), foreign investments in Rwanda from 2015 to 2018, and the performance of the country in increasing exports. In FPC (Foreign Private Capital) inflows increased by 2.4 percent, amounting to \$ 463.0 Million in 2018 from \$ 452.2 Million in 2017, mainly driven by FDI (Foreign Direct Investments) (+7.1 percent). In terms of FPC composition, the energy sector led with a 35.7 percent share of the total FPC inflows, followed by ICT (17.9 percent), the financial sector (17.6 percent), and the manufacturing sector (13.6 percent) (BNR, 2019). The report shows an increase in the total FPC companies’ turnovers of 17.4 percent, amounting to \$2446.5 Million (25.8 percent of GDP) in 2018 from \$2,084.3 Million registered in 2017. Net profits of the same companies increased by 1.1 percent, amounting to \$ 142.5 Million in 2018 from \$141.0 Million in 2017.

**Table 10.2: Distribution of business-oriented enterprises by institutional sector and employed capital 2017**

Institutional sector	Employed capital					
	Total Sample	Less than 500.000	500.000 - 15.000.000	More than 15 to 75 million	More than 75 million	Not stated

Private sector	179,019	76.5%	21.4%	1.2%	0.7%	0.2%
Cooperative	2,658	29.8%	46.1%	12.8%	9.8%	1.5%
Public sector	19	10.5%	31.6%	15.8%	42.1%	0.0%
Public Private Partnership	41	4.9%	24.4%	12.2%	43.9%	14.6%
<b>Total</b>	<b>181,737</b>	<b>75.8%</b>	<b>21.7%</b>	<b>1.4%</b>	<b>0.9%</b>	<b>0.3%</b>

**Source:** Establishment Census, (NISR, 2017)

Currently, the availability of private investment-based information is difficult in Rwanda, in the period 2015 to 2019 only a single survey was conducted (see the above table), and it shows a range of capital by sector, it is not even showing clearly the component of each sector. The detailed information is the investments (flows and stocks for foreign private capital (next table). Of 178,019 full private enterprises, 2,658 cooperatives (considered also as private but for group interests not for individual and 41 enterprises at which shared by both privates and government they are characterized by the low level of investments.

Investments greater than 75 million are for private enterprises in partnership with public and for publicly owned enterprises (43.9% and 42.1% respectively) while individual enterprises still struggling with capital of less than 76.5%.

**Table 10.3: Foreign private Capital from 2015 to 2018**

Sector	2015	2016	2017	2018
<b>FPC Inflows (million \$)</b>				
Direct Investment	379.8	342.3	356.4	381.9
Portfolio Investment	2.5	3	0.3	5.9
Other Investment	93.9	195.9	95.4	75.2
<b>Total FPC Inflows</b>	<b>476.3</b>	<b>541.2</b>	<b>452.2</b>	<b>463</b>
Growth Rate	-	13.60%	-16.40%	2.40%
<b>FPC Stocks (million \$)</b>				
Direct Investment	1,401.80	1,680.30	1,959.30	2,283.70
Portfolio Investment	97.5	100.5	103.9	109.3
Other Investment	578.6	747.1	772.8	804.9
<b>Total FPC Stock</b>	<b>2,077.90</b>	<b>2,527.90</b>	<b>2,836.10</b>	<b>3,197.90</b>
Growth Rate	-	21.70%	12.20%	12.80%

**Source:** (BNR, 2019)

As seen from the above table, 2015 to 2016 was the period of a huge increase in foreign investments where foreign inflows (millions \$) increased by 13.6% and total FPC increased by 21.7%, the last also keep growing up to 2018 from 2017 to 2018 increased at 12.8%. In the other case, total FPC inflows increased by 2.4% in the same period. The reduction of total FPC inflows from 2016 to 2017 was also affected by the progress made in Rwanda, where foreign investments were also controlled to make a selection based on the domestic market, need for exports as well as production using domestic raw materials.

### 10.3 Rwanda's imports and exports from 2015 to 2019

Rwanda imports mainly food products, machinery and equipment, construction materials, petroleum products, and fertilizers (Martin, 2017). Rwanda's major exports are coffee, tea, tin cassiterite, Wolframite, and pyrethrum. Coffee makes up between 50% to 80% of the total export. Rwanda is the 172nd largest export economy in the world. In 2017, Rwanda exported \$223M and imported \$1.11B, resulting in a negative trade balance of \$890M. In 2017 the GDP of Rwanda was \$9.1B and its GDP per capita was \$2.04k (Martin, 2017).

**Table 10.4: Rwanda's imports and exports from 2015 to 2019**

Flow/Period	2015	2016	2017	2018	2019
Exports	405.80	406.07	680.15	702.70	519.47
Growth Rate	-	0.1%	67.5%	3.3%	-26.1%
Imports	1,863.21	1,780.49	2,946.43	2,970.90	3,127.42
Growth Rate	-	-4.4%	65.5%	0.8%	5.3%
Re-Exports	170.17	203.28	268.11	312.32	394.07
Growth Rate	-	19.5%	31.9%	16.5%	26.2%
<b>Total Trade</b>	<b>2,439.18</b>	<b>2,389.84</b>	<b>3,894.70</b>	<b>3,985.92</b>	<b>4,040.95</b>
Growth Rate	-	-2.0%	63.0%	2.3%	1.4%
<b>Trade Balance</b>	<b>-1,287.24</b>	<b>-1,171.13</b>	<b>-1,998.17</b>	<b>-1,955.87</b>	<b>-2,213.88</b>
Growth Rate	-	-9.0%	70.6%	-2.1%	13.2%

Source: (BNR, 2019)

Rwanda's exports are not increasing in a consistent way, the same case for imports. From 2015 to 2016 there was a very low rate of exports growth rates (0.1%), from 2016 to 2017 this was highly increased to reach 67.5%, from 2017 to 2018 this was reduced highly to reach 3.3% and later exports were reduced at a growth rate of -26.1%. Rwanda's imports also are increasing inconstantly, where from 2015 to 2016 reduced by 4.4%, increased at a high growth rate of 65.5% from 2016 to 2017, growth rate reduced to 0.8% from 2017 to 2018, and imports also reduced by -26.1%. The reduction of imports is an outcome of the domestic production protectionism policy implemented from 2015 to 2019.

#### 10.4 Test of the study hypothesis

Test of study hypothesis was made using regression analysis and before that, the researcher has tested similarities or dissimilarities between both groups of data. Group one for the dependent variable (imports and private investments) and the group as variables of the independent variable (exports and GDP). The information taken is for the year 2015 to 2019 (5 years) for all taken indicators and all units were in million USD:

**Table 10.5: Selected indicators for the independent variable (Group 1)**

$\chi_1 = \text{Exports}$	$\overline{\chi_1 - \chi_1}$	$\chi_2 = \text{GDP}$	$\overline{\chi_2 - \chi_2}$
405.8	-137.04	5968	-1518.7
406.1	-136.74	6672	-814.7
680.1	137.26	7601	114.3
702.7	159.86	8190	703.3
519.5	519.5	9002.7	1515.9

Mean= 542.84		Mean= 7486.73	
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Source: (BNR, 2019)

Table 10.6: Selected indicators for the dependent variable (Group 2)

$\chi_1$ =Imports	$\chi_1 - \bar{\chi}_1$	$\chi_2$ =FPC inflows	$\chi_2 - \bar{\chi}_2$
1863.2	-674.48	476.3	-6.88
1780.5	-757.18	541.2	58.02
2946.4	408.72	452.2	-30.98
2970.9	433.22	463	-20.18
3127.4	589.72	483.2	0.02
Mean= 2537.68		Mean= 483.18	

(BNR, 2019)

Let's consider an as X matrix of 5 rows to 2 columns and a matrix (centered data matrix) of 5 to 2 rows and columns. And apply the following formula:

- $C_i = \frac{1}{n_i} \hat{X}^T \hat{X}$  to produce the following for group one and two:

Table 9.7: Covariance's matrices for groups one and two.

Covariance of Group 1		
	$\chi_1$	$\chi_2$
$\chi_1$	16483.6	82452.1
$\chi_2$	82452.1	1155207

Covariance of Group 2		
	$\chi_1$	$\chi_2$
$\chi_1$	346149	-12137
$\chi_2$	-12137	956.13

- $S_i(r, c) = \frac{1}{n} \sum_{i=1}^g n_i c_i(r, c)$  as pooled covariance matrix computed using weighted average (12/23) \* covariance group 1 + (11/23) \* covariance group 2 to provide:

Table 10.8: Pooled covariance matrix

Pooled Covariance Matrix		
	$\chi_1$	$\chi_2$
$\chi_1$	174149.7744	37213.93242
$\chi_2$	37213.93242	603174.0886

- The Mahalanobis distance is simply quadratic multiplication of mean difference and inverse of pooled covariance matrix:

Table 10.9. Inverse of pooled covariance matrix and Mean difference matrix

Inverse pooled covariance matrix			Mean Difference	
	$\chi_1$	$\chi_2$		



$\chi_1$	0.0000058	-0.0000004	-1994.84
$\chi_2$	-0.0000004	0.0000058	7003.553333

Mean difference was provided by subtracting means of group two from group one with corresponding nomination.

To perform the quadratic multiplication, we use the stated formula of Mahalanobis distance.

$$d_{ij} = \left( (\bar{X}_i - \bar{X}_j)^T S^{-1} (\bar{X}_i - \bar{X}_j) \right)^{1/2}$$

When you get the mean difference, transpose it, and multiply it by inverse pooled covariance. After that, multiply the result with the mean difference again and you take the square root.

Then, we have:

$$d_{ij} = [-1994.84 \quad 7003.6] \begin{bmatrix} 0.0000058 & -0.0000004 \\ -0.0000004 & 0.0000058 \end{bmatrix} \begin{bmatrix} -1994.8 \\ 7003.6 \end{bmatrix}^{1/2} = 11.7$$

As the obtained Mahalanobis distance is greater than 0, Group1 ≠ Group 2

In general, the center of the observations will differ from the origin and we are interested in the distance of observations from their centers  $\bar{x}_i$  and  $\bar{x}_j$  given by 11.7. Now we are allowed to perform our next step to see really the effects of significance between domestic production protection policy implementation and private investments growth. Here below are results got using the same data in SPSS (Statistical Package for Social Scientists) linear regression analysis:

**Table 10.10: Linear regression analysis**

Coefficients <sup>a</sup>					
Model	Unstandardized Coefficients		Standardized Coefficients	t	Sig.
	B	Std. Error	Beta		
1 (Constant)	383.938	88.316		4.347	.144
Exports	.070	.132	.290	.527	.691
GDP	.039	.016	1.942	2.482	.244
Imports	-.141	.057	-2.676	-2.475	.244

a. Dependent Variable: Total FPC Inflows

The equation based on the above results is written like:

$$y = 383.938 + 0.070x_1 + 0.039x_2 - 0.141x_3$$

Where “y” represents private investments represented by “Total FPC Inflows), X1 to X3 represent respectively Exports, GDP and Imports (all units were in million USD). This means that, one-unit change of X1 to X3 or exports, GDP and Imports lead to 0.070; 0.039 and - 0.141 change times change times of Total FPC Inflows; however, this correlation is not statistically significant. In the other case if all factors remain null or zero, Total FPC inflows will be equal to 383.938 units. Meaning that domestic investments for both foreigners and domestic investors cannot be stopped however their increase or growth need a correlation with multiple factors.

**Table 10.11: Collinearity Diagnostic analysis**

Collinearity Diagnostics <sup>a</sup>							
Model	Dimension	Eigenvalue	Condition Index	Variance Proportions			
				(Constant)	Exports	Total FPC Inflows	GDP
1	1	3.945	1.000	.00	.00	.00	.00
	2	.045	9.333	.00	.22	.01	.00
	3	.009	20.560	.01	.26	.01	.99
	4	.001	72.118	.99	.51	.98	.01

a. Dependent Variable: Imports

Collinearity diagnostic was used to test the overall correlation for the variable tested. The highest eigenvalue is 3.945 and the lowest is 0.001. The fraction of the highest eigenvalue to the lowest eigenvalue (3.945/.001) is 3,945 as this is greater than 1,000 meaning that there is a correlation between tested variables.

The study findings show that the growth of private investment is an outcome of policies implemented in the field of domestic production protectionism, however, is not limited to these policies and their implementation process. Based on the study findings there is no reason to reject the null hypothesis (H0), the reason comes for the alternative hypothesis.

**11.0 CONCLUSION**

This study was aimed at testing the significance of domestic production protection policy implementation on private investment growth in Rwanda from 2015 to 2019. From 2015 to 2019 the country (Rwanda) has adopted a policy of protecting and promoting domestic production against the international market. It is in that context some imports were limited (for example second hands cloths) and domestic and foreign domestic investors were supported in different services with the purpose of increasing domestic production to satisfy the domestic market and increase supply to the external market (exports). The positive achievements were achieved (a reference to the reduction of imports and increase of exports as well as the increase of GDP). The study conducted was used GDP information, imports, exports, foreign investments, and private domestic investments. The study analysis has shown a positive correlation between variables and the alternative hypothesis was rejected due to that. In the other case, the significance between variables is not significant meaning that

private domestic investments are an outcome of multiple factors including but not limited to domestic production protection policy implementation. The researcher recommends government and policymakers increase measures made in Rwanda's policy implementation and encourage private investments (for nationals and foreigners). The information used by this study was limited to the national level, the researcher encourages other researchers to fill this gap by going down and analyzing the significance of domestic production protection policy on a single private investor's business not as a set of private sector investments and production.

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