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The possibilities and determinants of Egyptian foreign trade for the countries of the Nile Basin : Facts and Hopes

Dr. Mona Fakhry Gorgy [1] and Dr. Ehab Moreed Sharabin[2]

[1]Head Researcher, Agricultural Research Center- Agricultural Economics Research Institute, Egypt
[2]Senior Researcher, Agricultural Research Center- Agricultural Economics Research Institute, Egypt
Email: Dr.ehab19712012@yahoo.com

Abstract: This research aims at studying the possibilities and determinants of Egyptian foreign trade for Nile Basin countries, Facts and Hopes, through the recognition of Egypt's foreign trade with Nile Basin countries and the spread of the total and agricultural foreign trade between Egypt and Nile Basin countries and the effect of the basin countries on it, and to know the situation facts and hopes for the exports and agricultural imports of the Nile Basin countries. To achieve the objectives of the study, the Gravity Model was used to check the flow of overall foreign trade and agricultural trade between Egypt and the Nile Basin countries and the impact of the basin countries on them in the Ordinary Least Squares, OLS through two models: the first, Basic Gravity Model and, the second, Augmented Gravity Model. The Augmented Gravity Model includes three attempts. To study the flow of agricultural trade and the situation Facts and Hopes of the Nile Basin, statistical analyze, Panel Least Squares and Pooled Least Squares were used only through the Augmented Gravity Model of the second and third attempts. The variables used are the GDP of each country, the population of each country, the geographical distance between them, the average per capita income of each country, the squared difference of the GDP of the exporting and importing country, the exchange rate of the exporting country against one unit of the imported country currency and the mock variable of time. The study indicates that Egyptian exports and imports to Sudan, Kenya and Ethiopia were concentrated during the four-year period of study. The ratio of Egyptian exports and imports to total exports and imports of Nile Basin countries increased during the first average period, from 18.86%, 29.27%, to about 25.88%, 49.34%, respectively, during the fourth period. The trade balance was in Egypt's interest for the second, third and fourth periods. The most important countries affecting the increasing of the Egyptian total exports are Sudan and Eritrea in all the attempts models, in addition to Ethiopia and Kenya in the Basic Gravity Model and Augmented Gravity Model of the first attempt. The increase Egyptian agricultural imports are mainly from Kenya in the Basic and Augmented Model of the first attempt.

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Keywords: Basic Gravity Model (BGM), Augmented Gravity Model (AGM), Panel Data, Fixed Effects Model (FEM), Panel Least Squares, Pooled Least Squares, Dummy Variables, Random Error limit.

1. Introduction:

The Nile Basin countries represent the strategic importance of Egypt by virtue of participation in the Nile water, and therefore these countries should be dealt with in a comprehensive strategic perspective, depending on linking the common interests of these countries and pushing the economic development wheel in a balanced framework between countries, with increasing the volume of trade between the two countries and reinforcing the Egyptian presence in the Nile Basin countries through the commodity presence of the Egyptian product in the countries markets, and not neglecting the import of the available raw materials, in order to increase the dependence of the Nile Basin countries on the Egyptian market as a main market for their goods, especially since the Nile Basin countries' markets are of great importance after the markets of the Arab countries and the European Union countries. Egypt has signed many agreements with these countries, which has given them many customs facilities and the spread of their products in these markets because of their price advantage, which has led to an increase in the trade exchange between Egypt and the Nile Basin countries.

The Egyptian trade exchange with Nile Basin countries includes: "Sudan, South Sudan, Ethiopia, Uganda, Congo, Kenya, Tanzania, Rwanda, Rwanda, Burundi, and Eritrea".

Egypt has been keen to respond to the development needs of the Nile Basin countries

according to its priorities in different fields, whether through the Egyptian initiative for the development of the Nile Basin or the leading role of the Egyptian Agency for Partnership for Development of the Ministry of Foreign Affairs, especially in the fields of energy, irrigation, health and agriculture. It is also through its cooperation with African brother countries to convey the latest experiences in various fields and to build the capacity of African cadres to contribute to the development of these countries.

Research Problem: -

Despite the importance of trade exchange between Egypt and Nile Basin countries, and the existence of many agreements aimed at improving and increasing the total trade and agricultural exchange between Egypt and Nile Basin countries, However, the volume of trade exchange between them is a little, with Egypt's total exports and imports to and from the Nile Basin countries contributing 3.45%, 0.62% of Egypt's total exports and imports as an average for the period 1999-2018. Egypt's agricultural exports and imports to and from Nile Basin countries contribute 5.72%, 2.25% of Egypt's agricultural exports and imports as an average of the same period. It was also noted that the trade exchange between Egypt and the Nile Basin countries is focused on the two countries of Sudan and Kenya, where Egypt's exports represent about 75.31% of Egypt's exports to the Nile Basin countries, and Egypt's imports reached about 88.62% of Egypt's imports to the Nile Basin countries as an average for the same period. This is an indication of the weakness of Egyptian products' running out of those markets, i.e. more cooperation and economic and commercial integration between Nile Basin countries is still needed, which requires finding out the reasons for that and trying to find out how to increase the volume of trade exchange between Egypt and Nile Basin countries.

Research Objectives:

The research aims at identifying the possibilities and limitations of the Nile Basin countries' foreign trade through:

First: Study of Egypt's total and agricultural foreign trade with Nile Basin countries during the period (1999-2018)

Second: The standard estimate of the foreign trade flows between Egypt and the Nile Basin countries.

Third: An assessment of the Gravity Model to measure the impact of Nile Basin countries on Egyptian trade.

Fourth: Assessment of the Gravity Model of agricultural foreign trade of Nile Basin countries using mixed data.

Fifth: the situation facts and hopes for agricultural foreign trade of Nile Basin countries.

2. Methodology:

The research has been based on descriptive and quantitative statistical methods in analyzing foreign trade data with Nile Basin countries. To achieve the research objectives, the Gravity Model was estimated using the "Panel Data" method of data regression. The published data were also obtained from the web sites of the United Nations, IMF and intercountry distances, as well as the Trade Exchange Bulletin between Egypt and the Nile Basin issued by the Central Agency for Public mobilization and Statistics (CAPMAS) during the period 1999-2018.

Gravity Model Description:

The Gravity model is based on Newton's theory of Gravity that the attractive force between two objects is directly proportional to the multiplication of their masses and inversely to the square of the distance. Thus, using that law, a trade flow between two countries could be proportional to both the GDP of the two countries and at the geographic distance between their capital or major cities.

According to the Gravity model used in trade, the quantity of trade, exports or imports between two countries (XIJ) is a function of the two countries' GDP and population, as well as their geographical distance (between the two capitals of the two countries, or trade centers), as well as a set of Dummy Variables as follows:

$$X\,IJ = \beta 0\ GDPI\ \beta 1\ GDPJ\ \beta 2\ NI\ \beta 3\ NJ\ \beta 4\ DIJ\ \beta 5\ AIJ\ \beta 6\ UIJ \quad (1)$$

Where: XIJ refers to the amount of trade, exports, imports or trade between each country, (GDPI), (GDPJ) refers to the GDP of both the exporting and importing country, respectively. (NI), (NJ) refers to the population of both the exporting and importing country, respectively. (DIJ) refers to the distance between the capitals of the two countries (or trade centers), while (AJ) represents any other factors that help or hinder trade between the two countries, (UIJ) Random Error limit. An alternative formulation of the equation (1) uses per capita income instead of population.

$$X\,IJ = \gamma 0\ GDPI\ \gamma 1\ GDPJ\ \gamma 2\ NHI\ \gamma 3\ NHJ\ \gamma 4\ DIJ\ \beta 5\ AIJ\ \beta 6\ UIJ \quad (2)$$

(NHI), (NHJ) refers to the per capita income of both the exporting and importing countries, respectively. The equation (1) and the equation (2) are equal if the coefficients are as follows:

$\beta 3 = -\gamma 3$; $\beta 4 = -\gamma 4$; $\beta 1 = \gamma 1 + \gamma 3$; $\beta 2 = \gamma 2 + \gamma 4$

The second formula is usually used in the case of estimating bilateral exports of specific products.

The description of the first equation is used in the case of the total exports.

In the case of estimation, the model (1) can be expressed in the written form as follows:

$$\text{Ln } XIJ=\beta 0 +\beta 1 \text{ ln GDPI} +\beta 2 \text{ ln GDPJ} +\beta 3 \text{ ln NI} +\beta 4 \text{ ln NJ} +\beta 5 \text{ ln DIJ} +UIJ \quad (3)$$

where: Ln indicates that the variables are in the logarithmic image.

The following formula was used when estimating:

$$\text{LnXIJ}=\beta 0+\beta 1\text{lnGDPI}+\beta 2\text{lnGDPJ}+\beta 3\text{lnNI}+\beta 4\text{lnNJ}+\beta 5\text{lnDIJ}+\beta 6\text{lnGDP\_DIFIJ}+\beta 7\text{lnRIJ}+\beta 8\text{Dumm1}+UIJ \quad (4)$$

Addition to the definitions of equation (1), (GDP_DIFIJ) the difference square to the two products, (RIJ) points to the exporting countries exchange rate against one unit of the imported country's currency multiplied by the importer's GDP Deflator divided by the source's GDP deflector. (Dumm1) refers to a Dummy Variable that takes the value one in 1999 to 2018, and zero in other years during the study period [(1) (2) (4)].

Research includes the standard estimate of the Gravity Model in two ways:

1- Egypt with Nile Basin countries and the influence of the basin countries on it:

It is worth mentioning here that the number of Nile Basin countries is 11, including Egypt and the number of years of the period under consideration is 20. In this part, the flow of trade from Egypt to the Nile Basin countries and the effects of the basin countries on them is studied, and therefore the number of views is 200, which are composite views representing the sectional data of ten Nile Basin countries that Egypt deals with. The series is 20 years in each country, where the gravity model of the trade flows between Egypt and Nile Basin countries is estimated in the case of exports and total imports on the one hand and agricultural exports and imports on the other. Through the first two models, the Basic Gravity Model, the variables used are the GDP of Egypt (GDPI), the total GDP of the Nile Basin countries (GDPJ), and the geographical distance between Egypt and each country (DIJ), The second Augmented Gravity Model includes three attempts of the first attempt, in which variables use both the per capita GDP of Egypt (NHI), the per capita GDP of for the Nile Basin countries (NHJ) and the geographical distance of between Egypt and each country (DIJ). The second attempt uses the variables used in Basic Gravity Model and adds the population in both Egypt (Ni) and Nile Basin countries (NJ), the difference square to the two products (GDP_DIFIJ), and the exchange rate between Egypt and each Nile Basin country (RIJ). The third attempt uses the same variables found in the second attempt, with the change of the number of people in Egypt (NI), Nile Basin countries (NJ) and GDP per capita used for Egypt (NHI), and GDP per capita for Nile Basin countries (NHJ).

To measure the impact of each country on the value of Egyptian trade, 10 Dummy Variables have been made for the Nile Basin countries, so that the Dummy Variable for each of the Nile Basin countries for the years of study takes the value one, and zero otherwise, it is noted from the regression equations that it does not include one or more of the study countries in order to prevent the occurrence of complete linear duplication between the Constant and the Dummy Variables, which sum gives One, the Wald test was used to confirm the significance of the effect of time.

2- Estimating the Gravity Model of the Nile Basin countries using Panel data:

This section is concerned with studying agricultural foreign trade only, because of the importance of agriculture for intra-regional trade between Egypt and the Nile Basin countries. The focus will be on the second and third attempts of the Augmented Gravity Model. The research, in this part, relied on data of 11 countries of the Nile Basin, including Egypt, during the period (1999-2018), and therefore the number of views reached about 2200, in which it is clear that the data is a Panel Data. I.e. any mixed between Sectional and time data. This type of data is more useful in determining the appropriate relationship between variables over time. In addition to that it enables the ability to monitor the individual effects of each pair of trading partners, which when neglected, the OLS method will be biased if these individual effects are associated with Regression coefficients.

Therefore, the pooled Estimation method was used and is done in two ways: The first is a Random Effects Model (REM). It is used when the trade flow between samples of trading partners is determined randomly.

As for the second Fixed Effects Model (FEM) and it is better than the previous when estimating trade flows between previously identified countries [(7)] (Egger, 2000). The last method of estimation was used with a comparison of its results using the OLS method; and the Wald test was used to make sure of the significance of the effect of time.

The estimated and better model was used statistically (the significance of the features and the model, and the problems associated with it) and

economic (expected signs, the size of the features if they are specific in size) in estimating the volume of the hoped trade.

Expected cues for model variables:

The high level of GDP in the exporting country indicates a high level of production, which increases the availability of goods for export, so it is expected that β1 is positive. It is expected that the value of the coefficient β2 of the (GDPJ) is positive, because if there is a high level of GDP in the importing country, the import volume can be increased, while estimating the population coefficient of the exporting country β3, it can be positive or undetermined (depending on the size of the country's exports), as the population increases, it is possible that the volume of trade, exports or imports increase or decrease. As for the population factor of the imported country β4, its indication is also positive or negative for the same reason, while the distance coefficient is expected to be negative because it expresses all possible sources of commercial cost. In general, the Gravity Model uses the distance to represent commercial costs, as the exchange rate variable has been entered for the model because of the existence of the time dimension in the analysis, and its signal is expected to be negative, as there is an inverse proportion between the exchange rate and export volume.

First: Egypt's total and agricultural foreign trade with Nile Basin countries during the period 1999-2018:

1- Total and agricultural exports between Egypt and Nile Basin countries:

Table (1) shows the increase in the value of total Egyptian exports to Nile Basin countries from about $64.64 million as an average for the first period (1999-2003) to about $1079.73 million as an average for the fourth period (2014-2018), an increase of about 1570.374% compared to the first period.

It shows that Egyptian exports to Sudan, Kenya and Ethiopia are concentrated during the four periods of study.

Also, the decrease in the ratio of Egyptian exports to Sudan, Burundi and Tanzania is also reflected in the total Egyptian exports to Nile Basin countries despite the increase in the value of exports, while the ratio of Egyptian exports to Kenya, Ethiopia, Uganda, Rwanda, Eritrea and Congo increased mainly during the study period.

The same table shows that Egyptian agricultural exports to Nile Basin countries increased from about $17.37 million as an average for the first period (1999-2003) to about $259.45 million as an average for the fourth period (2014-2018), an increase of about 1393.667% compared with the first period.

The table also shows that although Sudan has received the highest value of Egyptian agricultural exports, its share of Egypt's exports to the Nile Basin countries decreased from 55.05% as an average for the first period to about 37.04% as an average for the last period, Egypt's agricultural exports to both Brunei and Kenya declined during the four periods, Uganda, Ethiopia, Congo, Rwanda and Eritrea are on the increase, Egypt follows the characteristic of partial diversification, but this policy was not a real diversification of Egyptian agricultural exports, as Egypt's agricultural exports during the first period were concentrated in Sudan, Kenya and Tanzania, accounting for 96.58% of total Egyptian agricultural exports, In the second period, agricultural exports were concentrated in Sudan, Kenya and Ethiopia, representing 95.53%, while in the third and fourth period agricultural exports were concentrated in Sudan, Kenya and Eritrea, representing 86.22%, 80.42%, respectively, of total Egyptian agricultural exports.

2- Total and agricultural imports between Egypt and Nile Basin countries:

Table (2) shows that Egyptian imports from Nile Basin countries increased from about $159.15 million as an average for the first period (1999-2003) to about $425.85million as an average for the fourth period (2014-2018), the increase was about 167.58% compared to the first period.

It also shows that Egyptian imports from Nile Basin were concentrated from Kenya, Sudan and Ethiopia, representing a combined 97.09%, 91.26%, 94.35% and 95.24% during the four time periods respectively. The rest of the Nile Basin countries had a small contribution to Egyptian imports, i.e. there is no diversity of Egyptian imports from Nile Basin countries. The same table shows that Egyptian agricultural imports are concentrated in the first period (1999-2003) from Kenya, Sudan and Tanzania, where they represent 98.58% of total Egyptian agricultural imports from Nile Basin countries during the first period; while Kenya, Sudan and Ethiopia each contribute 95.19%, 96.57%, 98% of total Egyptian agricultural imports from Nile Basin countries during the second, third and fourth periods respectively. The table shows that Egypt focuses on Ethiopia in its agricultural imports from Nile Basin countries during the four study periods

3- Relative importance of agricultural exports and imports from total exports and imports from Egypt and Nile Basin countries:

Table (3) shows the increase in the percentage of Egyptian agricultural exports from total exports to Nile Basin countries from about 18.86% during the first period to about 25.88% during the fourth period.

It is also clear from the data of the previous table that the contribution ratio of Tanzania, Uganda, Ethiopia, Burundi, Rwanda and Eritrea increases

Table No. (1): the development of Egyptian agricultural and total exports between Egypt and the Nile Basin countries, in millions of dollars during the period (1999-2018).

Country	Total exports								Agricultural exports							
	First period (1999-2003)	%	second period (2004 - 2008)	%	third period (2009-2013)	%	Fourth period (2014-2018)	%	First period (1999-2003)	%	second period (2004 - 2008)	%	third period (2009-2013)	%	Fourth period (2014-2018)	%
Tanzania	2.27	3.51	9.12	2.65	34.79	3.45	29.73	2.75	0.71	4.11	1.60	2.45	9.07	3.17	10.48	4.04
Uganda	0.90	1.39	6.77	1.96	37.89	3.75	57.65	5.34	0.06	0.34	0.18	0.28	9.38	3.28	14.00	5.40
Ethiopia	2.75	4.25	17.98	5.22	59.82	5.92	119.24	11.04	0.16	0.94	3.23	4.96	9.48	3.31	14.17	5.46
Congo	0.32	0.50	1.77	0.51	17.38	1.72	20.15	1.87	0.16	0.93	0.04	0.06	2.66	0.93	3.98	1.53
Sudan	41.95	64.90	238.67	69.28	554.54	54.93	466.79	43.23	9.56	55.05	36.16	55.48	145.92	51.01	96.11	37.04
Burundi	0.17	0.26	0.74	0.21	13.22	1.31	8.54	0.79	0.01	0.03	0.25	0.39	5.34	1.87	2.26	0.87
Rwanda	0.30	0.46	1.87	0.54	15.58	1.54	20.28	1.88	0.00	0.02	0.02	0.03	3.50	1.22	5.90	2.27
Kenya	15.15	23.44	63.62	18.47	221.41	21.93	279.58	25.89	6.50	37.42	22.87	35.09	65.10	22.76	57.32	22.09
Eritrea	0.83	1.29	3.95	1.15	55.00	5.45	77.78	7.20	0.20	1.16	0.83	1.27	35.62	12.45	55.23	21.29
South Sudan	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Total	**64.64**	**100**	**344.49**	**100**	**1009.62**	**100**	**1079.73**	**100**	**17.37**	**100**	**65.17**	**100**	**286.07**	**100**	**259.45**	**100**

Source of date:

(1) General Mobilization and Statistics Organization, Bulletin of Trade Exchange between Egypt and the Nile Basin Countries, Volumes (1999-2018).

(2) Trade Statistics (Exports & Imports) United Nations, Comtrade Database, Statistics Division. (http://unstats.un.org/unsd/comtrade/dqQuickQuery.aspx)

(3) GDP and Per Capita income: United Nations, National Accounts Statistics data-base, Statistics Division. (http://unstats.un.org/unsd/snaama/SelectionQuick.asp)

GDP Deflator, Exchange rate, population and stock of public capital (as infrastructure variables) IMF, International Financial Statistics. (http://ifs.apdi.net/imf/ifsbrowser.aspx?branch=ROOT)

(4) Distance between main trading cities: (http://www.distances.com)

Table No. (2): Evolution of the Egyptian total and agricultural imports between Egypt and the Nile Basin countries, in millions of dollars during the period (1999-2018).

Country	Total imports								Agricultural imports							
	First period (1999-2003)	%	second period (2004 - 2008)	%	third period (2009-2013)	%	Fourth period (2014-2018)	%	First period (1999-2003)	%	second period (2004 - 2008)	%	third period (2009-2013)	%	Fourth period (2014-2018)	%
Tanzania	3.45	2.17	3.44	2.68	5.15	1.48	3.84	0.90	1.76	1.49	1.18	1.82	1.02	0.38	1.11	0.35
Uganda	1.08	0.68	6.13	4.77	4.05	1.16	3.06	0.72	0.95	0.80	1.43	2.19	3.74	1.40	1.41	0.44
Ethiopia	6.99	4.39	13.80	10.75	21.81	6.28	22.39	5.26	0.72	0.61	3.80	5.83	14.40	5.38	17.47	5.46
Congo	0.08	0.05	0.07	0.06	5.20	1.50	9.38	2.20	0.00	0.00	0.04	0.06	0.00	0.00	0.13	0.04
Sudan	53.96	33.90	58.89	45.86	37.55	10.81	98.09	23.03	22.88	19.38	15.96	24.49	4.24	1.59	32.06	10.02
Burundi	0.00	0.00	0.22	0.17	0.39	0.11	0.17	0.04	0.00	0.00	0.22	0.34	0.16	0.06	0.05	0.02
Rwanda	0.00	0.00	1.10	0.85	1.33	0.38	0.21	0.05	0.00	0.00	0.04	0.06	1.18	0.44	0.18	0.06
Kenya	93.59	58.80	44.49	34.65	268.40	77.26	285.13	66.95	91.73	77.71	42.26	64.87	239.79	89.60	263.95	82.52
Eritrea	0.01	0.00	0.26	0.21	3.52	1.01	3.57	0.84	0.00	0.00	0.22	0.34	3.06	1.15	3.49	1.09
South Sudan	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Total	**159.15**	**100**	**128.39**	**100**	**347.40**	**100**	**425.85**	**100**	**118.04**	**100.00**	**65.23**	**100**	**267.61**	**100**	**319.86**	**100**

Source of date: The same sources found in Table No. (1)

Table No. (3): The relative importance of agricultural exports and imports of total exports and total imports during the average of four study periods.

Country	% Of agricultural exports from total exports				% Of agricultural imports from total imports			
	First period (1999-2003)	second period (2004 -2008)	third period (2009-2013)	Fourth period (2014-2018)	First period (1999-2003)	second period (2004 -2008)	third period (2009-2013)	Fourth period (2014-2018)
Tanzania	31.41	17.53	26.08	35.25	50.97	34.43	19.82	29.00
Uganda	6.57	2.71	24.75	24.29	87.72	23.29	92.57	46.02
Ethiopia	5.95	17.97	15.85	11.88	10.34	27.53	66.03	78.02
Congo	50.42	2.06	15.33	19.74	0.01	57.14	0.00	1.35
Sudan	22.80	15.15	26.31	20.59	42.40	27.10	11.30	32.68
Burundi	3.18	34.02	40.39	26.48	0.65	99.78	41.54	30.16
Rwanda	1.08	1.07	22.43	29.07	2.42	3.71	88.76	85.81
Kenya	42.91	35.94	29.40	20.50	98.02	94.99	89.34	92.57
Eritrea	24.26	21.00	64.76	71.01	0.13	83.10	86.95	97.73
South Sudan	0	0	0	0	0	0	0	0
Average	**18.86**	**14.74**	**26.53**	**25.88**	**29.27**	**45.11**	**49.63**	**49.34**

Source: - Collected and calculated from Tables No. (1) and (2).

during the study periods, while the contribution of agricultural exports to total exports is declining in the Congo, Kenya and the Sudan, i.e. Egypt's exports to Nile Basin countries are often agricultural exports.

The same table shows that the ratio of Egyptian agricultural imports to total imports of Nile Basin countries increases from about 29.27% for the first period to about 49.34% for the fourth period.

The contribution ratio of agricultural imports to total imports is shown to have increased for Burundi, Ethiopia, Eritrea and Rwanda, Meanwhile, the rest of the Nile Basin countries decreased the contribution of agricultural imports to total imports, which means that Egypt's imports from Nile Basin countries are, to some extent, going to non-agricultural items, for the low-basin countries contributing to agricultural imports.

4- Trade balance between Egypt and Nile Basin countries:

The trade balance is defined as the difference between the value of Egypt's exports and total imports to or from a certain country on the one hand, and the value of agricultural exports and imports between Egypt and or from another country, and in this case the agricultural trade balance on the other.

Table (4) shows that the trade balance in the first period was negative, reaching$ -94.51 million, which is not in Egypt's interest, While in the second, third and fourth periods, it was in Egypt's interest as it was converted from negative to positive, reaching about 216.10, 662.22, 653.88 million dollars respectively. The deficit in the first period was concentrated in Tanzania, Uganda, Ethiopia, Sudan and Kenya, and in the third and fourth periods it was concentrated in Kenya, while the rest of the Nile Basin countries in the four periods were as valuable as the table mentioned.

The same table shows that the agricultural trade balance in all four periods was negative except for the third period, with the deficit reaching about -100.67, -0.06, -60.40 million dollars respectively, In the third period, it was about 18.46 million dollars, and the deficit was concentrated in the first period in Tanzania, Uganda, Ethiopia, Sudan and Kenya, while the second period was concentrated in Uganda, Ethiopia, Congo, Rwanda and Kenya, The third and fourth periods are concentrated in Ethiopia and Kenya and their respective values are reflected in the previous scale, So Egypt's agricultural trade balance is often not in Egypt's interest.

Second: Standard estimate of foreign trade flows between Egypt and Nile Basin countries:

1- The Gravity Model of total foreign trade between Egypt and Nile Basin countries:

:

A- A Model of Gravity for total exports between Egypt and Nile Basin countries:

Table (5) shows the logical variables in the Basic Gravity Model and first attempt of the Augmented Gravity Model in terms of the signal, all variables were significant, the $\overline{R}^2$coefficient is about 0.85, 0.63 for the Basic Model and the first attempt, which means that the variables involved in the two attempts explain about 85%, 63% of the change in the dependant variable, respectively, and the rest is due to unmeasured factors in the model.

The results show that the increase in both GDP in Egypt (GDPI) and GDP in the Nile Basin countries (GDPJ) to the Basic Gravity Model by 1% increases Egypt's total exports by 1.9%, 1.02%, respectively; the increase in the per capita GDP of Egypt (NHI) and GDP per capita in those countries (NHJ) for the first attempt by 1% increases the total Egyptian exports by 2.68%, 0.97%, respectively, the increase in geographical distance between Egypt and each country (DIJ) by 1% leads to a drop in total Egyptian exports by 2.59%, 2.68% for the basic model and the first attempt, respectively.

As for the second and third attempts, the variables involved in the two attempts, except the exchange rate of the two attempts, are logical, and all the variables of the second and third attempts proved significant except for the average per capita GDP of the importing country for the third attempt, and squared difference to the two outcomes, the $\overline{R}^2$coefficient is about 0.86 for the second and third attempts, this means that the variables in the two attempts explain about 86% of the change in the dependant variable, and the rest are due to unmeasured factors in the model.

The results of the second and third attempt show that the increase of both GDP in Egypt (GDPI) and GDP in the Nile Basin countries (GDPJ) by 1% increase the total Egyptian exports to them by 1.49%, 1.06% for the second attempt, 4.34% and 1.05% for the third attempt respectively. The increase in the population in Egypt (NI), and the exchange rate between Egypt and each Nile Basin (RIJ) by 1% increases the total Egyptian exports by 2.85%, 0.2%, respectively, the increase in Egypt's average per capita GDP by 1% leads to a drop in total Egyptian exports by 2.85% for the third attempt, and an increase in the geographical distance of between Egypt and each country (DIJ) by 1% leads to a drop in total Egyptian exports by 1.28% for the second and third attempts.

B- The Gravity Model of total imports between Egypt and Nile Basin countries

Table No. (4): The trade and agricultural balance between Egypt and the Nile Basin countries, in million dollars during the period (1999-2018).

Country	Trade balance				Trade Agricultural balance			
	First period (1999-2003)	second period (2004 -2008)	third period (2009-2013)	Fourth period (2014-2018)	First period (1999-2003)	second period (2004 -2008)	third period (2009-2013)	Fourth period (2014-2018)
Tanzania	(1.18)	5.68	29.64	25.89	(1.04)	0.41	8.05	9.37
Uganda	(0.18)	0.64	33.84	54.58	(0.89)	(1.24)	5.63	12.59
Ethiopia	(4.24)	4.18	38.01	96.84	(0.56)	(0.57)	(4.92)	(3.30)
Congo	0.24	1.70	12.18	10.77	0.16	(0.09)	2.66	3.85
Sudan	(12.00)	179.78	517.00	368.69	(13.32)	20.20	141.68	64.05
Burundi	0.17	0.52	12.83	8.38	0.01	0.03	5.18	2.21
Rwanda	0.30	0.78	14.25	20.07	0.00	(0.02)	2.31	5.71
Kenya	(78.44)	19.14	(46.99)	(5.55)	(85.23)	(19.39)	(174.69)	(206.63)
Eritrea	0.83	3.69	51.48	74.20	0.20	0.61	32.55	51.74
South Sudan	0	0	0	0	0	0	0	0
Average	**(94.51)**	**216.10**	**662.22**	**653.88**	**(100.67)**	**(0.06)**	**18.46**	**(60.40)**

Source: - Collected and calculated from Tables No. (1) and (2).
*The value in parentheses is negative

Table (6) shows the logical variables in the Basic Gravity Model and first attempt of the Augmented Gravity Model, in terms of the signal except for the distance variable in the Basic Gravity Model, and all the variables, except for the gross domestic product of Egypt, proved to be significant for the Basic Model and the average per capita Egyptian GDP for the first attempt, the $\overline{R}^2$ coefficient is about 0.59, 0.13 for the basic model and first attempt, which means that the variables in the two attempts explain about 59%, 13% of the change in the dependant variable respectively, and the rest are due to unmeasured factors in the model.

The results show that the increase in both Nile Basin countries (GDPJ) in the Basic Gravity Model, and the per capita GDP in those countries (NHJ) for the first attempt by 1% increases Egypt's total imports by 0.12%, 0.97%, respectively; the increase in geographical distance between Egypt and each country (DIJ) by 1% leads to a drop in total Egyptian imports by 0.45%, 1.98% for the basic model and the first attempt, respectively.

For the second and third attempts, the variables involved in the two attempts are logical, except distance and exchange rate, for the second and third attempts, the GDP in Egypt (GDPI) for the third attempt. Also, all the variables for the second and third attempts were proven significant except for GDP of Egypt (GDPI) for the third attempt and the distance, and the squared difference for the two outcomes for the second and third attempts; the $\overline{R}^2$coefficient is about 0.64 for the second and third attempts, which means that the variables in the two attempts explain about 64% of the change in the dependant variable, and the rest are caused by unmeasured factors in the model.

The results show also that there has been a change in both GDP in Egypt (GDPI), GDP in Nile Basin countries (GDPJ), population in each Nile Basin country (NJ), exchange rate between Egypt and each Nile Basin country(RIJ),and the population in Egypt (NI), For the second attempt, by 1%, Egyptian imports changes by 1.19%, 1.82%, 0.51%, 0.4%, and 5.4% respectively, as well as a change in both of GDP in Nile Basin countries (GDPJ),the average Egyptian GDP per capita (NHI), the average in Nile Basin countries GDP per capita (NHJ), and exchange rate between Egypt and each Nile Basin country (RIJ) for the third attempt at 1% change Egyptian imports by 2.33%, 5.4% and 0.51%. 0.4%, respectively.

1- The Gravity Model of agricultural foreign trade between Egypt and Nile Basin countries:

A - Egypt-Nile Basin countries' model of gravity for agricultural exports:

Table (7) shows the logical variables in the Basic Gravity Model and first attempt of the Augmented Gravity Model, in terms of the signal except for the distance variable in the Basic Gravity Model, the $\overline{R}^2$ coefficient is about 0.66, 0.54 for the basic model and the first attempt, which means that the variables involved in the two attempts explain about 66%, 54% of the change in the dependant variable, respectively, and the rest is due to unmeasured factors in the model.

The results show that the increase in both GDP in Egypt (GDPI) and GDP in the Nile Basin countries (GDPJ) to the Basic Gravity Model by 1% increases Egypt's agricultural exports by 3.17%, 1.22%, respectively, the increase in the per capita GDP of to Egypt (NHI) and per capita GDP in those countries (NHJ) for the first attempt by 1% increases the Egyptian agricultural exports by 4.14%, 1.31%, respectively; the increase in geographical distance between Egypt and each country (DIJ) by 1% leads to a drop in Egyptian agricultural exports by 3.48% for the Basic Model and the first attempt, respectively.

As for the second and third attempt, the logical variables in the two attempts, except the exchange rate of the two attempts, also, all the variables of the second and third attempts were proven significant except for the exchange rate and the squared difference to the outcome of the two attempts, and both the population of Egypt and the importing country for the second attempt,

Table No. (5): Statistical analysis of Gravity Models for total exports between Egypt and the Nile Basin countries `during the period (1999-2018).

Variables	BGM			AGM								
				First attempt			Second attempt			third attempt		
	Coeffi.	t-stat.	Prob.	Coeffi.	t-stat.	Prob.	Coeffi.	t-stat.	Prob.	Coeffi.	t-stat.	Prob.
C	-9.22	-3.92	0.00	-2.84	-0.85	0.39	-25.62	-4.91	0.00	-25.62	-4.91	0.00
GDPI	1.90	12.67	0.00				1.49	5.09	0.00	4.34	3.95	0.00
GDPJ	1.02	18.16	0.00				1.06	5.66	0.00	1.05	5.66	0.00
DIJ	-2.59	-11.94	0.00	-2.68	-7.92	0.00	-1.28	-2.74	0.01	-1.28	-2.74	0.01
NHI				2.68	8.86	0.00				-2.85	-2.15	0.03
NHJ				0.97	6.73	0.00				0.00	0.04	0.97
NI							2.85	2.15	0.03			
NJ							0.00	-0.04	0.97			
GDP_DIFIJ							-0.06	-0.85	0.40	-0.06	-0.85	0.40
RIJ							0.20	2.99	0.00	0.20	2.99	0.00
Mean dependent var	2.44			2.44			2.44			2.44		
S.D. dependent var	2.34			2.34			2.34			2.34		
Akaike info criterion	2.66			3.55			2.63			2.63		
Schwarz criterion	2.73			3.62			2.77			2.77		
Hannan-Quinn criter.	2.69			3.58			2.69			2.69		
Durbin-Watson stat	0.72			0.45			0.76			0.76		
R-squared	0.85			0.64			0.86			0.86		
Adjusted R-squared	0.85			0.63			0.86			0.86		
S.E. of regression	0.90			1.41			0.88			0.88		
Sum squared resid	143.96			350.89			133.92			133.92		
Log likelihood	-235.30			-315.48			-228.80			-228.80		
F-statistic	339.53			104.71			154.71			154.71		
Prob. (F-statistic)	0.00			0.00			0.00			0.00		
N	200			200			200			200		

Source of date: Collected and calculated from table data (1), based on the output of Eviews program.
Where:- GDPI means the Egyptian GDP, in millions of dollars GDPJ means GDP of the country J
DIJ means the geographical distance between Egypt and the country under study in km^2
NHI means GDP per capita in Egypt in dollars / person NHJ means GDP per capita in country J in dollars / person
NI means Population of Egypt NJ means Population of the country J
GDP_DIFIJ means Square differences for the gross domestic product of Egypt and the importing country
RIJ means the exchange rate for Egypt against one unit of the country of import

Table No. (6): Statistical analysis of Gravity Models of total imports between Egypt and the Nile Basin countries during the period (1999-2018).

Variables	BGM			AGM								
				First attempt			Second attempt			third attempt		
	Coeffi.	t-stat.	Prob.	Coeffi.	t-stat.	Prob.	Coeffi.	t-stat.	Prob.	Coeffi.	t-stat.	Prob.
C	4.85	1.14	0.26	6.36	0.99	0.32	-7.01	-0.68	0.50	-7.01	-0.68	0.50
GDPI	0.31	-1.24	0.22				1.19	2.04	0.04	-4.22	-1.91	0.06
GDPJ	0.12	14.23	0.00				1.82	4.87	0.00	2.33	6.46	0.00
DIJ	-0.45	-4.65	0.00	-1.98	-3.00	0.00	0.70	0.75	0.45	0.70	0.75	0.45
NHI				0.54	0.92	0.36				5.40	2.03	0.04
NHJ				0.97	3.19	0.00				-0.51	-2.25	0.03
NI							-5.40	-2.03	0.04			
NJ							0.51	2.25	0.03			
GDP_DIFIJ							-0.26	-1.80	0.07	-0.26	-1.80	0.07
RIJ							0.40	3.06	0.00	0.40	3.06	0.00
Mean dependent var	1.07			1.07			1.07			1.07		
S.D. dependent var	2.83			2.83			2.83			2.83		
Akaike info criterion	4.04			4.81			3.94			3.94		
Schwarz criterion	4.11			4.88			4.09			4.09		
Hannan-Quinn criter.	4.07			4.84			4.00			4.00		
Durbin-Watson stat	0.75			0.48			0.78			0.78		
R-squared	0.60			0.14			0.66			0.66		
Adjusted R-squared	0.59			0.13			0.64			0.64		
S.E. of regression	1.80			2.64			1.69			1.69		
Sum squared resid	505.10			1088.66			435.98			435.98		
Log likelihood	-319.00			-380.43			-307.22			-307.22		
F-statistic	78.79			8.68			41.56			41.56		
Prob. (F-statistic)	0.00			0.00			0.00			0.00		
N	200			200			200			200		

Source of date: Collected and calculated from table data (2), based on the output of Eviews program.
Where:-
GDPI, GDPJ, DIJ, NHI, NHJ, NI, NJ, GDP_DIFIJ, RIJ these variables are defined in Table No. (5).

Table No. (7): Statistical analysis of Gravity Models for agricultural exports between Egypt and the Nile Basin countries during the period (1999-2018).

Variables	BGM			AGM								
				First attempt			Second attempt			third attempt		
	Coeffi.	t-stat.	Prob.	Coeffi.	t-stat.	Prob.	Coeffi.	t-stat.	Prob.	Coeffi.	t-stat.	Prob.
C	-22.29	-4.07	0.00	-11.90	-2.06	0.04	-50.21	-4.01	0.00	-50.21	-4.01	0.00
GDPI	3.17	9.08	0.00				2.32	3.36	0.00	7.92	3.04	0.00
GDPJ	1.22	9.37	0.00				0.92	2.08	0.04	0.71	1.63	0.11
DIJ	-3.38	-6.71	0.00	-3.48	-5.92	0.00	-1.35	-1.21	0.23	-1.35	-1.21	0.23
NHI				4.14	7.85	0.00				-5.60	-1.78	0.08
NHJ				1.31	5.22	0.00				0.20	0.79	0.43
NI							5.60	1.78	0.08			
NJ							-0.20	-0.79	0.43			
GDP_DIFIJ							0.11	0.63	0.53	0.11	0.63	0.53
RIJ							0.36	2.21	0.03	0.36	2.21	0.03
Mean dependent var	0.20			0.20			0.20			0.20		
S.D. dependent var	3.62			3.62			3.62			3.62		
Akaike info criterion	4.35			4.66			4.35			4.35		
Schwarz criterion	4.42			4.73			4.49			4.49		
Hannan-Quinn criter.	4.37			4.69			4.40			4.40		
Durbin-Watson stat	0.87			0.72			0.90			0.90		
R-squared	0.67			0.55			0.68			0.68		
Adjusted R-squared	0.66			0.54			0.67			0.67		
S.E. of regression	2.10			2.46			2.08			2.08		
Sum squared resid	773.21			1056.57			739.58			739.58		
Log likelihood	-384.94			-412.89			-380.96			-380.96		
F-statistic	117.80			70.57			52.69			52.69		
Prob. (F-statistic)	0.00			0.00			0.00			0.00		
N	200			200			200			200		

Source of date: Collected and calculated from table data (1), based on the output of Eviews program.
Where:-GDPI, GDPJ, DIJ, NHI, NHJ, NI, NJ, GDP_DIFIJ, RIJ these variables are defined in Table No. (5).

and both the domestic product of the importing country and the average per capita share of Egypt and the importing country for the third attempt, the $\overline{R}^2$ coefficient of is about 0.67 for the second and third attempts, which means that the variables in the two attempts explain about 67% of the change in the dependant variable, and the rest are caused by unmeasured factors in the model.

The results of the second and third attempt show that the increase of both the GDP in Egypt (GDPI) and the total of GDP in the Nile Basin countries (GDPJ) by 1% increase the Egyptian agricultural exports to them by 2.32%, 0.92% for the second attempt, 7.92% of the total Egyptian GDP for the third attempt, respectively, the increase in the exchange rate between Egypt and each Nile basin (RIJ) by 1% increases the Egyptian agricultural exports by 0.36% for the second and third attempts.

B - Egyptian-Nile Basin countries' model of gravity of agricultural imports:

Table (8) shows the logical variables in the Basic Gravity Model and first attempt of the Augmented Gravity Model, in terms of the signal except for the variable of Egyptian GDP in the Basic Gravity Model and the average Egyptian domestic production per capita in the second attempt. Also, all the variables, except for the Egyptian GDP for the Basic Gravity Model, the average Egyptian GDP per capita and the distance for the first attempt are significant; the $\overline{R}^2$coefficient of determination was about 0.26, 0.14 for the Basic Model and first attempt, which means that the variables involved in the two attempts explain about 26%, 14% of the change in the dependant variable respectively, and the rest is due to unmeasured factors in the model.

The results indicate that there has been a change in GDP in the Nile Basin countries (GDPJ), the geographical distance between Egypt and each country (DIJ) of the Basic Gravity Model and the average per capita GDP of for these countries (NHJ) for the first attempt by 1% will change Egypt's agricultural imports by 1.13%. -1.31%, 1.46%, respectively. As for the second and third attempt, the logical variables that are involved in the two attempts are clear except the distance and exchange rate of the second and third attempts; and the GDP of Egypt for the third attempt. Also, all the variables of the second and third attempts were proven significant except for the GDP variable for Egypt for the two Trials, the population of Egypt for the second attempt, and the average per capita GDP of Egypt for the third attempt; the $\overline{R}^2$ coefficient of determination was about 0.39

Table No. (8): Statistical analysis of Gravity Models of agricultural imports between Egypt and the Nile Basin countries during the period (1999-2018).

Variables	BGM			AGM								
				First attempt			Second attempt			third attempt		
	Coeffi.	t-stat.	Prob.	Coeffi.	t-stat.	Prob.	Coeffi.	t-stat.	Prob.	Coeffi.	t-stat.	Prob.
C	3.91	0.63	0.53	4.33	0.72	0.47	-23.67	-1.90	0.06	-23.67	-1.90	0.06
GDPI	-0.31	-0.82	0.41				0.03	0.05	0.96	-2.84	-1.03	0.31
GDPJ	1.13	6.69	0.00				2.92	6.10	0.00	2.17	5.28	0.00
DIJ	-1.31	-2.32	0.02	-0.70	-1.14	0.26	3.39	3.01	0.00	3.39	3.01	0.00
NHI				-0.95	-1.67	0.10				2.88	0.87	0.39
NHJ				1.46	4.50	0.00				0.75	2.16	0.03
NI							-2.88	-0.87	0.39			
NJ							-0.75	-2.16	0.03			
GDP_DIFIJ							-0.69	-4.17	0.00	-0.69	-4.17	0.00
RIJ							0.51	3.51	0.00	0.51	3.51	0.00
Mean dependent var	0.94			0.94			0.94			0.94		
S.D. dependent var	2.38			2.38			2.38			2.38		
Akaike info criterion	4.30			4.45			4.13			4.13		
Schwarz criterion	4.38			4.54			4.30			4.30		
Hannan-Quinn criter.	4.33			4.48			4.20			4.20		
Durbin-Watson stat	0.74			0.66			0.95			0.95		
R-squared	0.28			0.16			0.42			0.42		
Adjusted R-squared	0.26			0.14			0.39			0.39		
S.E. of regression	2.04			2.20			1.85			1.85		
Sum squared resid	533.63			622.20			425.74			425.74		
Log likelihood	-279.50			-289.63			-264.59			-264.59		
F-statistic	16.46			8.05			13.06			13.06		
Prob. (F-statistic)	0.00			0.00			0.00			0.00		
N	200			2002			200			200		

Source of date: Collected and calculated from table data (2), based on the output of Eviews program.
Where:-
GDPI, GDPJ, DIJ, NHI, NHJ, NI, NJ, GDP_DIFIJ, RIJ these variables are defined in Table No. (5).

for the second and third attempts, which means that the variables involved in the two attempts explain about 39% of the change in the dependant variable, and the rest are due to unmeasured factors in the model.

The results show that a change in both GDP in the Nile Basin countries (GDPJ) for the second and third attempts, the population of each Nile Basin country for the second attempt, the average per capita GDP of is for these countries (NHJ) the third trial, by 1% Egypt's agricultural imports change by 2.92%, 2.17% respectively for the second and third attempts, - 0.75% for the second attempt, 0.75% for the third attempt, respectively.

Third: Assessment of Gravity Model to measure the impact of Nile Basin countries on Egyptian trade:

1- Gravity Model for measuring the impact of Nile Basin countries on total foreign trade:

A- Gravity Model to measure the impact of Nile Basin countries on total Egyptian exports:

Table (9) shows the logical variables in the Basic Gravity Model and first attempt of the Augmented Gravity Model, in terms of the signal except for the distance. All variables were Statistical significant**,** the $\overline{R}^2$ coefficient determination was about 0.90, 0.88 for the Basic Gravity Model and first attempt, which means that the variables involved in the two attempts explain about 90%, 88% of the change in the dependant variable respectively, and the rest is due to unmeasured factors in the model.

The results show that the increase of both GDP in Egypt (GDPI) and GDP in the Nile Basin countries (GDPJ) to the Basic Gravity Model by 1% increases Egypt's total exports by 1.62%, 1.25%, respectively, the increase in the per capita GDP of Egypt (NHI) and GDP per capita in those countries (NHJ) for the first attempt by 1% increases the total Egyptian exports by 1.94%, 1.67%, respectively, the increase in geographical distance between Egypt and each country (DIJ) by 1% increases the total Egyptian exports by 14.48%, 17.48% for the Basic Gravity Model and the first attempt on the arrangement, this change does not conform to the economic logical.

The same table of the Basic Model and the first attempt show that the most important countries affecting the increasing the Egyptian total exports are Ethiopia, Kenya, Sudan and Eritrea for the Basic Model and the first attempt; and Uganda for the first attempt, as for Tanzania and Congo, the total Egyptian exports decreased, with the statistical significance of the affected countries, except Uganda in the Basic Model and Tanzania in the first attempt.

Table No. (9): the results of the Gravity Models of the Egyptian total exports with the Nile Basin countries in the event that the impact of the Nile Basin countries on them is measured during the study period (1999- 2018).

Variables	BGM			AGM								
				First attempt			Second attempt			third attempt		
	Coeffi.	t-stat.	Prob.	Coeffi.	t-stat.	Prob.	Coeffi.	t-stat.	Prob.	Coeffi.	t-stat.	Prob.
C	-144.96	-2.74	0.01	-164.89	-3.08	0.00	-336.16	-3.75	0.00	-336.16	-3.75	0.00
GDPI	1.62	6.00	0.00				1.28	4.44	0.00	-3.60	-0.96	0.34
GDPJ	1.25	5.98	0.00				0.06	0.06	0.95	6.64	2.60	0.01
DIJ	14.38	2.16	0.03	17.48	2.63	0.01	40.07	3.32	0.00	40.07	3.32	0.00
NHI				1.94	6.82	0.00				4.88	1.31	0.19
NHJ				1.67	7.33	0.00				-6.58	-2.75	0.01
NI							-4.88	-1.31	0.19			
NJ							6.58	2.75	0.01			
GDP_DIFIJ							0.44	1.02	0.31	0.44	1.02	0.31
RIJ							0.59	2.03	0.04	0.59	2.03	0.04
The impact of the Nile Basin countries on Egypt												
Tanzania	-2.98	-2.41	0.02	-1.76	-1.79	0.07	-17.18	-3.17	0.00	-17.18	-3.17	0.00
Uganda	1.44	1.82	0.07	3.24	3.51	0.00	-1.99	-0.90	0.37	-1.99	-0.90	0.37
Ethiopia	5.33	2.29	0.02	9.33	3.56	0.00	-1.01	-0.32	0.75	-1.01	-0.32	0.75
Kenya	1.45	3.21	0.00	3.01	7.68	0.00	-7.21	-2.37	0.02	-7.21	-2.37	0.02
Sudan	12.06	2.62	0.01	15.40	3.22	0.00	20.26	3.23	0.00	20.26	3.23	0.00
Eritrea	12.33	2.54	0.01	13.42	2.83	0.01	33.36	3.33	0.00	33.36	3.33	0.00
Congo	-1.54	-3.06	0.00	-3.42	-5.12	0.00	2.57	1.62	0.11	2.57	1.62	0.11
Rwanda	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Burundi	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
South Sudan	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Mean dependent var	2.44			2.44			2.44			2.44		
S.D. dependent var	2.34			2.34			2.34			2.34		
Akaike info criterion	2.31			2.44			2.26			2.26		
Schwarz criterion	2.51			2.64			2.52			2.52		
Hannan-Quinn criter.	2.39			2.52			2.37			2.37		
Durbin-Watson stat	1.01			1.01			1.05			1.05		
R-squared	0.90			0.89			0.91			0.91		
Adjusted R-squared	0.90			0.88			0.91			0.91		
S.E. of regression	0.75			0.80			0.72			0.72		
Sum squared resid	94.04			107.31			85.39			85.39		
Log likelihood	-196.97			-208.85			-188.29			-188.29		
F-statistic	158.71			136.99			123.08			123.08		
Prob. (F-statistic)	0.00			0.00			0.00			0.00		
N	200			200			200			200		

Source of date: Collected and calculated from table data (1), based on the output of Eviews program.
Where:-GDPI, GDPJ, DIJ, NHI, NHJ, NI, NJ, GDP_DIFIJ, RIJ these variables are defined in Table No. (5).

Table No. (10): A Wald Test of the impact of the Nile Basin countries on Egyptian total exports

Attempts	Measurement items	F-statistic	Prob.	Chi-square	Prob.	Null Hypothesis:
BGM		12.81749	0	89.72246	0	C (5) =C (6)=c (7)=c (8)=c (9)=c (10)=c (11)
AGM	First attempt	54.80384	0	383.6269	0	C (5) =C (6)=c (7)=c (8)=c (9)=c (10)=c (11)
	Second attempt	13.39735	0	93.78147	0	c (9)=c (10)=c (11)=c (12)=c (13)=c (14)=c (15)
	third attempt	13.39735	0	93.78147	0	c (9)=c (10)=c (11)=c (12)=c (13)=c (14)=c (15)

Source of date: Calculated from Table No. (9), based on the output of Eviews program.

As for the second and third attempt, the logical variables that are involved in the two attempts are clear except for the distance and exchange rate for the two attempts, and the Egyptian gross domestic product for the third attempt, also, all variables for the second and third attempts were proven significant except for the domestic product of the importing country, the number of the Egyptian population and the importing country for the second attempt, the GDP of the importing country for the third attempt, and the squared difference to the outcome of the second and third attempts, the R^2 coefficient of determination was about 0.91 for the second and third attempts, which means that the variables in the two attempts explain about 91% of the change in the dependant variable, and the rest are due to unmeasured factors in the model.

The results show that there has been a change in both GDP in Egypt (GDPI) for the second attempt, and GDP in the Nile Basin countries (GDPJ), the per capita GDP of in those countries (NHJ) for the third attempt at 1% changes total Egyptian exports to them by 1.28% for the second attempt, 6.64%, and 6.58% for the third attempt, respectively, the increase in the geographical distance of between Egypt and each country (DIJ), and the exchange rate between Egypt

and the Nile Basin countries (RIJ) by 1% increases the total Egyptian exports by 40.07%, 0.59% for the second and third attempts, and these two changes do not meet the economic logic.

The second and third attempts also show that the most important countries responsible for increasing the Egyptian total exports are Sudan and Eritrea for the second and third attempts, while Tanzania and Kenya lead to a drop in the total Egyptian exports with the statistical significance of the affected countries.

As can be seen from Table (10), the statistical significance of the differences between the times of countries is proven, as evidenced by the Wald Test.

B- Gravity Model to measure Nile Basin countries' impact on Egyptian total imports:

Table (11) shows the logical variables in the Basic Gravity Model and first attempt of the Augmented Gravity Model, in terms of the signal, the Egyptian GDP (GDPI) significance for the Basic Model and the average Egyptian GDP per capita(NHI) for the first attempt were also fixed, with results indicating an increase of 1%, which increases the total Egyptian imports to them by 1.67% and 1.72% respectively, the $\bar{R}^2$ coefficient of determination was about 0.71 for the Basic Model and the first attempt, which means that the variables involved in the two attempts explain about 71% of the change in the dependant variable, and the rest are due to unmeasured factors in the model.

The same table of the Basic Model and the first attempt show that the most important countries responsible for increasing the Egyptian total imports are Kenya for the first and Basic Model attempts, with their statistical significance proven.

Table No. (11): The results of the Gravity Models of the Egyptian college imports with the Nile Basin countries in the case of measuring the impact of the Nile Basin countries on them during the study period (1999- 2018).

Variables	BGM			AGM								
				First attempt			Second attempt			third attempt		
	Coeffi.	t-stat.	Prob.	Coeffi.	t-stat.	Prob.	Coeffi.	t-stat.	Prob.	Coeffi.	t-stat.	Prob.
C	89.92	0.70	0.49	45.98	0.37	0.71	198.90	0.98	0.33	198.90	0.98	0.33
GDPI	1.67	2.91	0.00				1.90	2.98	0.00	15.92	1.90	0.06
GDPJ	0.00	0.00	1.00				-0.49	-0.25	0.80	-9.90	-1.73	0.09
DIJ	-13.85	-0.86	0.39	-7.77	-0.51	0.61	-32.03	-1.18	0.24	-32.03	-1.18	0.24
NHI				1.72	3.04	0.00				-14.03	-1.68	0.10
NHJ				0.32	0.71	0.48				9.41	1.74	0.08
NI							14.03	1.68	0.10			
NJ							-9.41	-1.74	0.08			
GDP_DIFIJ							0.21	0.23	0.82	0.21	0.23	0.82
RIJ							0.90	1.37	0.17	0.90	1.37	0.17
The impact of the Nile Basin countries on Egypt												
Tanzania	5.11	1.79	0.08	4.08	1.84	0.07	21.33	1.78	0.08	21.33	1.78	0.08
Uganda	0.88	0.45	0.66	1.58	0.74	0.46	11.09	2.08	0.04	11.09	2.08	0.04
Ethiopia	-0.77	-0.13	0.89	1.61	0.27	0.79	9.36	1.17	0.24	9.36	1.17	0.24
Kenya	5.77	5.64	0.00	5.78	6.55	0.00	16.56	2.39	0.02	16.56	2.39	0.02
Sudan	-4.27	-0.38	0.71	-0.20	-0.02	0.99	-10.48	-0.72	0.47	-10.48	-0.72	0.47
Eritrea	-8.97	-0.77	0.44	-4.74	-0.43	0.67	-33.04	-1.49	0.14	-33.04	-1.49	0.14
Congo	1.32	1.15	0.25	0.47	0.34	0.73	-5.47	-1.47	0.14	-5.47	-1.47	0.14
Rwanda	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Burundi	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
South Sudan	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Mean dependent var	1.07			1.07			1.07			1.07		
S.D. dependent var	2.83			2.83			2.83			2.83		
Akaike info criterion	3.75			3.75			3.77			3.77		
Schwarz criterion	3.96			3.96			4.06			4.06		
Hannan-Quinn criter.	3.84			3.84			3.89			3.89		
Durbin-Watson stat	0.91			0.92			0.93			0.93		
R-squared	0.73			0.73			0.73			0.73		
Adjusted R-squared	0.71			0.71			0.71			0.71		
S.E. of regression	1.53			1.53			1.52			1.52		
Sum squared resid	347.20			347.23			337.00			337.00		
Log likelihood	-289.01			-289.01			-286.62			-286.62		
F-statistic	39.62			39.61			28.69			28.69		
Prob (F-statistic)	0.00			0.00			0.00			0.00		
N	200			200			200			200		

Source of date: Collected and calculated from table data (2), based on the output of Eviews program.

Where:-

GDPI, GDPJ, DIJ, NHI, NHJ, NI, NJ, GDP_DIFIJ, RIJ these variables are defined in Table No. (5).

Table No. (12): A Wald Test of the impact of the Nile Basin countries on total Egyptian total imports

Attempts	Measurement items	F-statistic	Prob.	Chi-square	Prob.	Null Hypothesis:
BGM		9.68067	0	67.76469	0	C (5) =C (6)=c (7)=c (8)=c (9)=c (10)=c (11)
AGM	**First attempt**	45.45141	0	318.1598	0	C (5) =C (6)=c (7)=c (8)=c (9)=c (10)=c (11)
	Second attempt	6.084161	0	42.58913	0	c (9)=c (10)=c (11)=c (12)=c (13)=c (14)=c (15)
	third attempt	6.084161	0	42.58913	0	c (9)=c (10)=c (11)=c (12)=c (13)=c (14)=c (15)

Source of date: Calculated from Table No. (11), based on the output of Eviews program.

As for the second and third attempt, the variables involved in the two attempts, except the GDP of the exporting country for the second attempt, the average per capita GDP of the exporting country for the third attempt and the exchange rate for the second and third attempts, are logical, not the significance of the variables proved only the variable of the Egyptian GDP for the second attempt, as it increased by 1%, which leads to an increase in the total Egyptian imports by 1.9%, the $\overline{R}^2$coefficient of determination was about 0.71 for the second and third attempts, which means that the variables involved in the two attempts explain about 71% of the change in the dependant variable, and the rest are due to unmeasured factors in the model.

The same table also shows from the second and third attempt that the most important countries responsible for increasing the Egyptian total imports are Uganda and Kenya for the second and third attempts, with the statistical significance of the affected countries.

As can be seen from Table (12), the statistical significance of the differences between the times of countries is proven, as evidenced by the Wald Test. 2-

2- Gravity Model to measure the impact of Nile Basin countries on Egyptian agricultural foreign trade:

A- Gravity Model to measure Nile Basin countries' impact on Egyptian agricultural exports: Table (13) the logic of the variables included in the Basic Model and the first attempt in terms of signal except for the distance variable, the statistical significance of all variables except the distance variable in the Basic Model has also been established, the $\overline{R}^2$coefficient of determination was about 0.72, 0.71 for the Basic Model and first attempt, which means that the variables involved in the two attempts explain about 72%, 71% of the change in the dependant variable respectively, and the rest is due to unmeasured factors in the model.

The results show that the increase of both GDP in Egypt (GDPI) and GDP in the Nile Basin countries (GDPJ) to the Basic Gravity Model by 1% increases Egypt's agricultural exports by 2.64%, 1.68%, respectively, the increase in the per capita GDP of to Egypt (NHI) and to GDP per capita in those countries (NHJ)the geographical distance of between Egypt and each country (DIJ) for the first attempt by 1% increases Egyptian agricultural exports by 3.13%, 2.27%, 32.83% respectively, and the variable distance does not appear to be consistent with economic logic.

The same table of the Basic Gravity Model and the first attempt show that the most important countries responsible for increasing Egyptian agricultural exports are Kenya for the Basic Gravity Model and the first attempt, Uganda, Ethiopia, Sudan and Eritrea for the second attempt, while Congo leads to a decrease in Egyptian agricultural exports in the Basic Model and the first attempt. With the statistical significance of influential countries.

As for the second and third attempt, the logical variables that are involved in the two attempts are clear except for the distance and exchange rate variables for the two attempts, and the Egyptian GDP for the third attempt, the statistical significance of all variables has also been established for the second and third attempts with the exception of the exchange rate and the square of the difference to the outcome of the two attempts, both the population of Egypt and the importing country and the GDP of the importing country for the second attempt, the population of Egypt, the importing country and the GDP of the importing country for the second attempt, both GDP and average GDP per capita for the third attempt. The $\overline{R}^2$coefficient of determination was about 0.73 for the second and third attempts, which means that the variables involved in the two attempts explain about 73% of the change in the dependant variable, and the remainder is due to unmeasured factors in the model.

The results of the second and third attempt show that there has been a change in both GDP in Egypt (GDPI) for the second attempt, and GDP in the Nile Basin countries (GDPJ). The average per capita GDP in those countries (NHJ) for the third attempt at 1% changes Egyptian agricultural exports to them by 2.05% for the second attempt, 14.7%, and 14.03% for the third attempt, respectively, the geographical distance of between Egypt and each country (DIJ) for the second and third attempt is 1%, which increases the Egyptian agricultural exports by 74.4%, which is contrary to the economic logic.

It is also clear from the same table from the second and third attempt that the most important countries responsible for increasing Egyptian agricultural exports are Sudan and Eritrea for the second and third attempts as for Tanzania it leads to a decrease in Egyptian

Table No. (13): The results of the Gravity Models of Egyptian agricultural exports with the Nile Basin countries in the event that the impact of the Nile Basin countries on them is measured during the study period (1999- 2018).

Variables	BGM			AGM								
				First attempt			Second attempt			third attempt		
	Coeffi.	t-stat.	Prob.	Coeffi.	t-stat.	Prob.	Coeffi.	t-stat.	Prob.	Coeffi.	t-stat.	Prob.
C	-275.39	-2.04	0.04	-304.43	-2.32	0.02	-608.54	-2.57	0.01	-608.54	-2.57	0.01
GDPI	2.64	3.84	0.00				2.05	2.72	0.01	-11.10	-1.12	0.27
GDPJ	1.68	3.14	0.00				0.67	0.28	0.78	14.70	2.17	0.03
DIJ	28.21	1.66	0.10	32.83	2.02	0.05	74.40	2.33	0.02	74.40	2.33	0.02
NHI				3.13	4.49	0.00				13.15	1.33	0.18
NHJ				2.27	4.06	0.00				-14.03	-2.20	0.03
NI							-13.15	-1.33	0.18			
NJ							14.03	2.20	0.03			
GDP_DIFIJ							0.24	0.21	0.83	0.24	0.21	0.83
RIJ							0.48	0.63	0.53	0.48	0.63	0.53
The impact of the Nile Basin countries on Egypt												
Tanzania	-4.78	-1.52	0.13	-3.23	-1.34	0.18	-31.99	-2.22	0.03	-31.99	-2.22	0.03
Uganda	2.91	1.44	0.15	5.40	2.39	0.02	-6.73	-1.15	0.25	-6.73	-1.15	0.25
Ethiopia	10.14	1.71	0.09	15.68	2.44	0.02	-3.79	-0.46	0.65	-3.79	-0.46	0.65
Kenya	2.88	2.50	0.01	4.97	5.18	0.00	-14.69	-1.81	0.07	-14.69	-1.81	0.07
Sudan	22.45	1.91	0.06	27.23	2.33	0.02	37.48	2.27	0.02	37.48	2.27	0.02
Eritrea	23.74	1.92	0.06	25.54	2.20	0.03	65.65	2.47	0.01	65.65	2.47	0.01
Congo	-2.32	-1.81	0.07	-4.91	-3.00	0.00	6.94	1.64	0.10	6.94	1.64	0.10
Rwanda	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Burundi	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
South Sudan	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Mean dependent var	0.20			0.20			0.20			0.20		
S.D. dependent var	3.62			3.62			3.62			3.62		
Akaike info criterion	4.18			4.24			4.18			4.18		
Schwarz criterion	4.38			4.43			4.45			4.45		
Hannan-Quinn criter.	4.26			4.31			4.29			4.29		
Durbin-Watson stat	1.06			1.05			1.09			1.09		
R-squared	0.74			0.73			0.75			0.75		
Adjusted R-squared	0.72			0.71			0.73			0.73		
S.E. of regression	1.90			1.95			1.88			1.88		
Sum squared resid	606.84			640.45			579.98			579.98		
Log likelihood	-363.26			-368.08			-359.21			-359.21		
F-statistic	47.84			44.44			35.44			35.44		
Prob (F-statistic)	0.00			0.00			0.00			0.00		
N	200			200			200			200		

Source of date: Collected and calculated from table data (1), based on the output of Eviews program.
Where:-GDPI, GDPJ, DIJ, NHI, NHJ, NI, NJ, GDP_DIFIJ, RIJ these variables are defined in Table No. (5).

Table No. (14): A Wald Test of the impact of the Nile Basin countries on total Egyptian agricultural exports

Attempts	Measurement items	F-statistic	Prob.	Chi-square	Prob.	Null Hypothesis:
BGM		6.579913	0	46.05939	0	C (5) =C (6)=c (7)=c (8)=c (9)=c (10)=c (11)
AGM	First attempt	15.59353	0	109.1547	0	C (5) =C (6)=c (7)=c (8)=c (9)=c (10)=c (11)
	Second attempt	6.447281	0	45.13097	0	c (9)=c (10)=c (11)=c (12)=c (13)=c (14)=c (15)
	third attempt	6.447281	0	45.13097	0	c (9)=c (10)=c (11)=c (12)=c (13)=c (14)=c (15)

Source of date: Calculated from Table No. (13), based on the output of Eviews program.

agricultural exports, with the statistical significance of the affected countries.

As can be seen from Table (14), the statistical significance of the differences between the times of countries is proven, as evidenced by the Wald Test.

B- Gravity Model to measure Nile Basin countries' impact on Egyptian agricultural imports:

Table (15) shows the logical variables in the Basic Gravity Model and the first attempt in terms of the indication except the distance variable for the Basic Gravity Model and the first attempt, statistical significance for the two trial variables was not established, the $\bar{R}^2$coefficient of determination was about 0.54 for the Basic Model and the first attempt, which means that the variables involved in the two attempts explain about 54% of the change in the dependant variable, and the rest are due to unmeasured factors in the model.

It is clear from the same table of the Basic Model and the first attempt that the most important countries responsible for increasing Egyptian agricultural imports are Kenya for the Basic Model and first attempts, with their statistical significance proven.

As for the second and third attempt, the logical variables that are involved in the two attempts are

shown except the distance variable in the two attempts, and the Egyptian GDP for the third attempt, the statistical significance of the variables included in the model was not established, The $\overline{R}^2$coefficient of determination was about 0.53 for the second and third attempts, which means that the variables in the two attempts explain about 53% of the change in the dependant variable, and the rest are due to unmeasured factors in the model.

The same table also shows that the second and third attempt made no evidence of any country's statistical significance of the increase or decrease of Egyptian imports from Nile Basin countries. As can be seen from Table (16), the statistical significance of the differences between the times of countries is proven, as evidenced by the Wald Test.

Fourth: Assessment of the gravity model of agricultural foreign trade of Nile Basin countries using Panel Data:

1- Assessment of the gravity model of agricultural exports of Nile Basin countries using Panel Data:

A- Gravity Model for agricultural exports of Nile Basin countries using Panel Least Squares analysis:

Table (17) makes sense of the variables involved in the second and third attempts in terms of logical, except the exchange rate of the two attempts, the statistical significance of all variables, except the variable difference between the two outcomes of the two attempts, has also established the population of the exporting country for the second attempt, the average per capita GDP of the exporting country for the third attempt, the average per capita GDP of the exporting country for the third attempt.

Table No. (15): The results of the Gravity Models of Egyptian agricultural imports with the Nile Basin countries in the case of measuring the impact of the Nile Basin countries on them during the study period (1999- 2018).

Variables	BGM			AGM								
				First attempt			Second attempt			third attempt		
	Coeffi.	t-stat.	Prob.	Coeffi.	t-stat.	Prob.	Coeffi.	t-stat.	Prob.	Coeffi.	t-stat.	Prob.
C	-102.52	-0.60	0.55	-104.42	-0.63	0.53	-168.84	-0.64	0.52	-168.84	-0.64	0.52
GDPI	0.36	0.54	0.59				0.58	0.76	0.45	-10.72	-0.96	0.34
GDPJ	0.58	1.11	0.27				3.56	1.58	0.12	8.66	1.20	0.23
DIJ	11.36	0.53	0.59	11.73	0.57	0.57	23.27	0.67	0.51	23.27	0.67	0.51
NHI				0.49	0.74	0.46				11.30	1.02	0.31
NHJ				0.73	1.36	0.18				-5.11	-0.76	0.45
NI							-11.30	-1.02	0.31			
NJ							5.11	0.76	0.45			
GDP_DIFIJ							-1.32	-1.27	0.21	-1.32	-1.27	0.21
RIJ							-0.58	-0.70	0.49	-0.58	-0.70	0.49
The impact of the Nile Basin countries on Egypt												
Tanzania	-1.31	-0.36	0.72	-0.57	-0.19	0.85	-7.14	-0.48	0.63	-7.14	-0.48	0.63
Uganda	2.35	0.91	0.37	3.07	1.10	0.27	-3.47	-0.50	0.62	-3.47	-0.50	0.62
Ethiopia	5.87	0.77	0.44	7.31	0.92	0.36	0.92	0.09	0.93	0.92	0.09	0.93
Kenya	5.16	4.19	0.00	5.88	5.36	0.00	-1.09	-0.12	0.90	-1.09	-0.12	0.90
Sudan	10.74	0.72	0.48	11.57	0.78	0.44	15.36	0.81	0.42	15.36	0.81	0.42
Eritrea	9.79	0.64	0.52	9.56	0.66	0.51	24.90	0.87	0.38	24.90	0.87	0.38
Congo	-0.38	-0.20	0.84	-1.15	-0.54	0.59	2.87	0.61	0.54	2.87	0.61	0.54
Rwanda	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Burundi	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
South Sudan	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Mean dependent var	0.94			0.94			0.94			0.94		
S.D. dependent var	2.38			2.38			2.38			2.38		
Akaike info criterion	3.88			3.88			3.92			3.92		
Schwarz criterion	4.12			4.12			4.25			4.25		
Hannan-Quinn criter.	3.98			3.98			4.06			4.06		
Durbin-Watson stat	1.19			1.21			1.19			1.19		
R-squared	0.57			0.57			0.58			0.58		
Adjusted R-squared	0.54			0.54			0.53			0.53		
S.E. of regression	1.62			1.62			1.63			1.63		
Sum squared resid	317.21			317.53			311.11			311.11		
Log likelihood	-245.17			-245.23			-243.89			-243.89		
F-statistic	16.11			16.08			11.51			11.51		
Prob (F-statistic)	0.00			0.00			0.00			0.00		
N	200			200			200			200		

Source of date: Collected and calculated from table data (2), based on the output of Eviews program.
Where: - GDPI, GDPJ, DIJ, NHI, NHJ, NI, NJ, GDP_DIFIJ, RIJ these variables are defined in Table No. (5).

Table No. (16): A Wald Test of the impact of the Nile Basin countries on total Egyptian agricultural imports

Attempts	Measurement items	F-statistic	Prob.	Chi-square	Prob.	Null Hypothesis:
BGM		11.79306	0	82.55145	0	C (5) =C (6)=c (7)=c (8)=c (9)=c (10)=c (11)
AGM	First attempt	16.58564	0	116.0995	0	C (5) =C (6)=c (7)=c (8)=c (9)=c (10)=c (11)
	Second attempt	6.158145	0	43.10701	0	c (9)=c (10)=c (11)=c (12)=c (13)=c (14)=c (15)
	third attempt	6.158145	0	43.10701	0	c (9)=c (10)=c (11)=c (12)=c (13)=c (14)=c (15)

Source of date: Calculated from Table No. (15), based on the output of Eviews program.

The $\overline{R}^2$coefficient of determination was about 0.18 for both attempts, which means that the variables in the two attempts explain about 18% of the change in the dependant variable, and the rest are due to unmeasured factors in the model. The results indicate that the increase in the GDP of the exporting country (GDPI) and the GDP of the importing country of the Nile Basin countries (GDPJ) for the second and third attempt by 1% increase the intra-trade of agricultural exports of the Nile Basin countries by 0.66%, 0.98% for the second attempt, 0.83%. 0.49% for the third attempt, respectively, the geographical distance of the Nile Basin countries (DIJ), the exchange rate of the exporting and importing country,(RIJ), for the second and third attempts, changed by 1%, which changes the intra-trade of agricultural exports of the Nile Basin countries by 2.81% and 0.12% for both attempts respectively, change in both the population of the importing country (NJ) for the second attempt, and the average per capita GDP of the importing country (NHJ) for the third attempt changed by 1%, which changes the intra-trade of agricultural exports of the Nile Basin countries by 0.49% and 0.49% respectively.

Table (17): Results of the model analysis of agricultural exports using the Panel Least Squares method during the period (1999-2018).

Variables	AGM					
	Second attempt			third attempt		
	Coeffi.	t-stat.	Prob.	Coeffi.	t-stat.	Prob.
C	2.59326	11.46691	0	2.59326	11.46691	0
GDPI	0.660051	11.41519	0	0.831843	14.14177	0
GDPJ	0.976127	22.13237	0	0.486568	13.55483	0
DIJ	-2.806366	-34.3811	0	-2.806366	-34.3811	0
NHI				-0.171792	-1.816564	0.0693
NHJ				0.489559	8.749411	0
NI	0.171792	1.816564	0.0693			
NJ	-0.489559	-8.749411	0			
GDP_DIFIJ	-0.007519	-0.438969	0.6607	-0.007519	-0.438969	0.6607
RIJ	0.117862	9.472055	0	0.117862	9.472055	0
Mean dependent var	0.187734			0.187734		
S.D. dependent var	1.552743			1.552743		
Akaike info criterion	3.512525			3.512525		
Schwarz criterion	3.52512			3.52512		
Hannan-Quinn criter.	3.516826			3.516826		
Durbin-Watson stat	0.333392			0.333392		
R-squared	0.188492			0.188492		
Adjusted R-squared	0.187133			0.187133		
S.E. of regression	1.39994			1.39994		
Sum squared resid	16386.15			16386.15		
Log likelihood	-14695.45			-14695.45		
F-statistic	138.717			138.717		
Prob. (F-statistic)	0			0		
Included observations:	1047 after adjustments			1047 after adjustments		

Source of date: Collected and calculated from table data (1), based on the output of Eviews program.
Where:-GDPI means GDP of the exporting country to the Nile Basin countries, in millions of dollars
GDPJ means GDP of the country imported from the Nile Basin countries, in millions of dollars
DIJ means the geographical distance between the Nile Basin countries under study in km^2
NHI means the per capita GDP of the Nile Basin countries in the country exporting in dollars / person
NHJ means per capita GDP in the Nile Basin countries of the importing country in dollars / person
NI means Population of the Nile Basin countries in the country exporting NJ means Population of the Nile Basin countries in the country importing
GDP_DIFIJ means Square difference of the GDP of the exporting and importing country
RIJ means the exchange rate of the exporting country against one unit of the country of import

B- **Gravity Model for agricultural exports of Nile Basin countries with time element entry using Pooled Last Squares analysis:**

The logical variables in the two attempts are shown in table (18), except for the exchange rate variable; statistical significance of all variables was established except for the variance of the squared differences for the GDP between the exporting and importing countries. As can be seen from Table (19), the statistical significance of the differences between the times of countries is proven, as evidenced by the Wald Test.

The $\overline{R}^2$ coefficient of determination was about 0.21 for both attempts, which means that the variables in the two attempts explain about 21% of the change in the dependant variable, and the remainder is due to unmeasured factors in the model.

The most positive factor in the volume of trade

Table No. (18): Results of the models of Gravity for agricultural exports in the Nile Basin countries, in the case of measuring the impact of years in the Nile Basin countries during the study period (1999-2018).

Variables	AGM					
	Second attempt			third attempt		
	Coeffi.	t-stat.	Prob.	Coeffi.	t-stat.	Prob.
C	1.350986	5.657193	0	1.350986	5.657193	0
GDPI	1.124946	17.56501	0	0.857953	14.81031	0
GDPJ	1.368986	27.30754	0	0.590005	16.3917	0
DIJ	-3.326903	-38.17508	0	-3.326903	-38.17508	0
NHI				0.266994	2.751329	0.0059
NHJ				0.778981	13.42035	0
NI	-0.266994	-2.751329	0.0059			
NJ	-0.778981	-13.42035	0			
GDP_DIFIJ	0.018123	1.070645	0.2844	0.018123	1.070645	0.2844
RIJ	0.12252	10.00827	0	0.12252	10.00827	0
The effect of years on the Nile Basin countries						
DUM1	0.430117	5.22281	0	0.430117	5.22281	0
DUM2	0.478638	5.840294	0	0.478638	5.840294	0
DUM3	0.59693	7.351599	0	0.59693	7.351599	0
DUM4	0.421472	5.129452	0	0.421472	5.129452	0
DUM5	0.589789	7.403728	0	0.589789	7.403728	0
DUM6	0.672852	8.570117	0	0.672852	8.570117	0
DUM7	0.48149	6.253608	0	0.48149	6.253608	0
DUM8	0.230642	3.069181	0.0022	0.230642	3.069181	0.0022
DUM11	-0.194218	-2.686933	0.0072	-0.194218	-2.686933	0.0072
DUM13	-0.271645	-3.55286	0.0004	-0.271645	-3.55286	0.0004
DUM14	-0.537003	-7.23944	0	-0.537003	-7.23944	0
DUM16	-0.210165	-2.901607	0.0037	-0.210165	-2.901607	0.0037
DUM17	-0.450604	-6.529528	0	-0.450604	-6.529528	0
DUM18	-0.199074	-2.700838	0.0069	-0.199074	-2.700838	0.0069
DUM19	-0.200805	-2.872119	0.0041	-0.200805	-2.872119	0.0041
Mean dependent var	0.187734			0.187734		
S.D. dependent var	1.552743			1.552743		
Akaike info criterion	3.478345			3.478345		
Schwarz criterion	3.503535			3.503535		
Hannan-Quinn criter.	3.486947			3.486947		
Durbin-Watson stat	0.358345			0.358345		
R-squared	0.218564			0.218564		
Adjusted R-squared	0.215849			0.215849		
S.E. of regression	1.37499			1.37499		
Sum squared resid	15778.92			15778.92		
Log likelihood	-14537.31			-14537.31		
F-statistic	80.49457			80.49457		
Prob (F-statistic)	0			0		
Fixed Effects	EXPIJ--C	2.58E-14		EXPIJ--C	1.75E-14	
Included observations:	1047 after adjustments			1047 after adjustments		

Source of date: Collected and calculated from table data (1), based on the output of Eviews program.
Where:-GDPI, GDP, DIJ, NHI, NHJ, NI, NJ, GDP_DIFIJ, RIJ these variables are defined in Table No. (17).
DUM1: DUM8 means Years from 1999 to 2006 DUM11، DUM13 means Years 2011 ، 2013 DUM14 means Year 2014
DUM16: DUM19 means Years from 2016 to 2018

Table No. (19): A Wald Test of the impact of the Nile Basin countries on total agricultural exports

Attempts	Measurement items	F-statistic	Prob.	Chi-square	Prob.	Null Hypothesis:
AGM	Second attempt	21.41239	0	321.1858	0	c (9)=c (10)=c (11)=c (12)=c (13)=c (14)=c (15)=c (16)=c (17)= c (18)=c (19)=c (20)=c (21)=c (22)=c (23)=0
	third attempt	21.41239	0	321.1858	0	c (9)=c (10)=c (11)=c (12)=c (13)=c (14)=c (15)=c (16)=c (17)= c (18)=c (19)=c (20)=c (21)=c (22)=c (23)=0

Source of date: Calculated from Table No. (18), based on the output of Eviews program.

between Nile Basin countries is also shown in the table to be the GDP of the importing country (GDPJ),the GDP of the exporting country (GDPI) for the second and third attempt, since their increase by 1% increases the agricultural trade exchange between Nile Basin countries by 1.37%, 1.12% for the second attempt respectively, and about 59.86% for the third attempt, respectively, the increase in average per capita GDP of the importing country (NHJ) and the (NHI) export by 1% increases the agricultural trade exchange of the Nile Basin countries by 0.78% ,0.27%the third attempt is on the order, and the exchange rate (RJ) is 0.12 % for both attempts. The most negative factor in the volume of intra- country trade being studied was the distance of the (DIJ) to both attempts, the population of both (NJ) and (NI) for the second attempt this means that by increasing the distance for the two attempts, and the population of both the importing and exporting countries for the second attempt by about 1%, the volume of intra-state trade between the countries in question is down by 3.33%, 0.78%, 0.27 % respectively.

2- Assessment of the Gravity Model of agricultural imports of Nile Basin countries using Panel data:

A- Gravity Model of agricultural imports of Nile Basin countries using Panel Least Squares analysis:

It is clear from Table (20) the logic of the variables included in the second and third attempts in terms of signal, and the statistical significance of all variables has been established, the R^2 coefficient of determination was 0.47 about for both attempts, which means that the variables in the two attempts explain about 47% of the change in the dependant variable, and the rest are due to unmeasured factors in the model.

The results show that there has been a change in both the GDP of the exporting country (GDPI) and the GDP of the importing country (GDPJ) of the Nile Basin countries for the second and third attempt by 1%which changes the intra-trade of agricultural importing of the Nile Basin countries by 0.55%, 1.89% for the second attempt, respectively, 0.43% and 2.62% for the third attempt, respectively, the geographical distance of the between the Nile Basin countries (DIJ) and the difference between the products of the exporting and importing country (GDP_DIFIJ), the exchange rate of the exporting and importing country (RIJ), for the second and third attempts at 1%, changes the intra-trade of agricultural imports of the Nile Basin countries by 3.52%, 0.04% and 0.38% for both attempts

Table (20): Results of the model analysis of agricultural imports using the Panel Least Squares method during the period (1999-2018).

Variables	AGM					
	Second attempt			third attempt		
	Coeffi.	t-stat.	Prob.	Coeffi.	t-stat.	Prob.
C	0.414396	1.986129	0.0471	0.414396	1.986129	0.0471
GDPI	0.549916	11.33925	0	-0.428145	-9.925802	0
GDPJ	1.893479	40.72862	0	2.622245	70.66029	0
DIJ	-3.516375	-48.89351	0	-3.516375	-48.89351	0
NHI				0.978061	13.55033	0
NHJ				-0.728766	-12.8379	0
NI	-0.978061	-13.55033	0			
NJ	0.728766	12.8379	0			
GDP_DIFIJ	0.04282	2.760055	0.0058	0.04282	2.760055	0.0058
RIJ	-0.37912	-31.92166	0	-0.37912	-31.92166	0
Mean dependent var	-0.40961			-0.40961		
S.D. dependent var	1.871993			1.871993		
Akaike info criterion	3.450962			3.450962		
Schwarz criterion	3.463414			3.463414		
Hannan-Quinn criter.	3.455212			3.455212		
Durbin-Watson stat	0.575761			0.575761		
R-squared	0.47499			0.47499		
Adjusted R-squared	0.474123			0.474123		
S.E. of regression	1.35752			1.35752		
Sum squared resid	15614.56			15614.56		
Log likelihood	-14630.88			-14630.88		
F-statistic	547.5538			547.5538		
Prob. (F-statistic)	0			0		
Included observations:	1061 after adjustments			1061 after adjustments		

Source of date: Collected and calculated from table data (2), based on the output of Eviews program.
Where:- GDPI, GDPJ, DIJ, NHI, NHJ, NI, NJ, GDP_DIFIJ, RIJ these variables are defined in Table No. (17).

respectively, the population of the exporting State (Ni) and (NJ) has changed for the second attempt the ratio of each of them to the average per capita GDP of the exporting country (NHI) and importing country (NHJ) for the third attempt is equal to 1%, which changes the intra-trade of agricultural imports of the Nile Basin countries by -0.98%, 0.73%, respectively

B - Gravity Model of agricultural imports of Nile Basin countries with the entry of the element of time using Pooled Last Squares analysis:

It is clear from Table (21) the logic of the variables included in the two attempts in terms of signal except the GDP of the exporting country, and the statistical significance of all variables has been established, as can be seen from Table (22), the statistical significance of the differences between the times of countries is proven,

Table No. (21): Results of the models of Gravity for agricultural imports in the Nile Basin countries, in the case of measuring the impact of years in the Nile Basin countries during the study period (1999-2018).

Variabies	AGM					
	Second attempt			third attempt		
	Coeffi.	t-stat.	Prob.	Coeffi.	t-stat.	Prob.
C	-1.111549	-4.950149	0	-1.111549	-4.950149	0
GDPI	1.050636	18.81638	0	-0.372358	-8.698425	0
GDPJ	2.30059	44.67256	0	2.734517	73.8532	0
DIJ	-4.070218	-52.41218	0	-4.070218	-52.41218	0
NHI				1.422994	18.77084	0
NHJ				-0.433927	-7.407877	0
NI	-1.422994	-18.77084	0			
NJ	0.433927	7.407877	0			
GDP_DIFIJ	0.063259	4.12729	0	0.063259	4.12729	0
RIJ	-0.359797	-30.61225	0	-0.359797	-30.61225	0
The effect of years on the Nile Basin countries						
DUM1	0.661834	8.223563	0	0.661834	8.223563	0
DUM2	0.78275	9.755178	0	0.78275	9.755178	0
DUM3	0.885687	10.93013	0	0.885687	10.93013	0
DUM4	0.752628	9.531659	0	0.752628	9.531659	0
DUM5	0.853078	11.06457	0	0.853078	11.06457	0
DUM6	0.933738	11.95737	0	0.933738	11.95737	0
DUM7	0.593538	8.016333	0	0.593538	8.016333	0
DUM8	0.428994	5.676965	0	0.428994	5.676965	0
DUM9	0.186884	2.642898	0.0082	0.186884	2.642898	0.0082
DUM10	0.357059	5.309631	0	0.357059	5.309631	0
DUM12	0.249858	3.776116	0.0002	0.249858	3.776116	0.0002
DUM13	0.172005	2.309874	0.0209	0.172005	2.309874	0.0209
DUM17	-0.227105	-3.443627	0.0006	-0.227105	-3.443627	0.0006
DUM18	-0.148331	-2.105238	0.0353	-0.148331	-2.105238	0.0353
Mean dependent var	-0.40961			-0.40961		
S.D. dependent var	1.871993			1.871993		
Akaike info criterion	3.415011			3.415011		
Schwarz criterion	3.439085			3.439085		
Hannan-Quinn criter.	3.423227			3.423227		
Durbin-Watson stat	0.587414			0.587414		
R-squared	0.495198			0.495198		
Adjusted R-squared	0.493527			0.493527		
S.E. of regression	1.33224			1.33224		
Sum squared resid	15013.56			15013.56		
Log likelihood	-14464.31			-14464.31		
F-statistic	296.3594			296.3594		
Prob. (F-statistic)	0			0		
Fixed Effects	IMPIJ--C	5.88E-14		IMPIJ--C	4.46E-14	
Included observations:	1061 after adjustments			1061 after adjustments		

Source of date: Collected and calculated from table data (2), based on the output of Eviews program.
Where:-GDPI, GDP, DIJ, NHI, NHJ, NI, NJ, GDP_DIFIJ, RIJ these variables are defined in Table No. (17).
DUM1: DUM10 means Years from 1999 to 2008
DUM112، DUM13 means Years 2010 ، 2011
DUM117 ، DUM18 means Year 2015 ، 2016

Table No. (22): A Wald Test of the impact of the Nile Basin countries on total agricultural imports

Attempts	Measurement items	F-statistic	Prob.	Chi-square	Prob.	Null Hypothesis:
AGM	Second attempt	24.18706	0	338.6189	0	c (9)=c (10)=c (11)=c (12)=c (13)=c (14)=c (15)=c (16)=c (17)= c (18)=c (19)=c (20)=c (21)=c (22)=0
	third attempt	24.18706	0	338.6189	0	c (9)=c (10)=c (11)=c (12)=c (13)=c (14)=c (15)=c (16)=c (17)= c (18)=c (19)=c (20)=c (21)=c (22)=0

Source of date: Calculated from Table No. (21), based on the output of Eviews program.

as evidenced by the Wald Test, the $\bar{R}^2$coefficient of determination was about 0.49 for both attempts, which means that the variables in the two attempts explain about 49% of the change in the dependant variable, and the remainder are due to unmeasured factors in the model.

B- Gravity Model of agricultural imports of Nile Basin countries with the entry of the element of time using Pooled Last Lquares analysis:

It is clear from Table (21) the logic of the variables included in the two attempts in terms of signal except the GDP of the exporting country, and the statistical significance of all variables has been established, as can be seen from Table (22), the statistical significance of the differences between the times of countries is proven, as evidenced by the Wald Test, the $\bar{R}^2$coefficient of determination was about 0.49 for both attempts, which means that the variables in the two attempts explain about 49% of the change in the dependant variable, and the remainder are due to unmeasured factors in the model.

The table also shows that the most positive factors affecting the volume of trade between Nile Basin countries include the GDP of the importing country, the GDP of the exporting country, the population of the importing country, and the differences between the two outcomes of the second attempt, the increase of each of them by 1% increases the trade exchange of agricultural imports of the Nile Basin countries by2.73%, 1.42%, and 0.06% respectively in the third attempt. The most negative factor in the volume of intra-State trade being studied was the geographical distance of the two attempts and the population of the exporting country to the second attempt, the GDP of the exporting country, the average per capita GDP of the importing country for the third attempt, is the same as that of the exporting country, this means that by increasing the geographical distance of the two attempts, the population of the exporting country to the second attempt, and the GDP of the exporting country, the average per capita GDP of the importing country for the third attempt by about 1%, the volume of intra-state trade among the countries under study is down by4.07%, 1.42%, and 0.37 %, 0.43% respectively.

Fifth: Facts situation and the Hopes for agricultural foreign trade of Nile Basin countries:

1-Facts situation and the Hopes for agricultural exports of Nile Basin countries:

Table (23) shows the value of agricultural exports to Nile Basin countries, distributed by countries and years. The results indicate that the commercial value of Ethiopia's agricultural exports with Nile Basin countries is better than what is hoped for, as shown by the value of the general average, which amounted to $ 28.15 million, an increase of about 36.54% over the expected situation, the second and third periods actually achieved a better position than what was hoped for by an increase of 67.35%, 71.71%, respectively, while the first and fourth periods were less than what was hoped, as they decreased by 83.41%, 37.96%, respectively.

The same table shows that the value of Eritrea's agricultural exports to the Nile Basin countries shows that the average general level of the Facts situation has dropped from the desired position, as the drop rate was estimated at 326.13 %. For the first period, it achieved a better-than-expected real situation with an increase of about 50.82%.The table also shows that the value of Sudan and Congo's agricultural exports with Nile Basin countries is lower than what is hoped for at all study periods, with the decrease of their general average of 201.05%, 1634.6%, respectively. This indicates that the exports of these countries were negative toward the Nile Basin countries.

The value of Uganda's agricultural exports to Nile Basin countries shows that the reality is better than what is hoped for in all four study periods, as the average general increase reached about 73.19% from the hoped situation.

The same table also showed that the value of the agricultural exports of Burundi to the Nile Basin countries current situation lower than what is hoped for at all study periods, as the overall average drop rate was about 160.88% from the hoped-for situation.

The above-mentioned table also shows that the value of Tanzania's agricultural exports to the Nile Basin countries has increased the Facts situation from what is hoped for, with the overall average increase of 71% over the hoped-for situation, The Facts situation is better than what was hoped for and an increase of 78.01%, 83.66%, 65.97%, 68.35%, for the duration of the study on the desired situation, respectively.

South Sudan had no trade with Nile Basin countries.

The table also showed that the value of Rwanda's agricultural exports to Nile Basin countries in the Facts situation achieved a better increase than what was hoped for, as the rate of increase in the general average reached about 53.43 % from the hoped situation, the study also achieved a better status than hoped for, with an estimated increase of 42.80%, 73.41%, 62.46%, and 34.13%, respectively, for study periods than hoped.

As for the countries of Kenya and Egypt, they have actually achieved a better situation than what is hoped, as the rate of increase for the average year reached about 78.5%, 48.77%, respectively, the first period proved to have achieved the maximum actual situation for Kenya, while Egypt in the third period, with an increase of 94.37%, and 57.13%, respectively, from the hoped-for situation.

From the previous presentation, the current situation is better than the hoped-for value of intra- Nile Basin

Table No. (23): The estimated volume of agricultural exports and imports expected in millions of dollars, using the Pooled Least Square method for the year and the Nile Basin countries during the four periods and the general average for the study period (1999-2018).

year	Order of periods	Country	Agricultural exports						Agricultural imports					
			Actual	Potentiality			Diff	%	Actual	Potentiality			Diff	%
				First	Second	Average of two attempts				First	Second	Average of two attempts		
1999-2003	1	Ethiopia	3.32	6.09	6.09	6.09	-2.77	-83.41	5.00	7.43	7.43	7.43	-2.43	-48.52
2004-2008	2		40.95	13.37	13.37	13.37	27.58	67.35	17.14	6.84	6.84	6.84	10.30	60.11
2009-2013	3		171.38	48.49	48.49	48.49	122.89	71.71	19.76	15.35	15.35	15.35	4.41	22.31
2014-2018	4		92.50	127.61	127.61	127.61	-35.11	-37.96	35.36	43.07	43.07	43.07	-7.71	-21.80
1999-2018	Ge.aver.		77.04	48.89	48.89	48.89	28.15	36.54	19.32	18.17	18.17	18.17	1.14	5.92
1999-2003	1	Eritrea	10.29	5.06	5.06	5.06	5.23	50.82	8.77	13.95	13.95	13.95	-5.18	-59.05
2004-2008	2		0.00	4.66	4.66	4.66	-4.66	0.00	0.00	32.70	32.70	32.70	-32.70	0.00
2009-2013	3		0.00	8.81	8.81	8.81	-8.81	0.00	0.00	330.83	330.83	330.83	-330.83	0.00
2014-2018	4		0.00	25.30	25.30	25.30	-25.30	0.00	0.00	1359.64	1359.64	1359.64	-1359.64	0.00
1999-2018	Ge.aver.		2.57	10.96	10.96	10.96	-8.39	-326.13	2.19	434.28	434.28	434.28	-432.09	-19700.00
1999-2003	1	Sudan	6.31	8.45	8.45	8.45	-2.14	-33.93	52.35	18.96	18.96	18.96	33.38	63.78
2004-2008	2		11.26	39.11	39.11	39.11	-27.85	-247.26	75.66	97.25	97.25	97.25	-21.59	-28.54
2009-2013	3		21.33	158.05	158.05	158.05	-136.72	-640.98	146.64	567.38	567.38	567.38	-420.74	-286.92
2014-2018	4		96.27	201.32	201.33	201.32	-105.05	-109.12	84.59	943.33	943.33	943.33	-858.74	-1015.13
1999-2018	Ge.aver.		33.79	101.73	101.74	101.73	-67.94	-201.05	89.81	406.73	406.73	406.73	-316.92	-352.89
1999-2003	1	Congo	0.00	5.37	5.37	5.37	-5.37	0.00	0.00	8.05	8.05	8.05	-8.05	0.00
2004-2008	2		0.00	8.16	8.16	8.16	-8.16	0.00	19.06	13.92	13.92	13.92	5.13	26.94
2009-2013	3		0.00	19.29	19.29	19.29	-19.29	-438409.1	3.62	61.16	61.16	61.16	-57.53	-1588.16
2014-2018	4		2.95	18.62	18.62	18.62	-15.68	-532.18	203.04	95.07	95.07	95.07	107.98	53.18
1999-2018	Ge.aver.		0.74	12.86	12.86	12.86	-12.12	-1643.80	56.43	44.55	44.55	44.55	11.88	21.05
1999-2003	1	Uganda	69.33	9.90	9.90	9.90	59.43	85.72	17.54	7.39	7.39	7.39	10.15	57.87
2004-2008	2		183.27	44.27	44.27	44.27	139.00	75.84	39.51	6.59	6.59	6.59	32.91	83.31
2009-2013	3		440.78	157.21	157.21	157.21	283.58	64.33	58.76	10.13	10.13	10.13	48.63	82.75
2014-2018	4		821.01	194.64	194.65	194.65	626.36	76.29	124.65	23.75	23.75	23.75	100.89	80.94
1999-2018	Ge.aver.		378.60	101.51	101.51	101.51	277.09	73.19	60.11	11.97	11.97	11.97	48.15	80.09
1999-2003	1	Burundi	4.22	6.55	6.55	6.55	-2.32	-55.01	9.91	7.60	7.60	7.60	2.31	23.33
2004-2008	2		6.78	11.95	11.95	11.95	-5.17	-76.22	12.00	7.92	7.92	7.92	4.08	34.00
2009-2013	3		11.69	35.18	35.18	35.18	-23.49	-200.92	36.49	19.82	19.82	19.82	16.66	45.66
2014-2018	4		21.23	60.92	60.93	60.93	-39.69	-186.92	34.60	44.98	44.98	44.98	-10.38	-30.02
1999-2018	Ge.aver.		10.98	28.65	28.65	28.65	-17.67	-160.88	23.25	20.08	20.08	20.08	3.17	13.62
1999-2003	1.00	Tanzania	38.78	8.53	8.53	8.53	30.25	78.01	10.36	7.26	7.26	7.26	3.10	29.92
2004-2008	2.00		115.37	18.85	18.85	18.85	96.52	83.66	16.81	5.53	5.53	5.53	11.29	67.13
2009-2013	3.00		163.92	55.78	55.78	55.78	108.14	65.97	63.43	5.61	5.61	5.61	57.82	91.16
2014-2018	4.00		343.24	108.63	108.64	108.63	234.60	68.35	68.62	14.21	14.21	14.21	54.41	79.29
1999-2018	Ge.aver.		165.33	47.95	47.95	47.95	117.38	71.00	39.80	8.15	8.15	8.15	31.65	79.52
1999-2003	1	South Sudan	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
2004-2008	2		0.00	19.77	19.77	19.77	-19.77	0.00	0.00	295.92	295.92	295.92	-295.92	0.00
2009-2013	3		0.00	108.13	108.13	108.13	-108.13	0.00	0.00	2291.64	2291.64	2291.64	-2291.64	0.00
2014-2018	4		0.00	123.64	123.64	123.64	-123.64	0.00	0.00	2075.02	2075.02	2075.02	-2075.02	0.00
1999-2018	Ge.aver.		0.00	62.88	62.88	62.88	-62.88	0.00	0.00	1165.65	1165.65	1165.65	-1165.65	0.00
1999-2003	1	Rwanda	12.12	6.93	6.93	6.93	5.19	42.80	9.20	8.14	8.14	8.14	1.06	11.49
2004-2008	2		55.71	14.81	14.81	14.81	40.90	73.41	48.41	12.46	12.46	12.46	35.95	74.27
2009-2013	3		121.10	45.46	45.46	45.46	75.64	62.46	137.93	48.97	48.97	48.97	88.96	64.50
2014-2018	4		107.64	70.91	70.91	70.91	36.74	34.13	117.82	109.99	109.99	109.99	7.83	6.65
1999-2018	Ge.aver.		74.15	34.53	34.53	34.53	39.62	53.43	78.34	44.89	44.89	44.89	33.45	42.70
1999-2003	1	Kenya	147.66	8.31	8.31	8.31	139.35	94.37	21.63	8.34	8.34	8.34	13.29	61.44
2004-2008	2		297.98	22.41	22.41	22.41	275.57	92.48	72.49	13.31	13.31	13.31	59.18	81.64
2009-2013	3		276.98	67.78	67.78	67.78	209.21	75.53	86.11	47.91	47.91	47.91	38.19	44.36
2014-2018	4		302.09	121.82	121.82	121.82	180.28	59.68	530.22	147.64	147.64	147.64	382.58	72.15
1999-2018	Ge.aver.		256.18	55.08	55.08	55.08	201.10	78.50	177.61	54.30	54.30	54.30	123.31	69.43
1999-2003	1	Egypt	17.37	8.97	8.97	8.97	8.41	48.38	118.04	7.35	7.35	7.35	110.69	93.78
2004-2008	2		65.17	32.19	32.19	32.19	32.98	50.61	65.23	7.09	7.09	7.09	58.14	89.13
2009-2013	3		286.07	122.64	122.64	122.64	163.43	57.13	267.61	17.63	17.63	17.63	249.98	93.41
2014-2018	4		259.45	157.95	157.95	157.95	101.50	39.12	319.86	39.39	39.39	39.39	280.46	87.68
1999-2018	Ge.aver.		157.02	80.44	80.44	80.44	76.58	48.77	192.68	17.86	17.86	17.86	174.82	90.73

Source of date: Calculated from the data of Tables (19) and (21)
* Where Ge. Aver. means the general Average

agricultural exports trade, except for Eritrea, Sudan, Congo and Burundi, which means the strength of trade relations of Nile Basin countries except these countries.

Table (24) shows the intra-Nile Basin agricultural export trade by country, the total value of agricultural exports among Nile Basin countries has actually achieved a better position than the hoped-for status of Ethiopia, Uganda, Tanzania, Rwanda, Kenya and Egypt, an increase of 36.54%, 73.17%, 71%,53.43%, 78.5%, and 48.77%, respectively, the situation in Eritrea, Sudan, Congo and Rwanda

Table No. (24): The estimated volume of agricultural exports and imports expected in one million dollars using the method the Pooled Least Square to the Nile Basin countries during the intermediate period (1999-2018).

Country	Agricultural exports						Agricultural imports					
	Actual	Potentiality			Diff	%	Actual	Potentiality			Diff	%
		First	Second	Average of two attempts				First	Second	Average of two attempts		
Ethiopia	77.04	48.89	48.89	48.89	28.15	36.54	19.32	18.17	18.17	18.17	1.14	5.92
Eritrea	2.57	10.96	10.96	10.96	-8.39	-326.14	2.19	434.28	434.28	434.28	-	-
Sudan	33.79	101.73	101.74	101.74	-67.94	-201.05	89.81	406.73	406.73	406.73	-	-352.89
Congo	0.74	12.86	12.86	12.86	-12.12	-1643.79	56.43	44.55	44.55	44.55	11.88	21.05
Uganda	378.60	101.51	101.51	101.51	277.09	73.19	60.11	11.97	11.97	11.97	48.15	80.09
Rwanda	10.98	28.65	28.65	28.65	-17.67	-160.88	23.25	20.08	20.08	20.08	3.17	13.62
Tanzania	165.33	47.95	47.95	47.95	117.38	71.00	39.80	8.15	8.15	8.15	31.65	79.52
South Sudan	0.00	62.88	62.88	62.88	-62.88	-	0.00	1165.65	1165.65	1165.65	-1165.65	-
Rwanda	74.15	34.53	34.53	34.53	39.62	53.43	78.34	44.89	44.89	44.89	33.45	42.70
Kenya	256.18	55.08	55.08	55.08	201.10	78.50	177.61	54.30	54.30	54.30	123.31	69.43
Egypt	157.02	80.44	80.44	80.44	76.58	48.77	192.68	17.86	17.86	17.86	174.82	90.73

Source of date: Calculated from the data of Tables (19) and (21)

Table No. (25): The estimated volume of agricultural exports and imports expected in one million dollars using the method the Pooled Least Square by year during the intermediate period (1999-2018).

year	Agricultural exports						Agricultural imports					
	Actual	Potentiality			Diff	%	Actual	Potentiality			Diff	%
		First	Second	Average of two attempts				First	Second	Average of two attempts		
1999	323.01	66.02	66.02	66.02	256.99	79.5	190.00	82.76	82.76	82.76	107.23	56.44
2000	272.60	71.22	71.22	71.22	201.38	73.8	242.73	95.48	95.48	95.48	147.25	60.67
2001	332.71	81.34	81.34	81.34	251.37	75.5	278.84	103.58	103.58	103.58	175.25	62.85
2002	217.07	66.38	66.38	66.38	150.68	69.4	294.12	90.79	90.79	90.79	203.32	69.13
2003	401.65	85.84	85.84	85.84	315.81	78.6	258.30	99.76	99.76	99.76	158.54	61.38
2004	528.38	105.89	105.89	105.89	422.49	79.9	237.30	118.78	118.78	118.78	118.52	49.95
2005	580.70	116.47	116.47	116.47	464.23	79.9	263.82	114.31	114.31	114.31	149.51	56.67
2006	647.14	131.73	131.73	131.73	515.42	79.6	280.76	144.08	144.08	144.08	136.68	48.68
2007	877.88	177.30	177.31	177.30	700.58	79.8	437.18	226.61	226.61	226.61	210.56	48.17
2008	1248.3	616.31	616.32	616.32	632.05	50.6	612.48	1893.8	1893.8	1893.8	-	-
2009	1177.7	527.51	527.52	527.51	650.22	55.2	590.81	1845.8	1845.8	1845.8	-	-
2010	1704.8	741.59	741.60	741.59	963.20	56.5	966.78	2853.9	2853.9	2853.9	-	-
2011	1247.6	995.79	995.80	995.79	251.86	20.1	801.15	3936.4	3936.4	3936.4	-	-
2012	1471.1	804.48	804.49	804.49	666.69	45.3	869.85	3676.1	3676.1	3676.1	-	-
2013	1864.9	1064.7	1064.7	1064.7	800.23	42.9	873.14	4769.8	4769.8	4769.8	-	-
2014	2045.8	1377.2	1377.2	1377.2	668.57	32.6	1745.0	7091.8	7091.8	7091.8	-	-
2015	1897.9	1286.2	1286.2	1286.2	611.71	32.2	1723.8	6855.2	6855.2	6855.2	-	-
2016	1718.6	1103.9	1103.9	1103.9	614.75	35.7	1388.7	3811.8	3811.8	3811.8	-	-
2017	2615.4	1346.1	1346.1	1346.1	1269.3	48.5	1606.4	4060.5	4060.5	4060.5	-	-
2018	1953.9	943.33	943.34	943.33	1010.6	51.7	1129.6	2661.0	2661.0	2661.0	-	-
Averag	**1156.3**	**585.47**	**585.48**	**585.48**	**570.91**	**54.7**	**739.55**	**2226.6**	**2226.6**	**2226.6**	**-**	**-**

Source of date: Calculated from the data of Tables (19) and (21)

***Geometric Mean (GM)**

was less than hoped, indicating the weak trade relations of these countries within the Nile basin.

According to table (25), intra-Nile agricultural export trade is also shown by year; the total value of agricultural exports has achieved a better bet than was hoped for along the time series, the current situation is decreasing by 79.56% in 1999 to about 51.72% in 2018 and by an engineering average of 54.71% during the study period from the desired situation, which means that trade relations between Nile Basin countries are strong at the start of the study period and are lower at the end of the study.

2- Facts situation and the Hopes for agricultural imports of Nile Basin countries:

Table (23) shows the trade in agricultural imports of Nile Basin countries by country and year, the current situation was lower than what was hoped for, as the general average showed, with an increase of 5.92% over the current situation, while the first and third periods actually achieved a better situation than what was hoped for, with a drop rate of about 48.52%, 21.80%, respectively.

It is also clear from the same table that Eritrea's agricultural imports with Nile Basin countries were not imported except for the first period and achieved a better realistic situation than what was hoped for, at a rate of 59.05% lower than what was hoped for.

The trade in Sudan's agricultural imports from Nile Basin countries in the current situation was also shown to be better than the hoped-for situation, with the overall average falling by 352.89% from the hoped-for situation and the rate of imports in the second, third and fourth periods reaching 28.54%, 286.92%, 1015.13%, respectively, on the status quo.

The agricultural imports trade of the Congo to the basin countries showed that the current situation is better than what was hoped for in the third period only, as it achieved a decrease in the value of its imports by $57.53 million, at a rate of about 1588.16
% from the hoped-for average situation for the period indicated.

The table also indicates that Uganda's agricultural imports actually increased from the hoped-for situation at all study periods, with the increase rate of about 80.09% for the general average of the period.

It was also clear that Burundi's agricultural imports from the basin countries in the current situation are better than what was hoped for during the fourth period only, as it achieved a decrease in the value of its imports by $10.38million, about 30.02% as an average for the period indicated. Other periods of study show that imports of the current situation are increasing from what is hoped, as scheduled.

It is also clear that the value of Tanzania's agricultural imports from Nile Basin countries in the current situation is greater than what was hoped for during the study period, as it showed that its imports increased, which is clear from the general average of about 79.52% from the hoped-for situation.

As for South Sudan agricultural imports, it is clear from the table that there was no trade between them and Nile Basin countries during the study period.

It was also found that the value of the current Nile Basin countries' agricultural imports from Rwanda, Kenya and Egypt was greater than what was hoped for at all study periods. This indicates that these countries did not achieve an available import from Nile Basin countries during the study period.

Table (24) shows the value of intra-Nile Basin agricultural import trade by country, where the total value of agricultural imports among Nile Basin countries is shown to have achieved a better realistic situation than is hoped for in Eritrea and Sudan. The drop in the value of imports was about $432.09,
$316.92 million each, respectively, while the rest of the countries did not achieve any available imports during the study period.

It also shows from table (25) the intra-Nile Basin agricultural import trade by year, the total value of agricultural imports in the current situation has achieved a better position than hoped for, from 2008 to 2018, the end of the period of study, agricultural imports fell from $1254.99 to $536.77 million, and agricultural imports fell from 116.56% percent as a geometric mean for the study period.

Conclusion:

From the study we could conclude the following results:

- The study indicates the concentration of Egyptian exports and imports to Sudan, Kenya and Ethiopia during the Periods of the study.
- The increase in the percentage of the contribution of Egyptian agricultural exports and imports to the total exports and imports of the Nile Basin countries during the average of the first period of about 18.86%, 29.27% to about 25.88%, 49.34% during the fourth period, respectively, and the trade balance was in favor of Egypt for the second, third and fourth period.
- Among the most important factors in the flow of total Egyptian exports trade to the Nile Basin countries are the (GDPI) of Egypt, the (GDPJ) of the Nile Basin countries for the basic model and the modified model for the second and third attempts, And per capita GDP of Egypt's (NHI), the Nile Basin countries (NHJ) for the modified model for the first attempt, the population in Egypt (NI), and the exchange rate (RIJ) between Egypt and the Nile Basin countries for the modified model for the second attempt.

• Among the most important factors that have a positive impact on the Egyptian total imports from the Nile Basin countries, the (GDPJ) of the Nile Basin countries, for the basic model and the modified model for the second and third attempts, The per capita GDP of the (NHJ) for the modified model for the first and third attempts, the average per capita GDP of the Egyptian (NHI) for the modified model for the third attempt, the exchange rate (RIJ) between Egypt and each country from the Nile Basin for the modified model for the second and third attempts, the population of Egypt (NI) and the population of each country From the Nile Basin countries for the modified model for the second attempt.

• Among the most important factors that affect the intra-trade between Egypt and the Nile Basin countries for agricultural export trade are (GDPI) of Egypt, (GDPJ) of the Nile Basin countries for the basic model and the modified model for the second and third attempts and the per capita GDP of Egypt's (NHI), (NHJ) in those countries for the modified model for the first attempt, and the exchange rate (RIJ) between Egypt and each country from the Nile Basin for the modified model for the second and third attempts.

• As for agricultural imports, the most important factors that lead to the flow of trade between Egypt and the Nile Basin countries are the (GDPJ) in the basin countries for the basic and adjusted model for the second and third attempts, and the average per capita GDP of these countries for the modified model for the first and third attempts and the population (NJ) for each of the Nile Basin countries for the modified model for the second attempt.

• Among the most important countries affecting the increasing the Egyptian total exports are Sudan and Eritrea in all attempts models, and Ethiopia and Kenya in addition to them in the basic model and the first attempt, and the one affecting the increasing Egyptian agricultural imports is Kenya in the basic model and the first attempt.

Among the most important factors that lead to an increase in the intra-regional trade of agricultural exports and imports between the Nile Basin countries are the GDP of the exporting country, the (GDPJ) of the importing country in the Nile Basin countries for the modified model for the second and third attempts, The exchange rate of the importing and exporting country (RIJ) for the modified model for the second and third attempts, the population of the importing country (NJ) for the modified model for the second attempt, In addition, the inter-trade of agricultural exports is related to the per capita GDP of the importing country (NHJ) for the third attempt, and with respect to inter-trade of agricultural imports each of the variables between the difference between the outputs of the exporting and importing country (GDP_DIFIJ), and the population of the exporting country (NI)

• It is obvious that the current situation is better than the expected situation for the value of trade in agricultural exports between the countries of the Nile Basin except Eritrea, Sudan, Congo and Burundi.

• The current situation is lower than what is hoped for except for the countries of Eritrea and Sudan, and has achieved an excess in imports during the study period.

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