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The Impact of Agricultural Exports to China on Economic Growth of Peru: A Short- and Long-Run Analysis

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Abstract

This study aimed to analyze and quantify the short- and long-run impact of agricultural exports to China on economic growth in Peru using an annual time series data from 2001 to 2016 obtained from the Central Bank of Peru, the World Bank, and the Trade Map. Agricultural exports value, labour force, and fixed capital formation value for each year of the stipulated period were used as the determinant factors of the economic growth. Vector Autoregression (VAR) Model, Augmented Dickey-Fuller test, Johansen Co-integration test, and Granger Causality test were employed for data analysis. The findings revealed that, in the short-run, the agricultural sector and agricultural exports value to China have a positive, but non-significant effect on economic growth of Peru. At the same time, both fixed capital formation and labour force have a positive and significant impact on the GDP. ADF test showed that all determinants achieved stationary at a level I (0). Moreover, the Co-integration test result revealed a long-run relationship between the studied variables, and a unidirectional causality in the relationship between all variables and the economic growth except the relationship between the economic growth and fixed capital formation, which revealed a bidirectional link. This study recommends policy options including substantial investment in the commercialization of agricultural products with added value and human capital development to improve the agriculture sector's performance in the Peruvian economy as a driver of sustainable economic growth.

Keywords: Agricultural exports, Peru, China, Economic growth, Fixed capital formation, Labour force

1. Introduction

Economic growth is the central objective of developing nations that include the theme of trade and development with the role of exportation increasingly recognized (Sanjuán-López & Dawson, 2010; Shah & Farooq, 2015). Empirical evidence suggests that development goes hand-in-hand with market expansion, so the economic growth is positively influenced by diversifying exports (Agosin, 2009). Also, diversification reduces the volatility of export revenues boosting the Gross Domestic Product (GDP) and employment, accelerating the development processes (Mordecki & Piaggio, 2008).

The role of the agriculture should be analyzed to know its importance on the economic growth. We can start citing Adam Smith (1976), who recognized not only the importance of the open markets for prosperity with the importance of the commercialization between nations but also demonstrated a positive relationship between the improvement of agricultural productivity and the wealth of nations (Johnson, 1999). The improved agricultural productivity is possible through a combination of land, labour, and capital, which are essential for the expansion of arable areas (Hayami & Ruttan, 1971). Contrarily, Malthus (1836) argued that some factors such as the excess savings, scarce consumption and population dynamics negatively affect the economic growth, pointing towards the importance of investment for economic growth through increased market demand and an accompanying increase in supply from the production side. These realizations about the agricultural sector's relationship with the economic growth are also reflected in Johnston and Mellor's 1961 paper (Johnston & Mellor, 1961) where the authors argue that expanding agricultural exports is one of the most important means of increasing income.

However, research on the relationship between primary exports such as agricultural exports and economic growth was not given serious attention until the beginning of the 21st century. Some modern economists (e.g., Verter & Becvarova (2014); Verter (2015)) posit that increasing agricultural exports play a pivotal role in economic growth, particularly in developing nations. However, recent research in this direction has also produced some contrasting results. For instance, studies including that of Dawson (2005); Aurangzeb (2006); Sanjuán‐López & Dawson, (2010); Gilbert et al. (2013); and Hyunsoo (2015) support the export-led growth phenomenon for some agricultural commodities in developing nations. On the contrary, studies that of Marshall et al. (1991) and Faridi (2012) found no evidence of the export-led growth in the developing nations. Mucavele (2013) argue that, in general, agriculture's performance and its contribution to a nation's economic development has traditionally been undervalued because its linkages (forward and backward) with other sectors of the economy, including the value added by these linkages, do not appear in the basic statistics of many developing nations. Another major issue is that of "adding up" caused by low price elasticity of demand for agriculture commodities, which can result in lower export revenue as volume exported increases and the average price of the commodities decreases (Hallam et al., 2004).

Formal trade between many Latin American economies and China essentially started at the beginning of the 21st century. The recent years have seen increased dynamics in trade

between the two rapidly growing regions. Exports have increased by four digits since 2000, and the total dollar value of products traded between Latin America and China exceeded 250 billion in 2017 (Trade Map, 2018). The rapidly growing trade also points out to the increasing importance and influence of China in the Latin American region. Peru, in particular, has benefited substantially from the positive trade balance with China over the years. The value of Peruvian export to China increased by 2500% - from approximately 500 million in 2001 to a staggering 13 billion in 2017. The Chinese export growth to Peru was equally impressive; the export value increased from 177 million in 2001 to approximately 7 billion in 2017 - a growth of over 3800% in a mere 17 years (Trade Map, 2018). This is nothing short of astonishing considering that both nations started with the trade openness and economic liberalization during the 1980s. The continued economic growth of China and its rapidly growing middle-class population is sure to drive further the export growth of Peru for some time in the future, mainly due to an increase in the export value of non-traditional agricultural products such as fruits (Kubo & Sakata, 2018; Murakami & Hernández, 2018).

Although several studies have outlined the theoretical relationship between agriculture and economic growth, their causal dynamics is an empirical question worthy of further investigation. Looking at the above trends, one tends to wonder about the contribution of agricultural exports to China on the Peruvian economy, and if that can be linked with the sustainable economic growth. However, there has been no study that analyzes the empirical relationship between agricultural exports to China, Fixed Capital Formation, Labour Force and economic growth of Peru. This study strives to make plausible inferences about the impact of agricultural exports to China on Peruvian economy based on the econometric analysis and includes recommendations for the improvement of the independent variables' effect on the economic growth.

2. Methodology

2.1 Research Design

This research was fundamentally analytical and descriptive as it embraced the use of secondary data to determine the effect of the agricultural exports to China on the economic growth of Peru, in a short- and long-run. For the analytical test, we used econometrical tests related to modeling the annual time series data; and for the descriptive analysis, we used regression of the Solow model and its interpretation.

2.2 Kinds and Sources of Data

For the current research, we needed annual time series data that covered the period between 2001-2016 including, data on Gross Domestic Product (GDP), agricultural exports to China, labour force and on the fixed capital formation value. The data for this research was obtained from secondary resources, mainly from the Peruvian Central Bank of Reserve (PCBR), PCBR Annual Reports, from the National Bureau of Statistics, from the Ministry of Labour in Peru, from Trade Map and the World Bank Indicators.

2.3 Model Specification

To examine the contribution of the agricultural exports to China on economic growth from a supply-side perspective, it is necessary to consider the neo-classical growth model developed by Solow (1956), which includes the capital and the labour force as main variables for the production function. As the following equation specifies it:

$$Y_t = f(L_t, K_t) \quad (1)$$

To fulfil the primary objective that is to describe how the agricultural export to China affects the economic growth, it is necessary to incorporate agricultural exports of both types: traditional and non-traditional exports in the previous equation.

$$Y_t = f(AXCH_t, K_t, L_t) \quad (2)$$

To discard the differences in the measurement units, we applied the natural logarithm on both sides of the equation 2, for the minimization of the gap between the dependent and independent variables.

$$LGDP_t = \beta_0 + \beta_1 LAXCH_t + \beta_2 LFKF_t + \beta_3 LLF_t + e_t \quad (3)$$

Where:

LGDP = time series of specified variable

LAXCH = time trend

LFKF = first differencing operator $\Delta Y_{t-1} = Y_t - Y_{t-1}$

LLF = natural logarithm of the labour force

e_t = error term

β_0 = constant term

$\beta_1 - \beta_3$ = parameters of explanatory variables estimated in the model

2.4 Estimation Procedures

In this case, for the short-run analysis, we used the Vector Autoregression (VAR) Model, enforced for the Unit Root Test and the Causality Granger Test; and for the long-run analysis, there was used the Co-integration Test.

2.4.1 Unit Root Test

A variable is considered as stationary if it has a constant mean, variance, and auto-covariance at any measured point. A non-stationary time series may become stationary after differencing a number of times. In the case the series isn't stationary at the base level, it would be stationary after successive differencing. The order of integration of a series is the number of times it needs to be differenced to become stationary. A series integrated at order I (n) becomes stationary after differencing n times. In this study, the stationary test was carried out using the Augmented Dickey-Fuller (ADF) test, which was formulated by Dickey & Fuller

(1979, 1981). The decision rule states the series is stationary if the ADF test statistic is greater than the critical value, and that it isn't stationary if it is less than the critical value. The following regression represents the general ADF Test form:

$$\Delta Y_t = \alpha_0 + \alpha_1 * Yt_{-1} + \Sigma\alpha * \Delta Y_t + e_t; \text{ it includes only the drift} \quad (4)$$

$$\Delta Y_t = \alpha_0 + \alpha_1 * Yt_{-1} + \Sigma\alpha * \Delta Y_t + \delta_t + e_t; \text{ it includes the drift and linear time trend} \quad (5)$$

Where:

Y = time series of specified variable

t = time trend

Δ = first differencing operator $\Delta Y_{t-1} = Y_t - Y_{t-1}$

α_0 = constant term

N = optimum lags' number

e_t = random error term

2.4.2 Johansen Co-Integration Test

The test was developed in by Johansen and Juselius in 1990 (Johansen & Juselius, 1990) which is necessary to determine the existence of a long-run equilibrium (stationary) relationship between the dependent and the explanatory variables. The co-integration of two (or more) time series suggests that there is a long run or equilibrium relationship between them. It determines the number of co-integrated vectors in a model that is based on the method of two likelihood ratio test statistic; the Maximal Eigenvalue Test and the Trace Statistic Test. The null hypothesis is the no existence of co-integration between the variables, which will be rejected when the test statistic is higher than the critical value that means there's a co-integration in the long-run.

2.4.3 Pairwise Granger Causality Test

To examine the significant relationship between the studied variables (the total agricultural exports to China, the fixed capital formation, and the labour force) with the economic growth in Peru, we performed Granger Causality Test. The independent variable is considered as a Granger-cause variable of Y if the y_t (the variable Y in the current period) is conditional on the past values of the variable X (x_{t-1}, x_{t-2}, x_{t-1} … x0).

Focusing on the total agricultural exports to China, the fixed capital formation and the labour force as the engines of the economic growth, we are interested in the bidirectional causal relation between them to provide evidence of those independent variables as causes of the economic growth between 2001 and 2016. Therefore, we considered the following principal hypotheses to respond:

For the case of LGDP (Logarithm of Gross Domestic Product) and the LAXCH (Logarithm of agricultural exports to China):

i. LAXCH does not Granger Cause LGDP

ii. LGDP does not Granger Cause LAXCH

For the case of LGDP (Logarithm of Gross Domestic Product) and the LFKF (Logarithm of Fixed Capital Formation):

i. LFKF does not Granger Cause LGDP

ii. LGDP does not Granger Cause LFKF

For the case of LGDP (Logarithm of Gross Domestic Product) and the LLF (Logarithm of Labour Force):

i. LLF does not Granger Cause LGDP

ii. LGDP does not Granger Cause LLF

For the case of LAXCH (Logarithm of agricultural exports to China) and the LFKF (Logarithm of Fixed Capital Formation):

i. LAXCH does not Granger Cause LFKF

ii. LFKF does not Granger Cause LAXCH

For the case of LAXCH (Logarithm of agricultural exports to China) and the LLF (Logarithm of Labour Force):

i. LAXCH does not Granger Cause LLF

ii. LLF does not Granger Cause LAXCH

2.4.3 Vector Autoregression (VAR) Model

The Vector Autoregression is frequently used for analyzing the dynamic impact of random disturbances on the system of variables. The VAR Model approach treats each endogenous variable in the system as a function of lagged values of all endogenous variables in the system. This model is also a dynamic system of equations, which examines the impacts of interactions between economic variables and it's represented by the following model:

$$Y_t = \alpha + \Sigma\alpha_i * \Delta Y_{t-1} + e_t \quad (6)$$

When this equation is extended, it'll be:

$$Y_t = \alpha + \alpha_1 * Y_{t-1} + \alpha_2 * Y_{t-2} + \alpha_3 * Y_{t-3} + \ldots + \alpha_k * Y_{t-k} + e_t \quad (7)$$

Where:

Y_t = vector of endogenous variables at time t

$\alpha_{i\ (i=1, 2, \ldots, k)}$ = (n x n) coefficient matrices that describe the relationship between endogenous and exogenous variables

e_t = vector of residuals or random disturbances

The above equation will change with the inclusion of the lag operator (L), and the following equation will represent it:

$$Y_t = \alpha^*(L)^* Y_{t-1} + e_t \quad (8)$$

Where:

Y_t = vector of endogenous variables at time t

$\alpha_{i\ (i=1, 2, \ldots, k)}$ = (n x n) coefficient matrices that describe the relationship between endogenous and exogenous variables

$\alpha^*(L)$ = matrix of coefficients

e_t = vector of residuals or random disturbances

3. Results and Discussion

3.1 Empirical Results

Before the comprehensive econometric analysis, a brief interpretation of statistical analysis is necessary. The definitions and summary of the statistics of those variables were provided in Table 1, which reported that the average of the GDP growth was 127,000.00 million dollars with 57,600.00 million as the standard deviation. In the case of the agricultural exports to China, it had an average value of 688.00 million dollars and a deviation standard of 290.00 million. It also showed that the fixed capital formation had a mean value of 28,300.00 million dollars and a deviation standard of 15,800.00 million. Finally, the labour force had a mean value of 15.40 million and a deviation standard of 1.72 million.

Table 1. Summary Statistics of the Variable, from 2001 – 2016 (million dollars)

Variables	Mean	Median	Max	Min	Std. Dev.	Skewness	Kurtosis
GDP	127000.00	121000.00	201000.00	52000.00	57600.00	0.05	1.42
AXCH	688.00	751.00	1120.00	232.00	290.00	-0.19	1.68
FKF	28300.00	27500.00	50900.00	9160.00	15800.00	0.10	1.44
LF	15.40	15.80	17.50	12.30	1.72	-0.48	1.88

For the measure and the direction of skew (which gives the measure of departure from symmetry), we analyzed the Skewness. All variables (the GDP, AXCH, FKF, and the LF) presented an approximately symmetric distribution.

3.2 Unit Root Test Results

We used the Augmented Dickey-Fuller test, which was performed on all variables (gross domestic product, agricultural sector, agricultural exports to China, fixed capital formation and labour force). The results of the Augmented Dickey-Fuller test, which was used to show the result of the unit root test, are represented in Table 2.

Table 2. Unit Root Test for an Order of Integration of Variables (ADF)

Variables			Critical values (1%)	Critical values (5%)	Critical values (10%)	Result
LGDP	At level	-1.658	-2.650	-1.771	-1.350	It's stationary
	First difference	-1.833	-2.718	-1.796	-1.363	It's stationary
LAXCH	At level	-2.132	-2.650	-1.771	-1.350	It's stationary
	First difference	-1.808	-2.718	-1.796	-1.363	It's stationary
LFKF	At level	-1.283	-2.650	-1.771	-1.350	It isn't stationary
	First difference	-1.803	-2.718	-1.796	-1.363	It's stationary
LLF	At level	-7.247	-2.650	-1.771	-1.350	It's stationary
	First difference	-2.955	-2.718	-1.796	-1.363	It's stationary

The reported result in Table 2 confirmed the stationary test of the variables at the level form I (0) for the LGDP, LAXCH, and the LLF. In the case of LFKF, those variables showed stationary at the level form I (1). According to this, the null hypothesis of non-stationary could be rejected at 5% and 10% critical value level confirming that the ADF test statistics were higher than the critical value, which also could be understood as the P-value was significant at the level form I (0) because it is less than 0.05. Since the null hypothesis was rejected for all the variables at an acceptable significance level, the variables didn't have a unit root at levels. Therefore, we could conclude that the variables data were stationary at the level of order one I (1). Those stationary tests supported the econometric model of the equation (3).

3.3 Co-Integration Test

Table 3 presented the result of the Johansen Co-integration Test in the Trace Statistic and the Maximum Eigen Test statistics. Both tests revealed that there were three co-integrating equations.

This was because at the null hypothesis of co-integration rank (r=0) the max-eigenvalue of 40.82 was greater than the 5, and even at the 1% critical value of 32.24. The trace statistics also indicated three co-integrating equations since the trace value of 70.43 was higher than the 5, and even at 1% critical value of 54.46. The evidence of cointegration in the study indicated that the agricultural exports to China, the fixed capital formation, and the labour force are long-run determinants of economic growth in Peru. The result of the Johansen statistics, therefore, rejects the null hypothesis of no co-integration among the variables.

Table 3. Johansen Cointegration Trace and Maximum Eigenvalue Test

Hypothesized No. of CE(S)	Trace Test			Maximum Eigen Test		
	Max-Eigen Statistic	0.05 Critical Value	0.01 Critical Value	Trace Statistic	0.05 Critical Value	0.01 Critical Value
None	40.82	27.07	32.24	70.43	47.21	54.46
At most 1	18.81	20.97	25.52	29.62*,**	29.68	35.65
At most 2	7.87	14.07	18.63	10.81	15.41	20.04
At most 3	2.94	3.76	6.65	2.94	3.76	6.65

* and ** shows that have a value significant at 5% and 1%, respectively

The same long-run relationship between agricultural exports, gross fixed capital formation, and economic growth was found in the study made by Gbaiye et al. (2013) in Nigeria; and confirmed by Ijirshar (2015) in Nigeria; Ouma, Kimani, & Manyasa (2016) in Kenya, Uganda and Rwanda; Myovella & Alam (2016) in Tanzania; and Simasiku & Sheefeni, (2017) in Namibia.

3.4 Granger Causality Test Results

In this case, we analysed the causal relationship between the LAXCH (Logarithm of agricultural exports to China) and the LGDP (Logarithm Gross Domestic Product); the causal relationship between the LFKF (Logarithm of Fixed Capital Formation); the causal relationship between the LGDP (Logarithm Gross Domestic Product); the causal relationship between the LLF (Logarithm of Labour Force) and the LGDP (Logarithm Gross Domestic Product); between the LAXCH (Logarithm of agricultural exports to China) and the LFKF (Logarithm of Fixed Capital Formation); and the causal relationship between the LAXCH (Logarithm of agricultural exports to China) and the LLF (Logarithm of Labour Force) with the application of Granger Causality Test. Table 4 shows the value of the test considering the probability value of 5%.

In the case of the LAXCH (Logarithm of agricultural exports to China) and the LGDP (Logarithm of Gross Domestic Product), the test revealed a unidirectional causal relationship between the two, where the agricultural exports to China Granger caused the gross domestic product. Similar results were obtained by Odetola & Etumnu (2013) in Nigeria; Bulagi, Hlongwane, & Belete (2015) in South Africa; Myovella & Alam (2016) in Tanzania, and Ouma, Kimani, & Manyasa (2016) in Rwanda.

This analysis also showed that there was a bidirectional relationship between the Gross Domestic Product Granger and the Fixed Capital Formation, in which the GDP Granger caused the FKF, and this variable also had an influence on the Gross Domestic Product. A similar result was demonstrated in Malaysia by Albiman & Suleiman (2016) that the economic growth Granger caused the domestic investment.

Table 4. Pairwise Granger Causality Test

Equation	Excluded	F-statistic	Prob.
LGDP	LAXCH	0.568	0.451
LGDP	LFKF	0.059	0.808
LGDP	LLF	8.975	0.003
LAXCH	LGDP	5.425	0.020
LAXCH	LFKF	4.245	0.039
LAXCH	LLF	12.343	0.000
LFKF	LGDP	0.822	0.365
LFKF	LAXCH	0.047	0.828
LFKF	LLF	7.286	0.007
LLF	LGDP	0.708	0.400
LLF	LAXCH	1.672	0.196
LLF	LFKF	0.192	0.661

About the causal relationship between the LLF (Logarithm of Labour Force) and the LGDP (Logarithm Gross Domestic Product), we found a unidirectional causal relationship between those variables. The labour force didn't Granger cause the gross domestic product, but it influenced the labour force.

Between LAXCH (Logarithm of agricultural exports to China) and the LFKF (Logarithm of Fixed Capital Formation), there was a unidirectional relationship between them, in which the Fixed Capital Formation didn't Granger cause the Agricultural exports to China, but this exportation Granger caused the Fixed Capital Formation. A study by Abrar ul haq (2015) in Pakistan explained that this relationship is due to the implication of the exportation increase in the income and in the GDP, which also leads into the rise of the investment and the capital stock for the improvement in the agricultural production.

Finally, for the case of the LAXCH (Logarithm of agricultural exports to China) and the LLF (Logarithm of Labour Force), the Agricultural exports to China influenced the Labour Force. As it was explained in the relationship between the Agricultural exports to China and the Fixed Capital Formation, an increase in the income due to an increase in exports leads to an increase in the investment, which includes the labour force that can be improved for the change of labour force into human capital force.

3.5 Vector Autoregression Model

Table 5 presented the result of the Vector Autoregression (VAR), which revealed the relationship between the dependent and independent variables in the short and long term.

The result of the regression equation (3) is shown in Table 5. The result indicates that this

function best fit the model with significant effects on the GDP, having 99.73% as the R^2. This result implied that independent variables explained 99.7% of the total variation in the GDP in the short-run. The Probability of F-statistic was 0.0000 that also indicated the significance of the model, which implied that the parameters were significant at 5% even at 1%. The Breusch-Godfrey Correlation LM Test was used to test the existence of autocorrelation, having no autocorrelation as the null hypothesis. In this particular case, the value was 0.16682 suggesting that the null hypothesis could not be rejected. So, the estimated model is free from autocorrelation.

For testing the existence of residuals normality, Jarque-Bera test was employed. The null hypothesis, in this case, was that the residuals are normally distributed. The test result was 0.3037, also suggesting that the null hypothesis could not be rejected and that the residuals are normally distributed.

Table 5. The Short-Run Dynamic of Factors That Affect the Economic Growth

Variable	Coefficient	Std. Error	t-Statistic	P-value
D(LAGDP)	0.151015	0.245	0.62	0.5
D(LAXCH)	0.005759	0.049	0.12	0.8
D(LFKF)	0.344999	0.110	3.12	0.0
D(LLF)	0.996633	0.354	2.82	0.0
D(LGDP-1)	0.171592	0.125	2.82	0.1
Constant	-7.184120	4.207	-1.71	0.1
R-squared	0.997300			
Prob (F-statistics)	0.000000			
Breusch-Godfrey LM Test	0.166820			
Jarque-Bera (Prob)	0.303670			

According to this result, there was a partial elasticity of the Agricultural sector (LAGDP), which had a value of 0.15 meaning an increase of 1% in the Agricultural Sector (through the rise in exports to the World) would result in a 0.15% increase in the Gross Domestic Product (LGDP). But, this result didn't have significance at 1%, 5% or at 10%. Similar findings were studies made by Ouma, Kimani, & Manyasa (2016) in Kenya; Mehrara & Baghbanpour (2016) in 34 developing nations; and Simasiku & Sheefeni (2017) in Namibia. These studies showed that the agricultural exports had a positive but low impact in the GDP. The low or insignificant impact of the variable in the GDP was explained by the production techniques, which are best suited for the individual or familial production instead of large-scale production; having as consequences low income from the production and commercialization in the raw state.

The coefficient of the Total Agricultural Exports to China (LAXCH) didn't have significance even at 10% in the short-run. An increase of 1% in the Non-Traditional Agricultural Exports (LANTX) resulted in an increase in the economic growth (LGDP) by 0.01%. These findings concur with similar studies by Sanjuán-López & Dawson (2010) and of Simasiku & Sheefeni (2017), who explained that such high statistical significance could be related to the value addition and the high prices relation in the world market.

About the control variable Fixed Capital Formation (LFKF) had a positive and significant impact on the economic growth of Peru at the significance level of 1%. The result implied that an increase of 1% of the fixed capital formation should produce a rise of 0.35% in the gross domestic product (LGDP). The findings concur with Gilbert et al. (2013) for Cameroon; Kanu & Ozurumba (2014) for Nigeria; Albiman & Suleiman (2016) for Malaysia; Bakari (2017) for Gabon; and Simasiku & Sheefeni (2017) for Namibia in the short run. In the case of the Labour Force (LLF), it also had a positive, and a significant impact on the economic growth of Peru. When there was an increase of 1% in the labour force, it produced an increase of 0.99% in the gross domestic product (LGDP). The same relation was revealed in Cameroon by Gilbert et al. (2013) and in Ethiopia for by Yifru (2015). These studies have also reported that an increase in the share of the labour force would have the same impact as the increase in capital formation's share for the economic growth. This situation would be explained by the quantity of the population that has as primary livelihood activity the agriculture production, and are gradually converted into the well-trained human capital capable of driving further the economic growth.

Finally, lagged GDP had a positive impact on the economic growth in Peru, and it was significant at 10%. When the lagged GDP increased by 1%, an increase of 0.17% in the economic growth (LGDP) would be observed. This result is according to the multiplier-accelerator interaction, which suggests that the previous period GDP increases the investment level of the nation leading to increased GDP in the current period.

4. Conclusion and Policy Implication

The primary objective of the study was to make an empirical analysis about the impact of agricultural exports to China on the economic growth of Peru in the short- and long-run using a time series data from 2001 to 2016. For economic analysis, ADF Test was used to determine the stationary of the data that showed all determinants achieved stationary at the level I (0) supporting the Vector Autoregression Model used for the short run analysis. The short-run analysis indicated a positive but non-significant relationship between the agricultural exports to China and the economic growth. The Co-integration Test result indicated the existence of a long-run relationship between the traditional agricultural exports and economic growth in Peru. Moreover, the Granger Causality test revealed a unidirectional causality relationship between agricultural exports to China and gross domestic, in which the agricultural exports to China Granger caused the economic growth. The insignificance of the positive relationship between both variables can be explained by the exportation of agricultural products as raw material rather than as value-added products, fetching a low price

in the world market. Nevertheless, it's necessary to recall that the exportation to China is an engine of economic growth in Peru.

The study included labour and capital as explanatory variables. The results showed that in Peru, the labour positively contributed to economic growth which was explained by the transformation of the human labour force in human capital through continued capacity development. Finally, the fixed capital formation also contributed positively to the gross domestic product, which was expected *a priori*.

In light of the findings, the policy implications are as follows:

- As the study showed that the impact of agricultural exports to China was essential but insignificant in the Peruvian economic growth, Peru should alter the structure, and the pattern of the foreign trade giving vital importance to the exports of agricultural products with value added;
- The government should incentivize the producers through the tax holidays and the tax concession to enhance the agricultural products with added value;
- To increase the competitiveness in the international market, local producers should improve the overall production methods to ensure that both the quality of produce is on par with the international competitors, which would generate higher revenues for them in the long term;
- The government should provide facilities to farmers to invest in modern machinery and technology, as part of the production quality improvement, and as part of the previous recommendation; and
- As the study demonstrated, the labour is passing from a labour force to human capital. Peru should continue to enhance the investment in the educational sector for the human capital development providing training and skill sets to farmers before the implementation of any agricultural project.

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