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The impact of public Expenditure on the Agricultural Sector Productivity in China.

Ph.D. Candidates: Zeraibi AYOUB & Michel MIVUMBI
School of Economics and Finance, Xi'an Jiao-Tong University Xian
Shaanxi, China, 71006

ABSTRACT: One of the important sectors in the economy of different countries including China is Agriculture. **"There was a growing awareness in growth economics that governments should closely pay attention to the agriculture sector" J.Edward (1996).** Government expenditure is on the principal instruments used by the government to support the agriculture sector and its output. This study has the objective which is to look at the impact of Chinese government expenditures on the Agriculture sector output. In this empirical study, time sires data (1988-2018) was used and in the econometric analysis the ARDL Model was employed to analyze relationship between variables for the long-run and for the short-run, where the Agriculture sector output was used as a dependent target and the Expenditure (GEX), Number of state farms (NSF), Cultivated Area of state farms (CA) as independent variables. The data was collected from China's National statistics office. The study analysis founds to have a positive relationship between the agriculture sector output and the independent variables. The government expenditure indicated a result above 0.05 in the short run and that, in the long run, indicated positive and direct relationships between the agriculture sector output and the independent variables except for the variable (NSF) which also indicated a value above 0.05. The study showed that the agriculture sector needs more government expenditure, especially in the short term, to diaper the value of the output of the agriculture sector in both short-term with long term.
KEYWORDS: *Agriculture, public expenditure, State farms, Auto-Regressive Distributed Lag Model.*

I. INTRODUCTION

Economic history shows the importance of the economic sector to which the agricultural revolution is one of the fundamental stages in its development process **(Oji-okaro, 2011)**. Developing countries, Agriculture is an important sector in economic growth and their development, **(Koester, 1988)**. And on the realization of the importance of agriculture in the economy, the government played a vital role in financing agricultural projects **(Santosh, 2015)**. The public expenditure's efficiency depends on revenue performance. In another concept, some of agriculture's revenues flow to public expenditure **(Mordecal, 2016)** of the dynamic sector which is the agriculture sector contribution **(Abbas, 2016)**. The agriculture sector is one of the determining factors on the development of human capital **(K.jothi, 2016)**. Public spending is related to the flow of public resources from government sources to different economic sectors **(Ajay, 2018)**. It is distributed into the capital investment flow where many producers are now querying whether modern agrarian systems are effective and on taxpayer issues **(Ojeyika, 2017)**. The capital of public expenditure has been limited as debt on non-financial assets were used on their acquisition while contemporary spending was constant **(Ideba, 2013)**, like debts for non-repayable activities in time **(David, 2011)**. The current study and empirical study statistics indicate that the total public expenditure (assets and recurrent) and the components indicate to increase in the upcoming three decades **(Jude, 2018)**. Public expenditure played an important role in the realization process of the economic and financial objective of the country, hence the value of public expenditure composition needs to be well-funded **(Bian, 2018)**. In support, where the development will include all economic sectors, analysis, and control of resource limitations is necessary to estimate the advantages of a special sector **(Budiyan, 2014)**. Agriculture and agro-economics is the new topic of research in China, and on a spectrum, the importance of the agriculture sector in achieving self-sufficiency. This is the same reason that led the Chinese state to increase convention spending to increase the output of the agricultural sector **(Okezie, 2013)**. Since China started collective agriculture in 1980, where its government used different models on its economic reform, China's government initiated the Household responsibility policy to manage and control the small plots and land for the egalitarian **(Zhun, 2017)**. China is also one of the largest countries in agriculture and also successful in that aspect **(Muhamad, 2018)**. However, this empirical study aims to analyze the nexus between government expenditure and the output of the

agriculture sector. The long and short-run relationship between the government expenditure, agriculture sectors and the output of agriculture sectors in China in the period of study **(1988-2018)** was investigated. In this study, the agriculture sector in China is assessed, how government expenditure can impact it, the status of the agricultural sector in China in the long run and short-run and also analyzing how the government expenditure can affect the agricultural sector output in long run. For this empirical study, the Auto-Regressive Distributed Lag Model (ARDL) was used to analyze the study's contribution and usefulness in an econometric study. The study will contribute to the development of the econometric study of agriculture, especially since this research area lacks research of applied econometric methods of agricultural output and productivity.

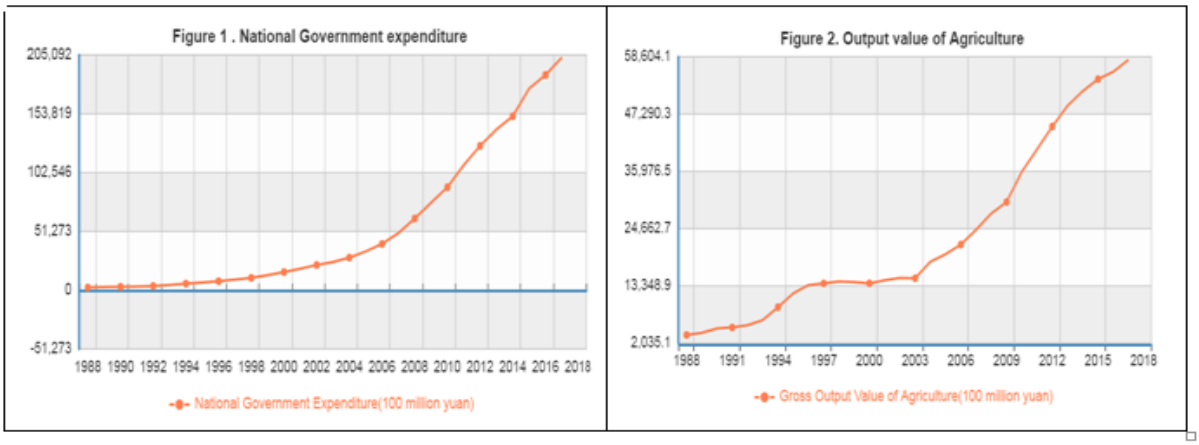
II. LITERATURE REVIEW

The number of literature relative to the study of the relationship between government expenditure and the agriculture sector plays a vital role as the backbone of the country's economy. Several empirical and analytic studies were investigated. One is the relationship between government expenditure and the government economic sector as well as the study by **(Santosh, 2015)**. In the case of Nepal, the study investigates the contribution of the agriculture sector to economic growth. The study found there was a correlation between government expenditure and agricultural development, and the expenditure on the agriculture sector had a positive correlation **(Abbas, 2016)**. The study investigated the impact of government expenditures on the agricultural sectors and economic growth. In the study, the Johansen co-integration and technique was used to analyze the data in the case of Pakistan. The empirical analysis also indicated to have signification between the government expenditure and the government sector output and also in the study by **(Joshi K., 2016)**. The empirical study analyzes the effect of public investment in the agricultural sector. The result indicates, in general, to have an argument impact on agricultural output and employment. The public investment in the agriculture sector has an impact on increasing development **(E.Eosuji, 2017)**. The study analyzed the relationship between government expenditure on economic growth and development. Its study results indicate development and reduction of poverty in China and Indonesia. The study result also indicates the agriculture sector contributes 30% on reducing poverty in China **(Osuji, 2017)**. Furthermore, the study was examined the relationship between government expenditures and Nigeria economic growth. The ordinary least square (old) technique was used in the study and found a positive signification between the government expenditure and the GDP in the case of Nigeria **(Waseem, 2017)**. The analysis found agricultural credit to agricultural GDP **(Abdul Bashir, 2018)**. The study analyzed the long-run relationship between the growing economy and the value added to agricultural sector output in the case of Indonesia. The investigation used the VECM and the model of the simultaneous equation. The result indicated to have both long and short-run causality between the value-added on the agriculture sector and economic growth. Also, the study mentions it has negative signs between the value-added on the agriculture sector and non-agricultural sectors' added value **(Muhammad, 2018)**. The study focuses on the role of the agriculture growth in the case of India, in which the result finds the management techniques and production technology to have directs effect on the agriculture growth rate **(Brian, 2018)**. The study analyzed the relationship between government expenditures and economic growth in Zimbabwe's case. Different technologies such as the ARDL, DOLS, and FMOLS were used. The study result indicates to have positive signification in the long run between the public expenditure and economic growth in Zimbabwe, as well as in the same context by **(Pankaj, 2018)**. The empirical study tested the relationship between government expenditure and agriculture growth in Nepal **(1972-2016)**. It used the ARDL (Auto-regressive Distributed Lag) method to test the relationship between the variable in the long-run and short-run. The study finds there isn't signification between the government expenditure and agriculture growth and in the long run. The result indicated to have signification between government expenditure and agriculture growth **(D.K. Mondal, 2018)**. The study focus on the impact of government expenditures on the agriculture sectors in India. Panel data cost was employed between different provinces. Results indicate to have a positive impact on government expenditure on the agricultural value output (**Ahmed, 2018)**. It investigated the relationship between government expenditure and the agricultural sector in the case of (Comesa) countries. There was an indication of a positive effect of government expenditure on the agriculture sector. **(Ebi Bassey, 2018)**. Indication of a positive signification between the agricultural expenditure and the agricultural output can be found in the study's conclusion. The result also indicates the agricultural workforce education to be vitally important in the agricultural output.

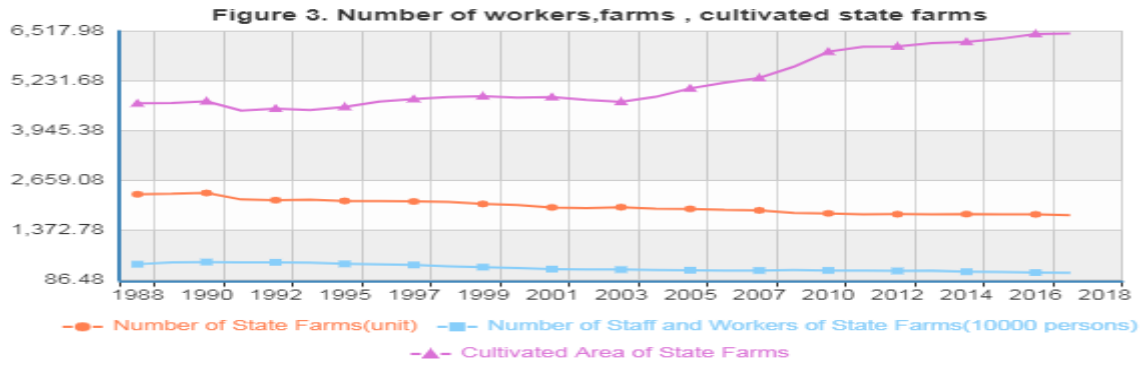
III. CHINA'S NATIONAL GOVERNMENT EXPENDITURE

From (Figure 1, Figure 2) between 1988–2018 years, the figures show China's annual national government expenditure and agricultural output growth. The period of 1988-1994, government spending is very slow and low. It can be noted that there is slow growth in the agriculture output curve. This is because the agriculture

policy has encouraged collective and family agriculture in the agricultural sector where the agriculture sector does not depend on government funding. The curve is seen to be stable from 1988-1994 since the national government expenditure was slow. During these years, China's economy included agriculture and the period indicates the time of the economic reform. The public project and public investment are slow between 1994 and 2004. Investments in Agriculture increase incomes of the agriculture areas to 50% in northern China. In the same period, we see the government expenditure also grows fast and this interprets the Government's determination to develop the agricultural areas and support the agriculture sector. China's government wants to improve support in the agriculture sector by inputting technology to improve the productivity of the sector.



Source: made by Author based on China national statistics office data http://www.stats.gov.cn/tjsj/



Source: made by Author based on China national statistics office data http://www.stats.gov.cn/tjsj/

From Figure 3 above, we notice that since 1988 there was a gradual decline in the number of workers on state farms, with a slow decline in the former state. This was according to the government policy which, since 2000, started new agriculture reforms in which the state transferred the ownership of farms and agricultural land to individuals and private owners. After collective farms and globally collective agriculture interpreted the decrease, they cultivated area which has more investor lease and invested in the government lands, and this was in the context of San non-agriculture reform policy.

IV. DATA AND METHODOLOGY

The study analyzes the long and short-run relationship between the government expenditure and agriculture sector output in China. This empirical study uses secondary data with annual data cover (1988-2018). The data was collected from China's national statistics office. The data was titled Expenditure (GEX), Number of state farms (NSF), China agriculture sector output (AOV).

Government Expenditure (GEX): in the case of China the public finance has an important role in the economic activity and government expenditure in one of the public finance the government uses to finance the public investment. The agriculture sector is one of the most important sectors in China's economy and the nature of the study requires the use of government expenditure as a fundamental variable in the study model spectrum due to ownership of the agriculture sector in China.

Number of State Farms (NSF): In the case of China, the State system and according to the latest economic and agrarian reform, all the land and farms are under the Government administration, which has the freedom to division to the people or the investors, and therefore we included in the study model as independent variables, where the farmer is considered a formidable place to create wealth and have direct effect on the size of the output of the agricultural sector in China.

Gross Output Value of Agriculture (AOV): In China, is controlled by several factors, but the government expenditure factor remains an influential factor and directly in the output of the agricultural sector, especially in the case of the state of China.

The cultivated area of state farms (CA): Cultivated agricultural land is considered a factor of production which has a direct impact on the size of the agricultural sector output, which in turn is affected by the amount of government spending allocated to it. The Chinese government is spending on land reclamation and making it viable for investment.

The study equation

In this investigation study, the agriculture output is the target variable and the Expenditure (GEX), Number of state farms(NSF), China's agriculture sector output (AOV), number of staff (NS) as independent variables and we can express the model as:

$$AOV_t = f(GEX, CA, NSF) \quad \text{.....(1)}$$

Where (AOV) = China's agriculture sector output, (GEX) = Government Expenditure, (NSF) = Number of state farms, (CA) = cultivated area of state farms.

$$AOV_t = \beta_0 + \beta_1 GEX_t + \beta_2 CA_t + \beta_3 NS_t + {}_t + \varepsilon_t \quad \text{.....(2)}$$

However, the (Ln) present the nature log, which in (AOV) interpret the nature log of Gross Output Value of Agriculture, and in (GEX) interpret the nature log of government expenditure. In (NSF) it interprets the nature log of Number of state farms, The B interprets the coefficients of the equation and the T interprets the time and 3 interpret the error terms.

V. METHODOLOGY

The study employs the Auto-Regressive Distributed Lag Model (ARDL) and the technique of unit root test with the co-integration test to out the study objective.

Auto-Regressive Distributed Lag Model (ARDL)

The study used the ARDL Model and the ADF technique. The ARDL was developed by **(Pesaran, 2001)** and we use the ARDL model to test both the short and long-run relationship between the target variable and independent variables. The ADF test technique is used to test the stationary character of variables. Some of the variables are stationary at I(0) and some of the time sires are stationary at I(1), and based on the econometric literature, the ARDL does not have any residual correlation issues. The ARDL model can be used to minimize the study sample's size, with care to different approaches. However, the ARDL model also borders the problems related to the auto-correlation or eliminated variables. **(Mrabet Z., 2017)**. The ARDL method combined by the co-integration is effective in determining the value between both the dependent and independent variables as long and short-run determinants of the accepted model **(Nkoro E., 2016)**. ARDL model can also minimize the utilization of sample size care as different approaches **(Ifa G., 2018).**

The Co-integration test:

In this study, all variables are integrated on the first difference which supports the existence of co-integration among the variables. For investigating long-run co-integration, the Johansen-Juselius technique was used. To identify the vectors and co-integration, the technique of trace statistic and the max eigenvalue was employed. The trace statistics hypotheses are:

$$\Phi_{trace} = -T\sum_{i=r+1}^{k} \ln(1-\Phi_1) \quad \text{.....(3)}$$

$$\Phi_{\max} = -T\ln(1-\Phi_{r+1}) \quad \text{.....(4)}$$

Error Correction Model

Based on **(Gujarati, 2003)**, each co-integration of the variables will just be indicated in the long-run in measure of the model but not in the short-run dynamics.

Unquestionably, the time series model is supposed; a superior time series model is assumed to run both the long and short run is concurrently stability. However, based on the introduction, we will run the error correction model (ECM).

The ECM model was developed by **(D. Sargan)** and currently improved by Eagle and Granger and was shown by **(Gujarati, 2003)**. The ECM model has explained the short-run dynamic connection between the variables and the error correction run. The long-run variables in the model indicate the error correction representation will be more important if co-integration exists. The short-run model and the econometric model will be written as follows:

$$\Delta \ln GEX = \alpha_2 + \sum_{i=1}^{n} \Phi_i \Delta \ln GEX + \sum_{i=1}^{n} \Phi_i \Delta \ln AOV + \sum_{i=1}^{n} \Phi_i \Delta \ln NSF + \gamma_2 \varepsilon_{t-1} + \upsilon_{2t} \quad (5)$$

$$\Delta \text{L n } AOV_{t-1} = \alpha_1 + \sum_{i=1}^{n} \Phi_i \Delta \ln AOV_{t-1} + \sum_{i=1}^{n} \Phi 1_i \Delta GEX_{t-1} + \sum_{i=1}^{n} \Phi_{1i} \Delta \ln NSF_{i=1} + \gamma_4 \varepsilon_{t-i} + \nu_{4t} \quad (6)$$

$$\Delta \ln NSF = \alpha + \sum_{i=1}^{n} \Phi_i \Delta \ln NSF + \sum_{i=1}^{n} \Phi_i \Delta \ln AOV + \sum_{i=1}^{n} \Phi_i \Delta \ln GEX_{t=1} + \sum_{i=1}^{n} \Phi_i \Delta \ln NSF_{t=1} + \Phi_3 \varepsilon_{t-1} + \upsilon_{3t} \quad (7)$$

$$\Delta \ln \text{CA} = \alpha + \sum_{i=1}^{n} \Phi_i \Delta \ln CA + \sum_{i=1}^{n} \Phi_i \Delta \ln AOV + \sum_{i=1}^{n} \Phi_i \Delta \ln GEX + \sum_{i=1}^{n} \Phi_i \Delta \ln NSF + \gamma_2 \varepsilon_{t-1} + \upsilon_{2t} \quad (8)$$

Where the ε_t indicates the long-run error adjustment

Unit root test (ADF)

In this study, we apply the ADF test to test if the data of the variables are stationary. The Augmented Dickey-Fuller test was developed by Dickey and Fuller (1979). A unit root test examines whether a variable time is non-stationary or carries a unit root.

The objective of the unit root test is to test whether the variables are stationary or have a unit root. The concept of unit root test is an alternative to the null hypothesis. In this study, the Augmentation Dickey-fuller technique was employed to test the characteristics of the time series of variables. The key to applying the ADF technique is to test if the variables are stationary and at first level, and in the case of variables which are not stationary in the first level, we can test the stationary of data on the first difference. The result of the present study's ADF test was drawn out in Table (1) and the equation is as follows:

$$\Delta LnAOV = \alpha_1 + \alpha_2 t + \partial \ln AOV + \sum_{i=1}^{p} \Phi \Delta \ln AOV + \varepsilon_t \quad (9)$$ Where

$$\Delta \ln \text{AOV}_{t-1} = (\text{Ln } AOV_{t-1} - \text{Ln } AOV_{t-2}) \quad (10)$$ Based on Table (1), the unit root test ADF result indicates that all the variables have non-stationary characteristics time series. When the P-value is above 5% the null hypothesis of the unit root is not rejected, but all the variables at the first difference and the total of the circumstances are in opposition. When the P-value is less than 5%, this interprets to the rejection of the null hypothesis; therefore all these study variables are combined within order one.

Table 1. Unit root test (ADF) result

	At level	First different	
Ln AOV	-3.038125 -2.986225	-4.483412 -2.998064	I(1)
Ln Gex	-3.352520 -2.981038	-5.822115 -2.971851	I(1)
Ln Ca	-3.910321 -2.967767	-8.632773 -3.580623	I(1)
Lnnsf	-5.990682 -3.574244	-8.538403 -3.580623	I(1)

Source: Calculation by Author based on e-views 10

Table 2. Auto-regressive Distributed Lag Long run Model

Ect= LNAOV-(1.5040*LNCA+1.3712*LNGEX+1.7927*LNNSF-0.13988)

	coefficient	t-statistic	Prob
Lnnsf	1.503985	3.865471	0.1931
Lnca	1.371215	4.994875	0.0048
Lngex	1.792687	1.421102	0.0011
C	-0.13988	-3.96772	0.0041

Source: Calculation by Author based on e-views 10

Table 3. Auto-regressive Distributed Lag Short-run Model

	coefficient	t-statistic	Prob
D(LinNSF)	6.490322	12.5519	0.0000
D(LinCA)	2.512581	7.65734	0.0001
D(LinGEX)	0.064689	0.44604	0.6674
Ect	-1.5650	-13.6628	0.0000
R^2	0.9429		
Durbin –watson	1.8808		

Source: Calculation by Author based on e-views 10

Table4. Auto-regressive Distributed Lag Model (ARDL) Bound test result

Test statistic	value	signif	I(0)	I(1)
F-statistic	24.88979	10%	2.37	3.2
k	3	5%	2.79	3.67
		2.5%	3.15	4.08
		1%	3.65	4.66

Source: Calculation by Author based on e-views 10

Table 5. Serial Correlation LM Test

F statistics	0.105002	P-Value	0.90
R-squared	0.8454	P.chi-square	0.6553

Source: Calculation by Author based on e-views 10

Based on Table 3 and Table 4 above, the long and short-run statistics equation, next to the test and the analysis of the results, indicate the result found some variables are important in the long and short run. The long and short-run test indicated a positive correlation between Government Expenditure and Gross Output Value of Agriculture in the long run. In the long run, the P-value indicates (P=0.0011) which is less than 5%, therefore statistically significant but in the short run, the P-value indicates (P=0.6674), which is larger than 5% and statistically insignificant. China's Spectrum is as such due to the long-term plans of the Chinese government, thus working to provide government spending on the emergency term. There is no short-term schemes spectrum due to the nature of the agricultural sector, which needs periods to miss the year for optimum production spectrum whether its products are agricultural or animals. The results of the current study were opposite to those of previous studies such as the study by **(Muhammad A., 2018)**. The study concluded that there is no impact of public spending on the output of the agricultural sector in the case of Indonesia. The study by ***(J. C. Mgbanya, 2018)*** indicated a correlating relationship both in the long and short run in the case of Nigeria, following the same context study by ***(Ebi, 2018)***. The empirical study test also indicated a positive correlating relationship between the government expenditure and the agriculture sector output when indicating the impact of government expenditures on the agriculture output with an average of 10% in the case of Nigeria. The study result by **(Santosh, 2015)** indicated a positive correlation between the government expenditures and economic growth including the agricultural output in Nepal's case. According to the present study, as a consequent of the result, government expenditure impacted the agricultural output just in the long run. This is because in China the

agricultural system is managed by the government with long term planning. This is different from other countries where the agriculture sector is managed by the private sector, and there is no correlation relationship between government expenditure both in the long and short run. Cultivated areas are statistically significant both in the long and short-run which indicate the P-value to be less than 0.05 with (P-value 0.0001) in the short run. It is also significant in the long run when (P-value 0.0048). There is a direct correlation between cultivated land and the output of the agricultural sector in both the Frazer and the spectrum because there are seasonal agricultural products. This translates the relationship, in the long term, of the size of cultivated agricultural land which is originally owned by the government and leased to farmers and investors as the state is working to promote the agriculture sector. The Number of State Farms are also significant where the test result indicates (P-value = 0.0000) in the short run. In the long run, the test result indicates P-value is more than 5%, with (P-value = 0.1931). The test results indicate a short-term relationship between the number of government farms and the size of the agricultural sector. Observation shows that there is no relationship in the long term, and that is due to the nature of the sector in the state of China. Investors and farmers have recently become inclined to cultivate the land by taking advantage of the privileges granted by the Government, the investment policy and the agricultural property in case the government farms are subject to conditions that make domestic investors avoid investment in the farming sector where it needs capital, experience, and background. In the investment sector high-risk rates are subject to the laws of the environment, thus makes the acceptance of investors move away from the land cultivation that does not need the previous conditions. The support of the Government of volume production and the occupied area spectrum due to the displacement of villagers from villages to cities spectrum allowed the cultivation of the land that does not need permanent resident farmers. It isn't allowed in certain periods to reverse the government farms that require permanent residency for investors; however, the bound test technique assessed the long-run link among the variables when the F-statistics is more than the bound critical. When the F-statistics is less than the bound critical, this means there is no long-run relationship between the variables, and when the F-statistics indicate result between the upper bound critical and the lower bound critical, that means the long-run relationship will be indefinite as found out by (Mintz, 1990). In Table 4, the F-statistics value (24.88) is large than the bound critical result (4.66), this result indicates a long-run relationship between the study variables when the result was confirmed in the model result in general. Table2 above indicates the coefficient of the ECM (-1) result is negative (-1.5650), which also indicates it is statistically significant. Following the test result, the Lm test result indicates (P-value = 0.90) and (P.chi-square = 0.6553). This means the model does not have any serial correlation or statistics issues. Based on Pesaran, the error correction expression ECM (-1) is statistically significant as the variables can buck to the equality average speed possibly in unity shock (Bahram & Pesaran, 2009).

VI. CONCLUSION

This study concludes that based on the hypothesis stated at the beginning of this investigation study, it is now possible to confirm and determine the impact of government expenditure on the agriculture sector output in China. The study employed ARDL model to determine the long and short-run relationship between the target variable Gross Output Value of Agriculture and government Expenditure (GEX), Number of state farms (NSF), cultivated area of state farms (CA). The study design used time sires data covering the period (1988-2018).

Moreover, the Augmented Dickey-Fuller test and the stationary test showed that the time series variables were stationary at the first level. Test result indicated the short-run relationship between the number of state farms, the cultivated area of state farms and the agriculture sector output, where the test result indicated P-value to be less than 5%. No significant result between the agriculture sector output and the government expenditure was indicated. Following the test result in the long run, Government expenditure, cultivated area of state farms and agriculture sector output indicated to have a significant result less than 5% and a negative result between the Number of state farms and agriculture sector output with the result more than 5%. Also, the study indicates a strong Error correction Model with value (ECM =-1.56).

However, government expenditure does not affect a few of the study variables. The Chinese government has been working to develop the agriculture sector by allocating programs and raising the volume of government expenditure as the study showed on the agriculture sector both in the long and short term spectrum. In order to show the importance as well as directly impact the socioeconomic provision of self-sufficiency of a country like China of a large population, the Chinese government should allocate most of its expenditure to the agricultural sector and the dependent farmers should use allocated farms to raise the size of the agricultural sector output in the long term so as to ensure dynamism in the sector.

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