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Assessing the Consequences of Land Reform on Agricultural Output Growth in Russia Federation

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Abstract: The essence of land reforms is to ensure the availability of land for the proper purpose and to avoid victimisation of the have-nots in society. Many economies focus land reform towards helping develop the agricultural sector, similar to Russia's land reforms. Land as a crucial factor of production is captured in an augmented growth model to assess its impact on the growth of the agricultural economy in Russia. Having met the criteria for ARDL estimation techniques, it was established there is a co-integration between the dependent and independent variables with a high convergence rate. The results further attest that land reforms are crucial to developing the agricultural sector in Russia in the short and long run. Other growth factors have established diverse consequences for developing the agricultural sector in Russia. Therefore, sustaining the current land reform and improving the availability of farming purposes is essential.

Keywords: Land Reform, Agricultural sector, Russia, economic growth, ARDL

1. INTRODUCTION

Land is one of the most crucial production variables, but its significance has been generally ignored in the development paradigm with the presumption that, after all, it is fixed. The fixed property of land was based on Malthus's (1798) population development hypothesis, which has been criticised for its failure to acknowledge the impact of technological change and market size effect (Persson, 2008; Clark, 2010; Clark, 2013; Erdkamp, 2016). The Malthus delusion is over, as technology can influence economic growth, which also expands land. Technology makes it possible for land to be reclaimed (land reclamation) from the sea, oceans, seas, riverbeds or lake beds. Also, in recent years, rooftop farming cases have been growing, especially in urban cities (Poddar, 2019). Yet, land reform is paramount to its valuable users.

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State policies and reforms literarily regulate the supply of land for agricultural purposes. In Russia, major land reform may be dated back to 1904. The Russian Federation, however, had undergone various reforms after the dissolution of the Soviet Union to allow private individuals, especially peasants, to own lands. Despite signs of progress, that initiative is far from being accomplished (Wegren, 2008). Gorbachev (1990) noted that the Communist Party initiated a "complete reform" of agricultural policy in 1989, allowing peasant farmers access to land. Gorbachev's land reform introduced land rental rather than direct possession of the land. Boris Yel'tsin (1992-1999) was critical of this land reform and proposed a more radical reform approach through a presidential order mandating land redistribution, allowing private citizens to buy landed property. Contemporary land reform provides private citizens with more agricultural land through state redistribution to private individuals (Wegren, 2009). However, the research alleges that certain peasants were being dispossessed of their land property and farm shares under Putin's current regime. This could be true, but Putin's reform seems more result-oriented to the farmers than the previous regimes.

However, with the ambitious goals of Gorbachev in land reform and the imperfect reform of Yel'tsin, Russia's contemporary land reform achieved much less than is generally believed. In other words, the amount of agricultural land transferred to private individuals from large state-owned farms, especially during the contemporary period, is not exceptionally remarkable if attention is given to the amount of natural land received per capita by households. By the end of the Yel'tsin era, it was estimated that vast farms still used 86% of the total agricultural land, while most had been formally privatised (Pallot and Nefedova, 2003). By the end of 2003, of the 220.8 million hectares used as agricultural land, large farms accounted for about 67% of agricultural land use, small farms accounted for just under 8%, and individual parcels accounted for less than 5% of agricultural land. About 20 per cent of the remaining farmland was used by commercial companies for pastures, meadows, forest land, and subordinate agriculture (Lipski, 2006).

Though Russian land reform privatised land and swapped possession and usage rights, the majority of agricultural land remains used by big farms as in the Soviet era. Compared to encounters in post-Soviet states such as the Trans-Caucasus zone, Russian households use a limited percentage of agricultural land (Lerman, 2004). In these years, the cumulative agricultural lands did not exceed 13.7 per cent of Russia's total land. In 1992, about 13.5 per cent of Russia's total land was used for agricultural purposes, down to 13.2 per cent in 2002 and 13.08 in 2012. More land has recently been designated for agricultural use, with approximately 13.29 per cent of the total land in 2015 and 13.47 per cent in 2019. The initial decline could be attributed to Wegren's (2009) initial claims that the current government is taking the land from some private individuals.

However, a recent increase in the portion of land used for agricultural purposes has shown evidence of redistribution to farmers in the country.

But, the effect of land reforms on economic development has been met with varied views, given all the attempts at land reforms. Some pessimistic schools of thought, such as Van and Otter (2001), found that the neoclassical growth theory indicates that the contribution of land has little effect on economic growth and may even have a negative impact with a constant contribution to technology and other production factors. The adverse effects on the economic development of the nation may be attributed to the kind of policies that were implemented. Any land reforms could result in rising land disputes (Kalabamu, 2019) and social unrest (Bernier, 1980), resulting in economic growth delays. The adverse effect of land scarcity may also be related to social inequality, which Conning and Robinson (2007) and Vollrath (2007) identified are increasingly substantiated at the micro-level. Deininger, Jin and Nagarajan (2009) established that bridging the difference in inequalities would entail a tremendous interest in a prospective redistribution of assets like land ownership reforms. Kinsey (1999) concluded that short-term estimates of Zimbabwean land are ill-advised but expect optimistic long-term economic results. Therefore, sustainable economic development cannot be achieved without appropriate land reforms peculiar to individual economies.

Land reforms change land use rights and possession transfer, and their introduction must be attested to expand the effect on economic growth and progress. The optimist school of thought claims that the impact of land reforms on economic development is significant. For example, Deininger et al. (2009) claim that India's land reform has brought economic development. Likewise, Huang and Du (2017) noted that Chinese lands are vital for attracting investment and fostering economic growth for local governments. China is a prominent communist state that passed land control to local government administrators. The scheme allows municipal authorities to supply or rent lands to investors, and its competitive existence has reduced land prices to lure such investors while they gain substantial income by leasing land to finance infrastructure and urbanisation (Ping, 2011; Wang, Zhang, Zhang and Zhao, 2011; Zhan, 2012; Li, 2014; and Fan, Zheng and Shi, 2016). In it all, the system reflects an increase in investment, which leads to China's large-scale economic growth. In South Africa, Khan (2015) stated that Local Economic Development (LED) and Rural Land Reform have contributed to economic growth.

Attaining self-sufficiency and a sustainable economic goal would require effective land reforms to impact economic growth positively. Thus, the essence of this research is geared at ascertaining the effects of various land reforms on the development of the agricultural economy in the Russian Federation. Land reforms are meant to make land available for multiple agricultural uses and boost economic production. Russia's socio-

political and economic system means that the state controls the resources, including lands, making it difficult for farmers to own private lands without meaningful and sustainable reforms. Various policy reforms, however, have allowed farmers access to and the right to land ownership, but their effects on economic growth are relatively unknown. Thus, a research gap constitutes the underlying purpose of this study.

To this end, this research adds to the existing literature by integrating land availability into an augmented Solow growth model to examine the impact of land availability on economic growth with reference to the agricultural sector of Russia. Land is substituted as capital in the growth model, and land reform increases the chances of such capital. The data used in this research conforms to the suitability of the Autoregressive Distribution Lag (ARDL) estimation technique, which is dynamic in explaining the short-and long-run effects. The methodology is suitable for short sample size, according to Odhiambo (2009) and appropriate for estimating data from the Russian Federation since its existence is less than thirty years. The findings reflect a positive impact in the short and long run to further contribute to existing literature.

The remainder of the paper follows the following sequence: section two discusses the model, data and analytical procedure. The findings are presented in section three, and section four deals with the conclusion and a short policy statement on the outcome.

2. METHODOLOGICAL NOTE

2.1. Model Specification and Data

The augmented neoclassical growth model developed by Mankiw, Romer and Weil (1992) will be essential for realising the primary objective of this paper. Two principal motives underlie this model's specification. First, the model considers human capital apart from labour supply, which improves labour productivity and can boost economic growth. Second, as the objective is to see how growth in the agricultural sector is influenced by an economic policy (like land reforms), Zahonogo (2017) noted that several other policy-related variables can be integrated into the equation. The model can be expressed as follows, given the variable of interest (land reforms), growth in the agricultural sector and other control variables:

$$Y_{it} = \alpha_i + \lambda_i Y_{it-1} + \Sigma_{p=1}^{k} \beta_{pi} X_{it}^{p} + L_{it} + \varepsilon_{it} \quad (1)$$

Where Y_{it} is the GDP growth in the agricultural sector, X includes the vector of control variables, including education, labour supply and investment rate. L_{it} is a land reform variable. α_i is constant while ε_{it} is the error term. Equation 1 can be expanded to accommodate all variables. Thus;

$$Y_{it} = \alpha_i + \lambda_i Y_{it-1} + \beta_2 K_{it} + \beta_3 H_{it} + \beta_4 N_{it} + \beta_5 L_{it} + \varepsilon_t \quad (2)$$

Following Buss and Koniger (2012), the vector X is decomposed into various control variables. The saving rate (K_{it}) is taken as gross savings (% of GDP). Savings are assumed to be equivalent to investment, which researchers (Buss and Koniger, 2012; Zahonogo, 2017) attest to stimulate economic growth. Labour supply (N_{it}) is represented by employment in agriculture (% of total employment). Labour supply is essential for economic growth and development (Jorgenson, Ho, and Samuels, 2016; Cao, Ho, Hu and Jorgenson, 2020). The country's educational expenditure measures investment in human capital (Hit). Human capital is instrumental to the determinant of technology adoption (Benhabib and Spiegel, 2005; Li, Liang, Fraumeni, Liu, & Wang, 2012; Jorgenson et al., 2016). In Buss and Koniger (2012), the growth rate of world technology and the depreciation rate are said to be constant across time and, therefore, are omitted in the regression.

Land supply could be regarded as a source capital (L) represented by agricultural land (% of land area). Land reforms are expected to make more lands available for agricultural produce, depending on the direction of the reform. In Russia, this land reform has taken a different dimension (given the communist system in operation), which means there could be a different land area reserved for agricultural purposes at different times. The contribution of this available agricultural land towards economic growth in the sector is paramount to this research.

Finally, as a dependent variable, annual growth rates in agriculture, forestry, and fishing, value added (annual % growth) substitutes aggregate economic growth and will subsequently be labelled as Y_{it} while the compulsory lag will be taken as Y_{it-1}. This research covers 28 years, from 1992- 2019 inclusive. Variable sources and a priori expectations are summarised in Table 1.

Table 1: Variables and Sources

Variables	*Expectation*	*Source*
Agricultural Economic Growth (Y_{it})	Dependent	World Bank (WDI)
Agricultural Land Supply (L_{it})	+ve	World Bank (WDI)
Gross Savings (% GDP) (K_{it})	+ve	World Bank (WDI)
Agricultural Labour Supply (N_{it})	+ve	World Bank (WDI)
Education Expenditure (% GDP) (H_{it})	+ve	World Bank (WDI)

Source: Compiled by the author

2.2. Estimation Technique

Literature offers diverse econometric techniques to investigate the long-run co-integration relationship among the variables. Such as the Engle and Granger (1987) test, Peter and Hansen (1990) fully modified ordinary least square (FMOLS) technique for univariate co-integration, as well as Johansen (1988) and Johansen and Juselius (1990) full information maximum likelihood methodology widely used for multivariate co-

integration. At the same time, Johansen's co-integration has been commonly used and favoured over other methods because it can tolerate slight sample size bias and have multiple co-integration relationships. However, it requires all variables to be integrated at the same order, which is a significant challenge to the methodology. Hardly would there be variables integrated in the same order.

For the empirical intent of this study, the Autoregressive-Distributed Lag (ARDL) model for co-integration is preferred primarily for its robustness for estimating long-run and short-run coefficients in a single equation model. Pesaran and Smith (1995) and Pesaran, Shin, and Smith (2001) state that the ARDL estimation technique has overcome the significant challenges of Johansen co-integration. Following Pesaran et al. (2001), the ARDL bound test has more benefits than other multivariate co-integration techniques. With an appropriate lag selection, the ARDL estimation technique would effectively resolve serial correlation and endogeneity among the variables while also providing robust estimates. Unlike the conventional Johansen co-integration method, it will be convenient to diagnose dynamic interaction between variables irrespective of whether they are integrated at I(1), I (0), or both. Odhiambo (2009) also noted that it could be applied to a small sample size. Lastly, it simultaneously evaluates the long and short-run dynamics of the models.

Table 2: Correlation and Descriptive Statistics

Panel A Descriptive Statistics					
Variables	Δy_{it}	L_{it}	n_{it}	s_{kit}	s_{hit}
Mean	0.524124	13.24812	10.31514	27.90022	3.618745
Median	1.264729	13.2336	9.9375	28.25611	3.55111
Maximum	17.1	13.52237	16.148	36.15421	3.9
Minimum	-18.8	13.06428	5.757	19.32351	3.544344
Std. Dev.	7.958669	0.110729	3.512023	3.631203	0.125518
Skewness	-0.18555	0.699085	0.372897	-0.37859	1.621128
Kurtosis	3.362044	3.168599	1.748239	3.341312	3.987463
Jarque-Bera	0.313595	2.313859	2.476969	0.804787	13.40186
Probability	0.854877	0.31445	0.289823	0.668717	0.00123
Sum	14.67546	370.9473	288.824	781.2062	101.3249
Sum Sq. Dev.	1710.191	0.331042	333.0262	356.0121	0.425379
Observations	28	28	28	28	28
Panel B Correlation					
Variables	Y_{it}	L_{it}	N_{it}	K_{it}	H_{it}
Y_{it}	1	-0.12946	-0.19238	0.342188	-0.42082
L_{it}	-0.12946	1	0.069313	0.013408	0.47348
N_{it}	-0.19238	0.069313	1	0.32055	0.446994
K_{it}	0.342188	0.013408	0.32055	1	0.133623
H_{it}	-0.42082	0.47348	0.446994	0.133623	1
Source: Author's Computation					

There are different parameters through which one can establish co-integration. According to Pesaran et al. (2001), the F-test is expected to be above the critical value of the lower and the upper levels. Also, Banerjee, Dolado and Mestre (1998) opined that a negative and significant error-correction term (ECM_{-1}) should be enough to establish a long-run relationship between variables.

Equation (2) could be altered for a re-parameterised Auto-regressive Distributed Lag Model (ARDL) error correction model for this paper with all variables in natural logarithm;

$$\Delta Y_{it} = \theta_i[\Delta Y_{it-1} - \phi_i'(K_{it} + H_{it} + N_{it} + L_{it})] + \Sigma_{j=1}^{p-1}\lambda_{ij}\Delta Y_{it-j} + \Sigma_{j=0}^{q-1}\varphi_{ij}'\Delta K_{t-j} + \Sigma_{j=0}^{q-1}\varphi_{ij}'\,\Delta H_{it-j} + \Sigma_{j=0}^{q-1}\varphi_{ij}'\Delta N_{it-j} + \Sigma_{j=0}^{q-1}\varphi_{ij}'\,\Delta L_{it-j} + \alpha_i + \varepsilon_{it} \quad (3)$$

Notes: θ_i = coefficient for speed of adjustment to equilibrium, which is expected to be less than 0.

ϕ'_i= Coefficients of long-run relationships

$ECT = \theta_i[\Delta Y_{it-1} - \varphi_i'(K_{it} + H_{it} + N_{it} + L_{it})]$ represent the error correction term to be estimated.

$\lambda_{ij}, \varphi_{ij}'$ represent the short-run dynamic coefficients

3. RESULT AND DISCUSSION

Table 2 reports summary statistics and correlation. Panel A reports summary statistics, while panel B reports the correlation. From the correlation results, it can be ascertained that none of the variables is correlated, eliminating any multicollinearity issue during regression estimation. In other words, multicollinearity issues are apparent when variables are correlated in a model.

Table 3: Unit Root Test

Variables	*Level*	*1st difference*	*Remarks*
Constant Only			
Y_{it}	-5.008564***	-9.783346***	I(0)
L_{it}	-2.059882	-4.767049***	I(1)
N_{it}	-2.585619	-5.728428***	I(1)
K_{it}	-4.164222***	-5.742950***	I(0)
H_{it}	-2.614497	-5.271326***	I(1)
Test critical values:	1% level	5% level	10% level
	-3.711457	-2.981038	-2.629906

Source: Author's computation using E-views 10 version, 2019.

The results of the unit root, as presented in Table 3, followed the augmented dickey fuller (ADF) test. The ADF test results show that the variables are stationary at either level or first difference, and none is stationary at the second difference variable. Agricultural growth rate and Savings are stationary at a level while Agricultural land supply, Agricultural labour supply and education are stationary at first difference. The results affirm the suitability of the estimation method, the ARDL technique.

With the ARDL model, the lag selection is essential. According to Bahmani-Oskooee and Nasir (2004) and Baek (2014), the lag selection is susceptible such that the result of the F-statistic could be affected. Therefore, this research will follow Muhammad, Azu and Oko (2018) and Azu and Abu-Obe (2016) in implementing a lag selection criterion. This research, therefore, employed VAR Lag selection criteria, through which lag two is selected.

3.1. Determination of Short-Run and Long-Run Coefficients

The bound test for co-integration reveals co-integration between the dependent and independent variables, which satisfies the criteria of Pesaran et al. (2001). The F-statistics fall at a 5 per cent significance level. The requirements regarding Banerjee et al. (1998) were also met. This is evident from the coefficient of *ECT* in the model, which also indicates the speed of error correction. Following Sovbetov (2018) and Sovbetov and Saka (2018), the negative value of ECT is bonded between -1 and 0, which signifies no serial error correction and instability problem due to a structural break in the data. The magnitude of *ECT* is reported in Table 5 with the coefficient of /0.84163/, which shows that the previous period's disequilibrium of the models corrects at a speed of 84.16 per cent annually. This reveals a very high convergence rate, which entails a strong co-integration in the series.

Table 4: Bound Test for Co-integration

Significance Level	*I(0)*	*I(1)*
10%	1.9	3.01
5%	2.26	3.48
1%	3.07	4.44
F-statistic	3.855757	
Case 1: No Constant and No Trend;		

The short-run effect of land reform is revealed to be positive and statistically significant at five per cent. The coefficient is 47.287, which implies that as land reform increases land availability by 1%, the growth rate in the agricultural sector increases by 47%, all things being equal, howbeit, in the short-run. In the long run, however, the effect remains positive but has a reduced impact. The coefficient is reported to be

9.4113 and statistically significant at 10%, which implies that as land reforms increase land availability by one per cent, there is the tendency that output in the agricultural sector will increase by 9.4%, all things being equal in the long run. There is no doubt that land reforms ensure the availability of land for farmers for agricultural purposes. If the essence of land reform is to increase productivity, then that is achieved, given the outcome of these estimations. When farmers are given access to land, there is no doubt it will increase productivity, and this is evident in Russia with the current land reforms, which increase the growth rate of the economy in the agricultural sector.

Table 5: Short-and Long-Run ARDL Estimation

Variable	*Coefficient*	*Variable*	*Coefficient*
$\Delta(Y_{it})$	-0.33851**	L_{it}	9.411289*
	(0.118928)		(5.112053)
$\Delta(L_{it})$	47.28671**	N_{it}	0.54935
	(18.61198)		(0.64478)
$\Delta(N_{it})$	2.220814**	K_{it}	0.215745
	(1.033578)		(0.64337)
$\Delta(N_{it-1})$	1.72662	H_{it}	-36.9829*
	(1.091695)		(17.84933)
$\Delta(K_{it})$	0.286964		
	(0.30215)		
$\Delta(K_{it-1})$	0.930192***		
	(0.293524)		
$\Delta(H_{it})$	-9.88673		
	(11.39985)		
ECT_{t-1}	-0.84163***		
	(0.169047)		
ARDL Error Correction Regression (Short-run); Case 1: No Constant and No Trend; Standard error in parenthesis			

Agricultural labour supply is evident to positively impact economic growth in the agricultural sector of the economy with a statistically significant positive coefficient in the short run. The implication is that an increase in labour supply in the sector will increase output by 2.22 per cent in the short run. The corresponding long-run result is

positive but not statistically significant. The effect of saving is positive and statistically significant in the short run at lag one. At level, the estimated coefficient is positive but not statistically significant. The long-run result is also not statistically significant, though positive. This implies that the effect of savings on economic growth in the agricultural sector is a short-run phenomenon. Savings are captured as a proxy for investment. Thus, increases in investment would boost economic growth in the agricultural sector.

On the contrary, the effect of education is negative but not statistically significant in the short run. The long-run result reveals a negative coefficient, which is statistically significant at ten per cent. This implies that education has more effect in the long run, which is negative. The indication is that the level of education is not geared toward improving agriculture. Education is captured here as a human development factor that improves labour quality. The expectation is that productivity increases as the quality of labour increases. However, it is contrary in Russia, and for the single reason that labour supply in the agricultural sector does not necessarily require formal education or training in that sector is relatively low, as revealed from the results.

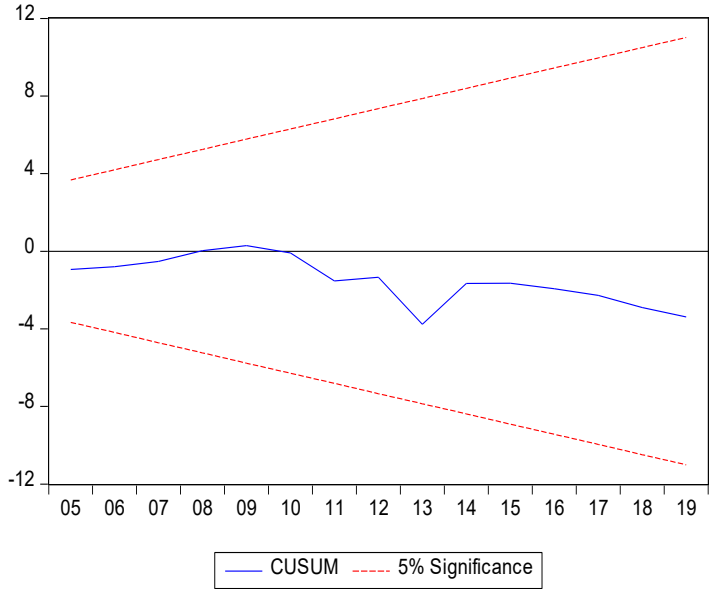
Table 6: Stability Test

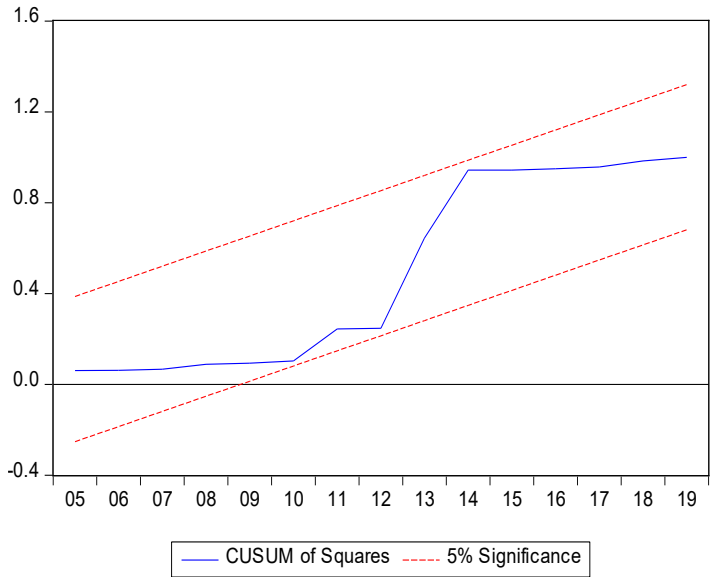
R-Square	0.880917
Adjusted R-square	0.834607
Serial Correlation	0.541194 (0.5956)
Heteroscedasticity Test	1.567607 (0.2162)

Note: Numbers in parentheses are probabilities. The serial correlation test was with Breusch-Godfrey serial correlation Lagrange statistics; the Heteroscedasticity test is with the Breusch-Pagan-Godfrey test. All were done using the E-views 10 version.

3.2. Stability Test

The stability test is essential to assess the degree of outcome dependence and reliability. This research absorbs the Lagrange Multiplier statistics for the Breusch-Godfrey serial correlation and the Breusch-Pagan-Godfrey Heteroscedasticity tests. Both tests reveal the model to be normal without any evidence of serial correlation and heteroscedasticity. The null hypotheses for the serial correlation and heteroscedasticity tests are rejected since their probabilities are very high (see Table 6). The R-square and adjusted R-square are relatively high, which implies that the independent variables have a high degree of control over the dependent variable. From the R-square and adjusted R-square, it can be revealed that the independent variables influence the dependent variable by over 80 per cent. Generally, the ARDL model used for analysis is stable and, therefore, dependable. The ARDL model used for the research is usually stable and thus accurate.





This research resolved for further stability test, adopting the Cumulative sum of recursive residuals (CUSUM) and cumulative sum of residual squares (CUSUM of Square) popularised in Brown, Durbin, and Evans (1975). Ploberger and Kramer (1992) demonstrate in a simulation analysis that the CUSUM test based on recursive residuals has greater power to detect parameter instability that happens early in the process

than the OLS-based test. Both Square test CUSUM and CUSUM could be depicted graphically to demonstrate some required model stability. There is an indication of complete stability in the models used herein without any significant errors because the plotted lines are inside the stability area. Adrift from this stability area reflects an error in the adopted model, but the outcome indicates otherwise. Therefore, one can rely on this article for further reference.

4. CONCLUSION

The essence of land reforms is to guarantee land availability for a favourable purpose when needed. Government land reforms are always geared towards making land available for agriculture while ensuring that the most powerful in society do not victimise the less powerful. In the Russian Federation, the government ensures that lands are available for food production. Still, the contribution of these lands to the agricultural economy's growth is relatively unknown. Thus, the overriding contention of this research. Land, as a significant factor of production, is essential for growth in the agricultural sector of the economy. Having integrated land in a growth model, this research used the ARDL estimation technique to assess the impact of land reforms through land availability on the growth of the agricultural sector in Russia.

The estimation established there is a long-run relationship between the dependent and independent variables. The result reveals that in the short run, the land is primarily essential for growth in agricultural sectors in the Russian Federation. The long-run effect is positive and statistically significant at ten per cent, which therefore established a robust impact of land reforms on the economic growth of the agricultural sector in Russia. For sustainable economic growth in the country, making land readily available for agricultural purposes is paramount, while the current regime on land usage should be sustained.

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