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Unlocking Growth: The Impact of Land Reforms on Agricultural Productivity in the Russian Federation

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Abstract: This study examines the impact of land reforms on agricultural productivity in the Russian Federation from 1991 to 2023 using the ARDL and NARDL estimation techniques. The analysis investigates the asymmetric effects of positive and negative changes in agricultural land on output growth, providing insights into the short- and long-term implications of land-use dynamics. The results indicate that positive changes in agricultural land have an insignificant impact on agricultural growth in the short and long run. In contrast, reductions in agrarian land exhibit a significant positive effect in the short term. The ARDL result suggests a positive impact of agricultural land on agro-economy growth in the short run. These findings suggest that land optimisation and efficiency improvements, rather than mere expansion, are critical to enhancing agricultural productivity. Drawing on the augmented neoclassical growth model, the study highlights the importance of aligning land reforms with technological investments, sustainable practices, and robust policy frameworks. Practical recommendations include strengthening land tenure systems, promoting efficient land use, and fostering innovation in the agricultural sector. The findings provide actionable insights for policymakers aiming to achieve sustainable growth in Russia's agricultural sector.

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

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1. INTRODUCTION

Land is an essential factor of production, yet its significance is often understated in development discourse. This oversight largely stems from the Malthusian perspective, which posited that land is a fixed and unchanging resource, limiting its ability to contribute to economic growth (Malthus, 1798). This argument suggested that as population growth outpaces agricultural production, diminishing returns on land would hinder development. However, technological advancements and innovative practices have refuted this notion, demonstrating that land is not as static as Malthus assumed (Persson, 2008; Clark, 2010, 2013; Erdkamp, 2016; Klimakova & Azu, 2024). Innovations like land reclamation and vertical farming have expanded the productive potential of previously unusable areas, while urban rooftop agriculture has shown how even dense cities can optimize land use (Poddar, 2019). Consequently, these developments highlight the transformative potential of technology in reshaping the economic role of land, underscoring the importance of land reforms to ensure equitable access and sustainable use.

State-led land reforms have been pivotal in shaping land use and distribution, especially in transitioning economies. Russia provides a compelling case study, with its land reform efforts dating back to 1904 and undergoing significant transformations during and after the Soviet era. Gorbachev's 1989 agricultural reforms marked a critical juncture, allowing peasant farmers limited access to land through rental arrangements rather than outright ownership (Wegren, 2008). Yeltsin's subsequent reforms in the 1990s were more radical, promoting land privatization and enabling private citizens to purchase land (Wegren, 2009). Despite these initiatives, large-scale state farms retained control over the majority of agricultural land, and the reform outcomes fell short of expectations. Scholars like Pallot and Nefedova (2003) noted that by the end of Yeltsin's era, state farms still dominated 86% of agricultural land, reflecting the challenges of transitioning from collective to private ownership.

Although contemporary land reforms in Russia have aimed to redistribute agricultural land more equitably, progress remains limited. By 2003, large farms accounted for 67% of agricultural land use, while small farms and individual parcels represented less than 13% (Lipski, 2006). Although recent policies have marginally increased the share of land designated for agriculture—rising from 13.08% in 2012 to 13.47% in 2019—systemic issues persist (Lerman, 2004;

Wegren, 2009). These include the dispossession of some private landowners, as observed under Putin's regime, and the limited per capita land allocation to households. This uneven distribution highlights the need for reforms prioritising small-scale farmers and promoting sustainable land management practices to maximize agricultural productivity and economic development.

Nevertheless, 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 effect 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.

The land system is central to farmers' well-being, agricultural progress, social stability, and the resolution of land tenure issues many nations face (Liu et al., 2014; Li, 2014; Travers et al., 2015; Zhou et al., 2020). Secure land tenure encourages sustainable agricultural practices and productivity, while uncertainties can lead to conflicts and instability (Travers et al., 2015; Fan et al., 2016; Zhou et al., 2020). Rapid urban expansion and the widening urban-rural divide strain rural livelihoods, threatening food security and increasing inequality (Bryan et al., 2018; Huang & Du, 2017; Ding, 2003). Land reforms aim to protect farmers' rights, reduce land conflicts, and bridge these disparities, promoting balanced development. Fathololoumi et al. (2024) raised concerns about urban expansion reducing prime agricultural lands, while Ullah et al. (2024) showed how land reforms in China improved agricultural productivity and alleviated rural poverty, underscoring the importance of balanced land policies.

Attaining self-sufficiency and achieving sustainable economic goals, such as those outlined in the Sustainable Development Goals (SDGs), particularly SDG 2 (Zero Hunger) and SDG 8 (Decent Work and Economic Growth), would require effective land reforms that positively impact economic growth. The essence of this research is to ascertain the effects of various land reforms on the growth of the agricultural economy in the Russian Federation. Land reforms aim to make land accessible for agricultural use and are designed to boost economic productivity (Klimakova & Azu, 2024). Russia's socio-political and economic structure, where the state controls resources, including land, poses challenges for farmers to own private land without meaningful and sustainable reforms. Various policy changes have granted farmers access and rights to land ownership, but the impact on overall economic growth remains uncertain. This research addresses this gap, exploring how land reforms align with SDGs by fostering agricultural productivity and economic development in Russia.

This research adds to the existing literature by integrating land availability into an augmented Solow growth model to examine its impact on economic growth in Russia's agricultural sector, substituting land as capital. To analyse this dynamic relationship, the Autoregressive Distributed Lag (ARDL) model is employed due to its suitability for small sample sizes (Azu et al., 2024) and for handling variables integrated at different levels, making it ideal for Russian Federation data, given its relatively short historical existence. The ARDL model captures short- and long-run effects, allowing for a comprehensive understanding of how land availability impacts growth over time. Additionally, a Nonlinear ARDL (NARDL) model accounts for asymmetries in land availability, recognising that positive and negative land reforms may influence economic growth differently. ARDL and NARDL provide robust insights into the linear and nonlinear dynamics of land availability and economic growth, offering a nuanced understanding of Russia's agricultural sector's development trajectory.

2. METHODOLOGICAL NOTE

2.1. Model Specification and Data

The augmented neoclassical growth model by Mankiw, Romer, and Weil (1992) was crucial in achieving the primary objective of this paper, which was to assess the impact of land reform on agricultural output growth in the Russian Federation. This model was chosen for two key reasons. First, it included human capital alongside labour supply, recognising its role in improving labour productivity and promoting growth. Second, Zahonogo (2017) highlighted that policy-related variables, such as land reforms, could be integrated into the model, making it suitable for analysing how economic policies influenced agricultural sector growth. 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 was decomposed into various control variables. In Equation 2, the saving rate (K_{it}) is gross savings (% of GDP). Savings were assumed to be equivalent to investment, which researchers (Buss & Koniger, 2012; Zahonogo, 2017) attested 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, & Samuels, 2016; Cao, Ho, Hu & Jorgenson, 2020). Also, investment in human capital (H_{it}) is measured by the country's educational expenditure. Human capital is instrumental to the determinant of technology adoption (Benhabib & 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), meaning a different land area could be reserved for agricultural purposes at different times. The contribution of this available agricultural land towards economic growth in the agricultural sector is paramount to this research.

Finally, as a dependent variable, annual growth rates in agriculture, forestry, and fishing, value added (annual % growth) substituted aggregate economic growth and were subsequently labelled as Y_{it}, while the compulsory lag was taken as Y_{it-1}. This research covers 33 years, from 1991- 2023 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

Econometric techniques widely investigate long-run cointegration among variables, including the Engle and Granger (1987) test, Phillips (1995) and Phillips and Hansen (1990) FMOLS technique, Johansen (1991) and Johansen and Juselius (1990) methodologies. Johansen's cointegration, often favoured for its ability to accommodate small sample sizes and multiple cointegration relationships, required variables to be integrated in the same order—a significant limitation. To address this, the study adopted the Autoregressive Distributed Lag (ARDL) model, known for estimating long- and short-run coefficients in a single equation. As noted by Pesaran and Smith (1995) and Pesaran et al. (2001), ARDL resolves issues of serial correlation and endogeneity while handling variables integrated at I(0), I(1), or both. With appropriate lag selection, its bound test approach delivers robust estimates and captures dynamic interactions. Nuhu, Isik and Azu (2020) highlighted its suitability for small samples. Cointegration is established when the F-test exceeds critical bounds or when a negative, significant error correction term (ECM-1) is present.

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

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

Notes: θ_i = The coefficient for speed of adjustment to equilibrium, which is expected to be less than 0. ϕ_i' = Coefficient of long-run relationships. $ECT = \theta_i [\Delta Y_{it-1} - \phi_i' (lnK_{it} + lnH_{it} + lnN_{it} + lnL_{it})]$ represents the error correction term to be estimated. λ_{ij}, φ'_{ij} represents the short-run dynamic coefficients.

We applied the nonlinear ARDL approach by Shin et al. (2014) to estimate the asymmetric relationship between variables, recognising that movements in an independent variable can be both positive and negative. This method decomposes the independent variable into two series based on positive and negative changes, following Qamruzzaman and Jianguo (2018), in contrast to the symmetric assumption used in traditional cointegration tests, which assume a linear relationship.

$$\begin{cases} POS(L)_t = \Sigma_{L=1}^{t} \ln L_L^{+} = \Sigma_{L=1}^{T} MAX(\Delta \ln L_L, 0) \\ NEG(L)_t = \Sigma_{L=1}^{t} \ln L_k^{-} = \Sigma_{L=1}^{T} MIN(\Delta \ln L_L, 0) \end{cases} \quad (4)$$

Equation (3) is rewritten in nonlinear form by incorporating a series of positive and negative changes, as follows:

$$\Delta Y_{it} = \theta_i[\Delta Y_{it-1} - \phi_i'(\ln K_{it} + \ln H_{it} + \ln N_{it} + \ln POS(L)_{it} + \ln NEG(L)_{it})] + \Sigma_{j=1}^{p-1}\lambda_{ij}\Delta Y_{it-j} + \Sigma_{j=0}^{q-1}\varphi_{ij}'\Delta \ln K_{t-j} + \Sigma_{j=0}^{q-1}\varphi_{ij}'\Delta \ln H_{it-j} + \Sigma_{j=0}^{q-1}\varphi_{ij}'\Delta \ln N_{it-j} + \Sigma_{j=0}^{q-1}\varphi_{ij}'\Delta \ln POS(L)_{it-j} + \Sigma_{j=0}^{q-1}\varphi_{ij}'\Delta \ln NEG(L)_{it-j} + \alpha_i + \varepsilon_{it} \quad (5)$$

Notes: θ_i remains the coefficient for speed of adjustment to equilibrium, which is expected to be less than 0. ϕ'_i is the Coefficient of long-run relationships.

$\theta_i[\Delta Y_{it-1} - \phi'_i(\ln K_{it} + \ln H_{it} + \ln N_{it} + \ln POS(L)_{it} + \ln NEG(L)_{it})]$

represents the error correction term to be estimated. λ_{ij}, φ'_{ij} represents the short-run dynamic coefficients.

Table 2: Summary Statistics and Correlation

Panel A Descriptive Statistics					
Variables	ΔY_{it}	L_{it}	N_{it}	K_{it}	H_{it}
Obs	33	33	33	33	33
Mean	0.6261	13.1966	9.3123	31.4843	3.8030
Std. Dev.	7.4520	0.0857	2.8568	4.52518	0.3544
Min	-18.8	12.9881	5.6587	23.7990	3.5443
Max	17.1	13.5224	15.008	48.6812	4.4412
Panel B Correlation Matrix					
Variables	ΔY_{it}	lnL_{it}	lnN_{it}	lnK_{it}	lnH_{it}
ΔY_{it}	1				
lnL_{it}	-0.2205	1			
lnN_{it}	-0.1001	0.4736	1		
lnK_{it}	0.1757	0.2851	0.2029	1	
lnH_{it}	-0.0773	-0.1174	-0.6054	0.1161	1

Source: Author's Computation Using Stata 14

3. RESULTS AND DISCUSSION

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

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 methods, the ARDL and NARDL techniques.

Table 3: Augmented Dickey-Fuller (ADF) Unit Root Test

Variables	*Level (t-statistics)*	*1st difference (t-statistics)*	*Remarks*
ΔY_{it}	-3.131**	-6.233***	I(0)
$\ln L_{it}$	-4.712***	-4.991***	I(0)
$\ln N_{it}$	-0.211	-4.984***	I(1)
$\ln K_{it}$	-5.567***	-5.846***	I(0)
$\ln H_{it}$	-0.568	-4.217***	I(1)
Critical Values	10%	5%	1%
Level	-3.709	-2.983	-2.623
Ist Difference	-2.624	-2.986	-3.716

Note: * indicates stationery at 10 %, ** means stationery at 5% and *** means stationery at 1%. Unit root test was based on Augmented Dickey-Fuller (ADF) using Stata 14

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

The bound test for cointegration reveals cointegration between the dependent and independent variables in both models (ARDL model and NARDL model), which satisfies the criteria of Pesaran et al. (2001). The F-statistics for both models fall at a 1% significance level. Also, there is evidence that the coefficients of *ECT* in both models have long-run relationships. Following Azu et al. (2024), 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 coefficients of /0.6450/ for the ARDL model and /0.6364/ for the NARDL model. This shows a convergence rate of 64.5% and 63.6%, respectively, which implies strong cointegration in the series.

Table 4 Cointegration Bound Tests Result

F-statistic (A)	8.706	EC_{M-1}	-0.6450***	(5.32)
F-statistic (B)	12.654	EC_{M-1}	-0.6364***	(-3.10)
Significant level		10%	5%	1%
F-Bounds Test (A)	Lower bound	2.45	2.86	3.74
	Upper bound	3.53	4.01	5.06
F-Bounds Test (B)	Lower bound	2.26	2.62	3.41
	Upper bound	3.35	3.79	4.68

Note: the number in parenthesis represents t-statistics, *** signifies a 1% level of significance, F-statistics is determined with restricted constant and no trend; A-Linear ARDL Model and B-Nonlinear ARDL Model

Based on the ARDL model, agricultural land reported a short-run coefficient of 645.5, which was statistically significant at 1%. In other words, the short-run shows that a 1% increase in agricultural land leads to a significant rise of 645.5 units in agricultural growth. However, the lagged effect indicates that a 1% increase in agricultural land in the previous period reduces current agricultural growth by 400 units, a statistically significant outcome at the 1% level, likely due to overuse or inefficiencies. In the long run, while the coefficient is positive at 364.2, it is not statistically significant, suggesting a limited direct impact of agricultural land on sustained growth. These findings imply that while immediate land expansion can spur growth, its diminishing effects in subsequent periods highlight the need for balanced land utilisation. Policies should prioritise optimising the productivity of existing agricultural land over mere expansion to achieve sustainable agricultural growth.

Table 6: Long Run and Short Run Estimation Results for ARDL and NARDL

ARDL Model		*NARDL Model*	
Variables	*Coefficient*	*Variables*	*Coefficients*
Long Run Estimation			
lnL_{it}	364.2 (521.2)	$lnPOS(L_{it})$	-454.6 (977.1)
lnN_{it}	-3.362 (8.021)	$lnNEG(L_{it})$	860.3 (553.9)
lnK_{it}	25.24**(11.95)	lnN_{it}	1.501 (6.570)
lnH_{it}	-27.73 (16.71)	lnK_{it}	39.11** (14.76)
-	-	lnH_{it}	-27.99 (19.970)

Short Run Estimation			
ECT_{t-1}	-0.650*** (0.122)	ECT_{t-1}	-0.636*** (0.205)
$\Delta(Y_{it-1})$	-0.401*** (0.0737)	$\Delta(Y_{it-1})$	-0.441*** (0.0983)
$\Delta(lnL_{it})$	645.5** (297.8)	$\Delta(lnPOS(L_{it}))$	-120.0 (591.1)
$\Delta(lnL_{it-1})$	-400.0*** (133.1)	$\Delta(lnNEG(L_{it}))$	3,195***(538.3)
$\Delta(lnN_{it})$	49.17***(10.68)	$\Delta(lnN_{it})$	61.28*** (10.89)
$\Delta(lnK_{it})$	-5.757 (6.012)	$\Delta(lnK_{it})$	-10.48 (6.399)
$\Delta(lnK_{it-1})$	43.25*** (6.203)	$\Delta(lnK_{it-1})$	37.46***(4.946)
$\Delta(lnH_{it})$	51.07*** (14.13)	$\Delta(lnH_{it})$	70.41*** (14.58)
Constant	-635.3(837.2)	Constant	-24.53 (39.06)
Observations	33	Observations	33
R-squared	0.962	R-squared	0.971
Standard errors in parentheses *** p<0.01, ** p<0.05, * p<0.1			

Based on the NARDL model, agricultural land highlights contrasting short-run and long-run effects of cumulative positive and negative changes on agricultural growth. In the short run, positive changes in agricultural land exhibit an insignificant negative impact with a coefficient of -120.0. In contrast, negative changes show a significant positive impact, with a coefficient of 3,195 and statistically significant at 1%, possibly due to improved efficiency or intensified use of remaining land. Long-term effects are not statistically significant for positive -454.6 and negative changes 860.3, indicating that land changes alone may not sustain growth. These findings emphasise the need for policymakers to prioritise optimising agricultural practices and land use efficiency over simple land expansion, with long-term strategies focusing on technology, sustainable management, and resource optimisation to boost growth.

The ARDL and NARDL results reveal differing impacts of agricultural land on agricultural growth, highlighting the importance of distinguishing between linear and nonlinear effects. In the ARDL model, short-run increases in agricultural land positively affect growth, but lagged changes show a significant negative effect, reflecting potential inefficiencies or diminishing returns from past expansions. In contrast, the NARDL model uncovers asymmetries: positive changes in agricultural land are insignificant, while negative changes significantly and positively impact agricultural growth in the short run, suggesting that reducing agricultural land could promote more efficient use or higher productivity. Both models show no significant long-term impact of agricultural land changes. Still, the NARDL results emphasise that the direction of change (positive or negative) matters, providing a nuanced understanding absent in the linear ARDL approach.

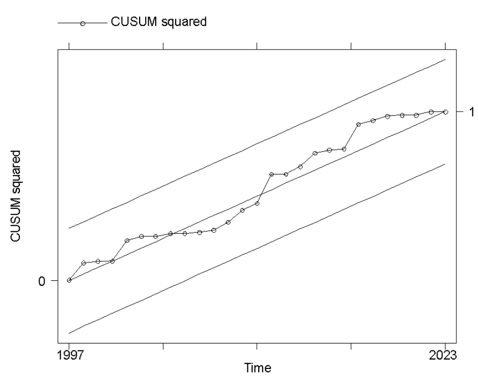
3.2. Stability Test

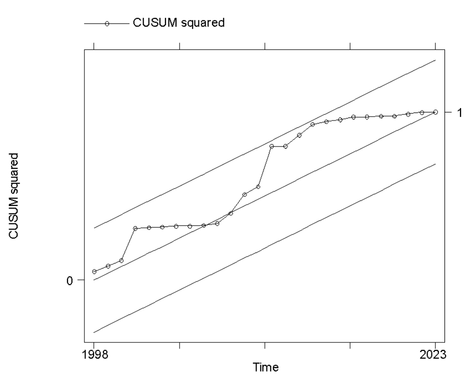
The stability test is crucial for assessing the reliability and consistency of results. This research incorporates the Breusch-Godfrey serial correlation and Breusch-Pagan heteroscedasticity tests, confirming that the models are normal and show no serial correlation or heteroscedasticity. The null hypotheses for both tests are rejected due to high probabilities (see Table 6). The R-squared and adjusted R-squared values are significantly high, indicating that the independent variables explain over 95% of the variation in the dependent variable in both models. Therefore, the ARDL and NARDL models used for analysis are stable and reliable. The cumulative sum of squared residuals (CUSUM of Square) further confirms the stability of the models, with the plotted lines remaining within the stability area, signifying no significant errors.

Table 6 Diagnostic Test

Statistics	ARDL Model	NARDL Model
R-Square	0.962	0.972
Serial Correlation	0.061 (0.8050)	1.111(0.2919)
Heteroscedasticity Test	16.30 (0.1010)	8.51 (0.1061)

Note: Probabilities are in parentheses. Serial correlation is with the Breusch-Godfrey LM test; the Heteroscedasticity test is with the Breusch-Pagan test. All were done using Stata 14.





3.3. Discussion of Findings

The results of this study align with the broader debates on land reforms and their impact on economic growth and agricultural productivity. The insignificant effects of positive changes in agricultural land on growth in both the short and long run suggest that simply increasing agricultural land without addressing efficiency and productivity issues may have limited benefits. This is consistent with Van and Otter's (2001) findings that the contribution of land to growth is minimal without improvements in technology and other production factors. Additionally, the significant short-run positive impact of negative changes in agricultural land aligns with observations by Liu et al. (2014) and Ullah et al. (2024), who emphasised that secure and optimised land use, rather than mere expansion, can lead to enhanced productivity and sustainability. Such findings highlight the critical need for strategic land use reforms that focus on maximising the productivity of existing resources.

However, the lack of long-term significance of land changes and the observed negative adjustment effects reflect the complexities of land reforms, as Kalabamu (2019) noted, which links land reforms to potential disputes and instability. This suggests that unbalanced land policies may impede sustainable growth, echoing concerns by Travers et al. (2015) and Bryan et al. (2018) regarding social inequality and food security risks from improper land management. The study's findings reinforce Deininger et al.'s (2009) argument that addressing inequalities and ensuring secure land tenure are crucial for sustainable agricultural development. Policymakers should draw on the successes of countries like China, where reforms focused on optimising land use and incentivising investment have driven significant growth (Huang & Du, 2017). As such, future reforms in agricultural land management should emphasise efficient land use, secure tenure rights, and policies that integrate technology and sustainability to foster long-term growth.

The results of this study are closely aligned with the augmented neoclassical growth model by Mankiw, Romer, and Weil (1992), which emphasised the role of both physical inputs and policy-related variables in driving growth. The findings, particularly the insignificant impact of positive land changes and the significant short-run effects of negative land adjustments suggest that land reforms alone are insufficient to enhance agricultural output unless complemented by improvements in productivity and efficiency. This supports the model's inclusion of human capital as a key factor, as efficient land use requires knowledge, skills, and technological adaptation to maximise output. Additionally, the study's emphasis on optimising existing agricultural land aligns with Zahonogo's (2017) assertion that economic policies, such as land reforms, must be strategically designed to influence growth positively. These results highlight that while land reforms are an essential component of growth, their effectiveness depends on how well they are integrated with other productivity-enhancing measures, consistent with the theoretical framework.

4. CONCLUSION

This study underscores the complex relationship between land reforms and agricultural productivity in the Russian Federation. The findings reveal that positive changes in agricultural land have an insignificant impact on productivity in both the short and long run, suggesting that simply increasing land allocation does not necessarily translate to higher output. In contrast, the significant short-term positive impact of reductions in agricultural land highlights the importance of optimising land use and prioritising productivity over expansion. These results align with the augmented neoclassical growth model, emphasising efficiency, human capital, and strategic policy interventions in driving economic growth. The study further suggests that while land reforms have historically focused on redistributing land, their success hinges on complementary measures such as technological advancement, capacity building, and sustainable land management practices. Ultimately, this research demonstrates that unlocking Russia's agricultural sector's full potential requires a balanced approach beyond land redistribution to include broader reforms that foster innovation and efficiency.

Policymakers should prioritise policies that promote land-use efficiency and enhance the productivity of existing agricultural land rather than focusing solely on land redistribution. Investments in agricultural technology, sustainable farming practices, and farmer capacity-building programs are critical to achieving this objective. Also, establishing clear land tenure systems can encourage sustainable practices and reduce land disputes, fostering social stability and long-term productivity. Drawing lessons from successful land reform examples in countries like China, Russia could explore integrating local government administration into land reforms to attract investments, finance rural infrastructure, and drive modernisation in agriculture. Lastly, long-term strategies should focus on improving access to credit, ensuring equitable land access, and addressing rural-urban disparities to enhance agricultural productivity and achieve inclusive economic growth in the Federation.

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