Research on World Agricultural Economy
https://journals.nasspublishing.com/index.php/rwae

RESEARCH ARTICLE

The Impact of Domestic Public Debt on Agricultural Government Investment and Economic Growth: Evidence from Iraqi between 2004 and 2022

Saad A. Hammad[1*], Noor Yousif Outhman[1], Mustafa Fadel Hamad[1], Faisal Ghazi Faisal[2], Thakir Hadi Abdullah[3], Ali Abd Ulkareem[4]

1 Department of Agricultural Economics, Agriculture College, University of Anbar, Ramadi 31001, Iraq
2 Jannat Iraq College, Ramadi 31001, Iraq
3 Ministry of Education, Ramadi 31001, Iraq
4 The Local Union of Agricultural Cooperative Societies, Anbar, Ramadi 31001, Iraq.

Abstract: The study aims to assess the impact of domestic public debt (DPD) on agricultural government investment (AGI) and economic growth in Iraq from 2004 to 2022 using the Autoregressive Distributed Lag (ARDL) model. The results demonstrate a significant cointegration relationship between DPD and economic growth, as indicated by the negative error correction coefficient (–0.0622), which is statistically significant at the 5% level. The study finds that DPD has a considerable positive effect on economic growth in the short term (2.5695) and long run (7.7793), with statistical significance at the 1% and 5% levels, respectively. Conversely, DPD did not have any discernible impact on AGI. The DPD and AGI were not cointegrated during the research period. Based on these findings, it is recommended that the Iraqi government formulate a clear strategy to manage DPD and establish precise criteria for the principles and conditions governing the use of domestic loans to optimize their effectiveness in agricultural economic development.

Keywords: ARDL; Agricultural growth; GDP

1. Introduction

Financing investment through domestic public debt DPD contributes to increasing the Public benefits by raising employment rates and addressing the problem of unemployment among workers. This in turn leads

*Corresponding Author:
Saad A. Hammad,
Department of Agricultural Economics, Agriculture College, University of Anbar, Ramadi 31001, Iraq;
Email: den.saad.abd@uoanbar.edu.iq

Received: 9 June 2024; **Received in revised form:** 6 July 2024; **Accepted:** 10 July 2024; **Published:** 30 August 2024

Citation: Hammad, S.A., Outhman, N.Y., Hamad, M.F., et al., 2024. The Impact of Domestic Public Debt on agricultural government investment and economic growth: Evidence from Iraqi between 2004 and 2022. *Research on World Agricultural Economy*. 5(3): 37–50. DOI: https://doi.org/10.36956/rwae.v5i3.1124

DOI: https://doi.org/10.36956/rwae.v5i3.1124

to raising income and education levels, and the welfare of citizens. It also increases production, diversifies product offerings, and intensifies competition in the markets. All of this leads to an increase in the national income, the average per capita income, and the standard of living of citizens, as well as the utilization of all aspects of production to provide the community with goods and services. It also helps economic development, especially when using capital production elements. It also increases the rates of capital formation through wealth creation and development.

There are economic dimensions and motivations Iraq's (Iraq's economy represents one of the economies of developing countries) shift towards DPD, which are represented by several reasons. The budget deficit, the rapid increase in expenditures, the decline in productive capacity, the lack of financing for government investment, the volatility of oil prices as the main source of government revenues (accounting for 98% of total revenues), the shortage of domestic savings, the mismanagement of external debt, the deterioration of the exchange rate, the high inflation, the decline in tax revenues, and the lack of development planning. These factors have driven Iraq to increasingly rely on DPD as a means of addressing its fiscal challenges and financing its investment and development needs. The accumulation of loans, whether internal or external, and the associated interest payments have resulted in high levels of public debt. High rates of domestic debt, in particular, have distinct economic implications for variables such as Agricultural government investment and gross GDP.

To know the size of the impact of this variable on the economy, And knowing the center and weight of this variable with other economies, We must compare with other economies. When comparing the size of the domestic public debt in Iraq with a developing economy such as Egypt, with an advanced economy such as the economy of the United States of America, and with a transitional economy (from a developing economy to a developed economy) such as Malaysia, We find that the size of the domestic public debt in Egypt, whose economy suffers from a financial deficit and a decline in revenues, amounted to 88.2% as a percentage of the gross domestic product, This percentage corresponds to an increase in GDP growth to 6.6%. This indicates that employing this debt in the economy has a positive impact on improving the level of the economy, It enables him to overcome the situation of declining revenues. In the United States of America, the domestic public debt exceeded the gross domestic product by 110.4%, The GDP growth rate in contrast was 1.9%. The proportion of public debt to GDP in Malaysia reached 60.3%, The GDP growth rate was 8.7% for the year 2022 [1]. These percentages, whether for a developing economy, an advanced economy, or an economy in transition, are a number that portends the economic challenges facing these countries. This comparison helps local economic policy makers use it to make decisions and set a specific ceiling for the size of this debt.

A study of the Iraqi economy reveals continued growth in its domestic debt. This is a consequence of the political and economic imbalance, the prevailing instability within the country, the absence of a clear formulation of economic policy, and the pervasive administrative and financial corruption. Iraq is plagued by the ongoing squandering of its wealth through the general budgets, stemming from the poor estimation of revenue and expenditure levels due to mismanagement and ineffective revenue collection. As a result, Iraq has been ranked among the countries with the highest rates of corruption, according to the Corruption Perceptions Index published by Transparency International [2].

The literature on economic points out the influence of DPD on GDP, with the impact depending on how the borrowed funds are employed. The nature of this effect is contingent upon the way in which these debts are utilized. If the funds are judiciously directed towards the import of capital goods to support economic development projects, it can catalyze the rapid formation of capital, enhance productive capacity, and boost employment levels, ultimately leading to an increase in the national income. Conversely, if these debts are used to finance the import of consumer goods, they may have adverse effects on the national economy [3].

In other words, debt has a negative impact on the country if it is not productive, due to the deductions made from the country's domestic product to cover the annual burdens represented by installments and interest payments. This puts pressure on the resources used for the development of economic sectors. The situation worsens when the growth in the deducted amounts exceeds the growth in the GDP.

The significance of this paper lies in shedding on the DPD and its impact on Agricultural government investment and economic growth. This debt is one of the fiscal policy tools used to finance the budget deficit, government investment, and achieve other economic objectives, The importance of local public debt comes from the agricultural sector's need to increase production. The agricultural sector in Iraq is characterized

by decline and inability to meet the needs of local demand, which forced it to increase the import of agricultural products, The trade exposure index for agriculture and live animals has increased abroad by 41% in 2022, This is a high percentage that indicates dependency and reliance on the outside world in providing agricultural products, lack of stability, and the danger of achieving food security. The core problem is whether the DPD constitutes a real crisis in the Iraqi economy in terms of repaying its installments and interest, providing this borrowing, managing it, and directing it towards productive sectors. Furthermore, whether its developments have an impact on investment and economic growth. Our goal here is to measure the effect of this debt on the studied economic variables and to calculate the correlation between them using econometric tests and models. The goal of this paper, unlike its predecessor in the existing literature, is determined by choosing the economic region, which is the Iraqi economy, well as the time period 2008–2022, The differences in variables and the way they are analyzed, It uses the descriptive analytical approach and the quantitative approach to standard models, As well as a review of the theoretical framework of the variables studied according to economic theory.

This paper is organized to achieve its goal of estimating the impact of internal public debt on government agricultural investment and economic growth in Iraq, It requires a review of previous studies, Defining and formulating the economic model and research methods and techniques, By analyzing data on economic variables and reviewing graphs, Using econometric models and tests to obtain and discuss results and then write conclusions and recommendations.

2. Literature Review

Adai [4] analyzed the trajectories of Iraq's public debt for the period 2010–2014 path and the extent of the risk facing Iraq due to borrowing operations. The study found the absence of a strategic framework for managing public debt and the inability to predict budget movements. This led to a rise in the deficit and an increase in domestic and external public debt [4].

Abubakar [5] investigated the effects of foreign debt and DPD on private investment in Nigeria. The paper employed non-linear ARDL models to examine the time series spanning from 1981 to 2018. The findings demonstrated the detrimental impact of rising overall debt, foreign debt, and debt servicing payments on private investment. On the other hand, The positive shock had a negligible impact on private investment, but domestic debt has a positive effect and significantly improves private investment [5].

Zouhaier [6] estimated the impact of debt on economic growth in 19 developing countries between 1990 – 2011, using a dynamic panel data model. The study also involved an empirical investigation of the effect of debt on the contribution of investment. The findings showed these two empirical analyses indicate that there is a negative effect of debt on GDP, and a negative interaction of debt with investment [6].

Gurung [7] examined the relationship between DPD, external debt, and economic growth in Nepal for the period 1975–2022. The study used the Granger causality test to determine the causal relation between the GDP, DPD, and external debt. The results of the causality test a bidirectional correlation between external debt and GDP, but no causal relationship between DPD and GDP. The Johansen cointegration test also revealed the absence of a long-term correlation between external debt, DPD, and GDP [7].

Haqa, M. Khan, et al. [8] determined the effects of Pakistan's economic development, private investment, and national debt. Using the time series 1972–2013, the estimate was performed using the ARDL regression and VECM approach. The findings showed that Pakistan's state debt indirectly hinders economic growth by discouraging private investment. Nevertheless, the analysis did not uncover any proof that the amount of public debt directly affects the rate of economic expansion [8].

CEPAL Review by Medina, J, V, et al. [9] examined the effect of public debt on economic growth in Mexico for the period 1994–2016. The objectives of this study were to determine whether the relationship between the two variables followed a non-linear, inverted U-shaped path. Using a dynamic model, findings demonstrated the existence of an inverted U-shaped nonlinear relationship, and found that the threshold ratio of debt to GDP is 27% [9].

This paper differs from previous studies reviewed, Previous studies addressed the impact of public debt (domestic debt, external debt) and internal debt on economic growth, The way this paper differs from the previous studies that were presented is that it addresses the impact of internal public debt on government agricultural investments, The differences of this paper from its predecessor are determined in the choice of the economic region, which is the Iraqi economy, As well as the time period 2008–2022, The differences in variables and the way they are analyzed, It uses the descriptive analytical approach and the quantitative approach to standard models, As well as a review of

the theoretical framework of the variables studied according to economic theory, The differences in results, discussion, conclusions and recommendations. There are similarities between this paper and some studies in using the same ARDL model as the study [8]. These studies were taken advantage of to arrive at the appropriate scientific method for analysis, This paper represents an approximation of the scientific gap in research on this topic.

3. Materials and Methods

Debt is a liability in which a creditor has a claim on the debtor**.** Domestic debts are debt liabilities owed by residents to residents of same economy [10]. "Debt is important for developing countries owing to their constrained number of creditors, inefficient resources, and inadequate investments which are unable to finance their budget deficits. On the other hand, excessive borrowing could lead to crowding out, low investment, slowed growth and reduced productivity in these economies. The impact of debt, both public and internal, on growth rate varies from one country to another depending on their initial debt accumulation and how the debt is used. Adam Smith addresses the issue of public debt in the last chapter of his book An inquiry into the nature and causes of the wealth of Nations where he states that public debt and taxes are necessary evils because an economy should ideally operate a balanced budget. Households and businesses in many economies are already struggle with high tax rates and should not be overburdened with increased debts" [11].

Investment, in its economic sense, is the process of adding to the productive assets or capital goods. When the government purchases equipment and machinery, builds new houses or warehouses, or dams or constructs roads, it is considered investment. Investment is actually realized when real capital is produced[12]. Investment spending is viewed as a flow, and also as a stock. Investment as a flow refers to the total expenditure on the purchase of capital goods, including changes in inventories, over a specific time period (such as a year or six months).

As for investment as a stock, it refers to the net investment, which represents the net addition to the society's stock of capital assets. Therefore, it represents the accumulation of capital. For a specific time, for example, October 2022[13]. The importance of Agricultural government investment evident as it is a crucial and essential element in driving the economic activities of the state. Given the long-term economic dimensions of the investment strategy, it is considered the fundamental pillar upon which the economic development of the state is based[14].

In this paper, economic growth is represented by continuous increases in the real Gross Domestic Product (GDP) of a particular an extended period. The growth rate is measured based on GDP, which expresses the total market value (prevailing market prices) of all final goods and services produced domestically in a specific country during a given time, usually a year [15]. The productive activity includes all residents in the country, including foreign companies operating in that country. It is worth noting that there are several economic activities that are not included in the calculation of GDP, such as household tasks, voluntary work, and activities in the black market [16].

The variables' time series data were transformed from yearly to quarterly data in its original format to enable the application of econometric techniques, which would yield more precise and impartial outcomes if the time series were longer. The ARDL model was used to determine the impact of DPD on Agricultural government investment and economic growth in Iraq. This model aids in determining how economic factors interact with one another. The model was formulated as follows:

$$Y1_t = \beta_o + \beta_1 X1_t + u_t \quad (1)$$

$$Y2_t = \beta_o + \beta_2 X1_t + u_t \quad (2)$$

The model can be expressed by Y1 represents the (dependent variable 1) economic growth, Y2 represents the (dependent variable 2) Agricultural government investment, is the intercept. X1 represents DPD as the independent variable, ut is the random variable and t refers to the time. To apply the econometric model, we first used the Augmented Dickey Fuller (ADF) unit root test to determine the sufficiency of the time series. We then performed the initial estimation and determined the optimal lag length for the time lags. Then tested the bounds for relationships using the F test, and estimate the short-run and long-run parameters and the error correction parameter. The ARCH test is performed to test the homogeneity of the model, to ensure that it is free of heterogeneity problem. LM test for serial correlation, to verify that the model is free from the issue of serial autocorrelation. Functional form test was used to check the suitability of the model using Cumulative Sum of Recursive Residuals (CUSUM) test and CUSUM of Squares test.

The advantages of using the ARDL model and its suitability to this paper, characterized by several characteristics that made it preferred over other well-known tests (ARMA, ARIMA, SARIMA) . This test can be applied regardless of whether the variables under study are zero-order integrated [I(0], Or of order one integer [I(1)], Or integrated of the same order, Or a mixture of the two, But one of the variables must not be a second-order integral [I(2)]. Using this model helps eliminate problems related to omission of variables and autocorrelation problems, The estimates resulting from this model are unbiased and efficient. It helps to estimate the components of the short and long term together and at the same time. It has better properties in the case of short time series. The results of applying the model are good if the sample size is small. This is in contrast to most traditional cointegration tests, which require the sample size to be large so that the results are more efficient [17].

This study measures and estimates the impact of DPD on Agricultural government investment and economic growth in the Iraqi economy, covering the period 2004–2022. The data were collected from different sources including the Economic Department, Technical Information Division at the Iraqi Ministry of Finance and the General Directorate of Statistics and Research at the Central Bank of Iraq.

Table 1 shows the volume of DPD, the rate of change, and the ratio of this debt to current-price GDP[18]. In 2022, the spending of DPD was directed in the form of payments to the Ministry of Finance to cover the salaries of employees in self-financing companies (non-productive and loss-making companies), settling property claims, covering the deficit in the federal general budget. The payment form DPD continues for building defense capabilities for the Ministry of Defense and granting loans to the Ministry of Electricity, to the commercial bank to finance the Ministry of Agriculture and the Ministry of Trade, to the water project in Al-Muthanna Governorate and payment the entitlements of contractors' and farmers' bonds.

Table 1. Domestic Public Debt and Rate of Change for the Period 2004–2022.

Year	Internal public debt (Million dinars)	rate of change %	Domestic public debt ratio of GDP	Year	Internal public debt (Million dinars)	rate of change %	Domestic public debt ratio of GDP
2004	5925061	—	20.0	2014	9520019	123.70	3.7
2005	6255578	5.57	13.0	2015	32142805	237.63	16.8
2006	5307008	–15.16	8.2	2016	47362251	47.34	24.1
2007	5193705	–2.13	4.6	2017	47678796	0.66	21.1
2008	4455569	–14.21	2.8	2018	41822918	–12.28	16.6
2009	8434049	89.29	6.0	2019	38331548	–8.34	14.6
2010	9180806	8.85	5.3	2020	64246559	67.60	32.3
2011	7446859	–18.88	3.4	2021	69912394	8.81	23.2
2012	6547519	–12.07	2.6	2022	69495737	–0.59	18.1
2013	4255549	–35.00	1.6				

Table 1 indicates that the domestic public debt DPD has often experienced fluctuations, both increasing and decreasing due to the lack of diversification in revenue sources where the country adopts near-total reliance on crude oil revenues. For instance, in 2009, the ratio of DPD to GDP increased to 89.29% compared to the previous year resulted by the global financial crisis and the accompanying decline in global crude oil prices. This forced the Iraqi government to finance the revenue deficit through domestic debt. The debt continued to fluctuate, but it is noteworthy that in 2015, the debt increased by the largest percentage during the study period, which was 237.63%. This was attributable to the significant drop in oil prices that the global markets witnessed starting from the second half of 2014.

Due to the rentier nature of the Iraqi economy, which relies on oil to finance 98% of its revenues [19]. the budget deficit has been exacerbated. This deficit was further compounded by the costs of the war on terrorism and the control of terrorist groups like ISIS over several governorates, as well as the escalating crisis of internally displaced persons, which harmed trade and destroyed infrastructure, and adversely impacted the non-oil economy. This compelled the government, through the Ministry of Finance, to borrow domestically to cover this deficit. Thereafter, public debt continued to fluctuate, both increasing and decreasing. In 2018, it decreased by 12.28% compared to 2017 due to the rise in crude oil prices and the subsequent increase in revenues. In 2022, the DPD decreased by 0.59%

compared to the previous year, due to the financial surpluses that occurred in 2022 as a result of the increase in oil revenues, which helped to repay part of the debt. The ratio of DPD to current-price GDP reached its lowest level of 1.6% in 2013 and its highest level of 32.3% in 2020. The average contribution of this debt to GDP during the study period was 12.5%. Table 2 and Figure 1 show the size of Agricultural government investment and its growth rate during the research period [20].

Based on the data provided in Table 2, the Agricultural government investment during the research period experienced fluctuations. In 2006, the Agricultural government investment increased by 241% compared to the previous year due to spending on the rebuilding of infrastructure that was damaged during the 2003 American invasion of Iraq. The decrease was recorded in 2020, which is attributed to the spread of the COVID-19 pandemic and the suspension of most projects, as well as a decline in government revenues which reduced the public expenditure, particularly on investment. In 2021, the investment ratio increased by 25% compared to the previous year, due to the resumption of projects that were halted in 2020, as well as an increase in government revenues leading to higher Agricultural investment spending. The growth rate of government agricultural investment was 3% in 2022 [21].

Table 2. Agricultural Government Investment and its Rate of Change for the Period 2004–2022.

Year	Agricultural government investment(million dinars)	Rate of change %	Year	Agricultural government investment(million dinars)	Rate of change %
2004	15155800	——	2014	42129699	184
2005	230331100	93	2015	46431846	10
2006	786940300	241	2016	14491522	68–
2007	17591619	97–	2017	11778007	18–
2008	50174500	185	2018	23483878	99
2009	11559200	76–	2019	64997144.9	176
2010	38345361	231	2020	14095691.4	78–
2011	57045665	487	2021	17688313	25
2012	114215244	100	2022	18277512	3
2013	14830121	87–			

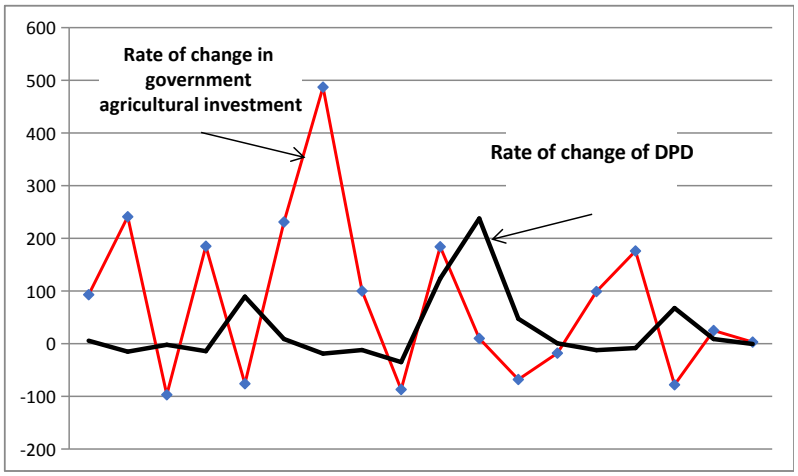

Figure 1. The Rate of Changes of DPD and Agricultural Government Investment between 2005–2022.

Table 3 and Figure 2 display the GDP at current prices and the rate of change for the period between 2005–2022 [18].

Based on Table 3, the GDP in Iraq increased continued to increase during the period (2004–2008). However, in 2009, it declined by 11.27%. Subsequently, the Iraqi GDP began a gradual increase during the period (2008–2013), but it soon declined once again due to the drop in global oil markets starting from the second half of 2014. Thereafter, it started a gradual increase, reaching 27,615,786,700,000 Iraqi dinars in 2019, This is attributable to the 3.8% rise in crude oil output over the prior year, with production reaching 1670.3 million barrels, compared to 1609.8 million barrels in 2018 [22].

Table 3. GDP and Rate of Change for the Period 2004–2022.

Year	GDP (million dinars)	Rate of change %	Year	GDP (million dinars)	Rate of change %
2004	29586000	——	2014	260610438	–3.87
2005	47959000	62.10	2015	194680971	–25.30
2006	64000000	33.45	2016	196924141	1.15
2007	111455813	74.15	2017	225722375	14.62
2008	157026062	40.89	2018	251064479	11.23
2009	139330211	–11.27	2019	276157867	9.99
2010	171956975	23.42	2020	215661516	–21.91
2011	217327107	26.38	2021	301152818	39.64
2012	254225491	16.98	2022	383064152	27.20
2013	271091778	6.63			

However, GDP declined by 21.19% in 2020 due to many reasons, the most important were the COVID-19 pandemic and the decline in global crude oil prices, as well as the decrease in crude oil production. The relaxation of limitations and the rise in OPEC's monthly production quotas led to an increase in oil output, which in turn caused the GDP to reach its greatest value in 2022. Additionally, the recovery of global crude oil prices was attributed to an increase in worldwide demand over 2021. The total GDP benefited from the drop in COVID-19 infections brought on by enhanced vaccination as well as by the rise in crude oil prices globally and OPEC's choices [20].

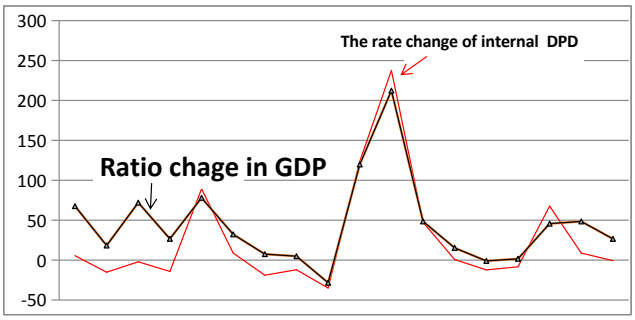

Figure 2. The rate of change of domestic public debt and the rate of change of GDP.

4. Results and Discussion

4.1.Unit Root Test

Table 4 shows the outcomes of the unit root test using the ADF test for time series of variables at level and first difference that have a constant term, a constant term with a general trend, and without a constant term and a general trend [23].

Table 4. Extended Dickey-Fuller (ADF) Test.

	At Level	X	Y1	Y2
With Constant	t-Statistic	0.0463	–0.8508	–1.9885
	Prob.	0.9593	0.7984	0.2913
		no	no	no
With Constant & Trend	t-Statistic	–2.4979	–2.0369	–1.8447
	Prob.	0.3284	0.5717	0.6729
		no	no	no
Without Constant & Trend	t-Statistic	1.21	1.4169	–0.9007
	Prob.	0.941	0.96	0.3228
		no	no	no
At First Difference				
		d(X)	**d(Y1)**	**d(Y2)**
With Constant	t-Statistic	–3.5327	–8.9374	–8.4906
	Prob.	0.0100	0.0000	0.0000
		***	***	***
With Constant & Trend	t-Statistic	–3.7373	–8.8763	–8.4941
	Prob.	0.0265	0.0000	0.0000
		**	***	***
Without Constant & Trend	t-Statistic	–2.8629	–8.544	–8.544
	Prob.	0.0048	0.0000	0.0000
		***	***	***

Table 4 shows that the variables are not stationary at the original level of the data. They became stationary after getting their first difference.

4.2 The Initial Estimation of the Correlation between DPD (X) and Economic Growth (Y1)

Table 5 displays the results of the initial estimate of the ARDL model for the correlation between DPD and economic growth [23].

Table 5. The Initial Estimate of the ARDL Model.

Variable	Coefficient	Std. Error	t-Statistic	Prob.*
Y1(-1)	0.611147	0.117005	5.223249	0.0000
Y1(-2)	–2.56E–14	0.140408	–1.82E–13	1.0000
Y1(-3)	2.80E–14	0.140408	1.99E–13	1.00000
Y1(-4)	0.326609	0.115995	2.815706	0.0065
X	–2.56957	0.444716	–5.778009	0.0000
X(-1)	1.224053	0.641723	1.90745	0.0611
X(-2)	–2.11E–13	0.660283	–3.20E–13	1.0000
X(-3)	2.65E–13	0.660283	4.02E–13	1.0000
X(-4)	1.829733	0.555275	3.295185	0.0016
C	17040318	5483930	3.107319	0.0028
R-squared	0.964232	Mean dependent var		2.08E+08
Adjusted R-squared	0.95904	S.D. dependent var		82137548
S.E. of regression	16623467	Akaike info criterion		36.21878
Sum squared resid	1.71E+16	Schwarz criterion		36.53498
Log likelihood	–1293.88	Hannan-Quinn criter.		36.34466
F-statistic	185.711	Durbin-Watson stat		1.412615
Prob (F-statistic)	0.0000			

Table 5 shows that the coefficient of determination (R-squared) reacted 96%, and the adjusted coefficient of determination is 95%, which states that the model has a very good explanatory power.

4.3 Optimal Lag Length Test

The findings of the best lag length test for the ARDL model of the relationship between DPD and Agricultural government investment are shown in Figure 3 [23].

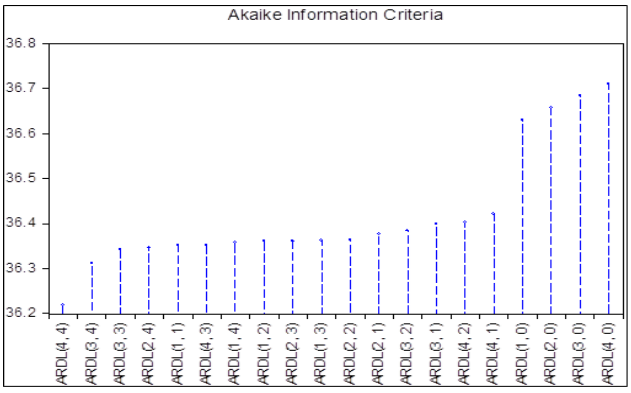

Figure 3. Testing the Optimal Lag Period.

The ideal lag time chosen by the ARDL model is of the order (4.4) as seen in Figure 3. The model's criteria are utilized to determine the ideal lag period, the lag length that yields the lowest result for these criteria is chosen.

4.4 Testing the Critical Value Bounds between Variables

The computed F-statistic value is 8.365416, At the 1% significance level, this result exceeds the upper bound critical value of the F-statistic, which is 7.840. This number shows that there is a cointegrating correlation between the variables. As a result, we may accept the alternative hypothesis, that there is a cointegrating correlation between the variables and reject the null hypothesis, which states that there is no cointegration.

4.5 Estimating Short and Long Terms and the Error Correction Parameter

The short- and long-term estimators of the estimated model parameters as well as the error correction vector parameter should now be derived after making sure that the variables have a cointegration relationship, as Table (6) illustrates [23].

Table 6. Estimating Short and Long Terms and the Error Correction Parameter.

Variable	Coefficient	Std. Error	t-Statistic	Prob.
D(Y1(-1))	–0.32661	0.115995	–2.81571	0.0065
D(Y1(-2))	–0.32661	0.115995	–2.81571	0.0065
D(Y1(-3))	–0.32661	0.115995	–2.81571	0.0065
D(X)	2.56957	0.444716	5.77801	0.0000
D(X(-1))	0.00000	0.660283	0.00000	1.0000
D(X(-2))	0.00000	0.660283	0.00000	1.0000
D(X(-3))	–1.82973	0.555275	–3.29519	0.0016
CointEq(-1)	–0.06224	0.031493	–1.97641	0.0526
Cointeq = Y1 – (7.7793*X + 273768263.0306)				
Long Run Coefficients				
Variable	**Coefficient**	**Std. Error**	**t-Statistic**	**Prob.**
X	7.779335	3.27192	2.377606	0.0205
C	2.74E+08	82073278	3.335657	0.0014

The results in Table 6 indicate the existence of a cointegrating correlation between DPD and economic growth. The value of the error correction term is –0.06224, which is negative and statistically significant at the 5% level. This suggests that 0.06224 of the short-run disequilibrium errors that shocks of the independent variable caused can be corrected by the dependent variable within a single time period. The short-run and long-run correlations can be interpreted as follows:

Short-run correlation

The results in Table 6 indicate the existence of posi-

tive correlation which is statistically significant between the variables in the short run. Specifically, there is a positive and statistically significant (at the 1% level) effect of DPD on economic growth in the short run. This implies that a one-unit increase in DPD maximizes the economic growth by 2.56957 units, and conversely, a one-unit decrease in DPD results to a decrease in economic growth by 2.56957 units with ceteris paribus.

Long-run correlation

The results in Table 6 also indicate the existence positive correlation which is significant statistically between the variables in the long run. Specifically, the DPD has a positive significant effect (at the 5% level) on economic growth in the long run. This implies that a one-unit increase in DPD results in increasing the economic growth by 7.779335 units, and conversely, a one-unit decrease in DPD results in a decrease in economic growth by 7.779335 units, ceteris paribus.

The results of the paper are not consistent with the study of Haqa, M. Khan [8], which used the ARDL model, and we do not find any evidence of an impact of public debt on long-term economic growth in Pakistan. Zouhaier's study, which used the dynamic panel data model, was inconsistent with the results of this paper and indicates the negative impact of debt on the GDP of a number of developing countries. Gurung's study that used Granger causality is inconsistent with the results of this paper and indicates that there is no causal relationship between internal public debt and GDP in the economy of Nepal.

4.6 Verifying the Model's Goodness-of-fit

After estimating the ARDL model, we can verify the model's goodness-of-fit and ensure that it is free from econometric issues through the following diagnostic tests:

ARCH test for heteroscedasticity

Given that the computed value of (F) reached (0.423076) at the probability level (0.5176), which was not significant at the level of (5%), it is evident that the model does not have a heterogeneity of variance issue. This indicates that the heterogeneity of variance issue is not present in the calculated model.

LM test for serial correlation

The estimated model's quality and validity are indicated by the LM test results. With a probability estimated value of 0.4579 and a computed F-statistic score of 0.7904354, there is no statistical significance at the 5% level. This clearly shows that there is no autocorrelation or serial correlation issue with the calculated model's residuals.

Ramsey RESET

The results shown in Table 7 indicate that specified correction of the model. The computed t-statistic value is 0.47120 with a probability value of 0.6392 [23]. Furthermore, the calculated F-statistic value scored 0.22203 with a value of probability 0.6392. Both the t and f values refer to the non-significant at the 5% level suggesting that the estimated model is appropriate and that there are no issues with the model specification.

Table 7. The Result of the Ramsey Test.

	Value	Df	Probability
t-statistic	0.47120	61	0.6392
F-statistic	0.22203	(1, 61)	0.6392

Tests for structural stability of the estimated model parameters

Two tests, namely CUSUM and CUSUM OF SQUARE, "are carried out to ensure that the data used to estimate the model is free of structural changes and to assess the degree of stability and consistency of the long-run parameter estimates with the short-run values".

According to these tests, if the graphical plots of the "CUSUM" and "CUSUM" of Squares tests fall within the upper and lower limits at the 5% significance level, then the estimated parameters in the ARDL model are structurally stable. As seen in Figure 4, in such a scenario, we may accept the null hypothesis that all of the predicted parameters are structurally stable [23].

As shown in the Figure 4, the graphical plots of both the "CUSUM and CUSUM" of Squares tests lie within the critical bounds (upper and lower bounds) at the 5% significance level. This indicates that the cumulative sums are around their mean throughout the study period. This cumulative sum provides a clear indication of the stability and consistency of short-run and long-run parameters.

4.7 Initial Estimation of the Effect of DPD on Government Investment

Table 8 presents the ARDL results of the initial estimation model to evaluate the effect of DPD on government investment [23].

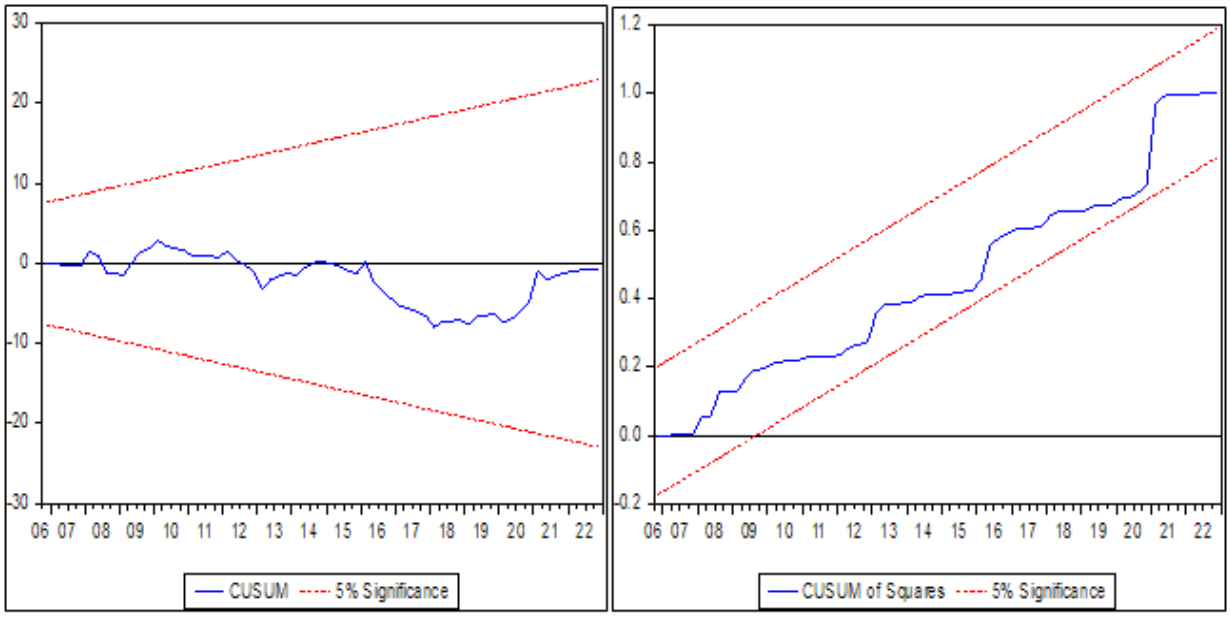

Figure 4. Structural Stability Testing.

Table 8. Results of the ARDL Model Estimation.

Variable	Coefficient	Std. Error	t-Statistic	Prob.*
Y2(-1)	3.305086	0.103797	31.84197	0.0000
Y2(-2)	–4.27914	0.283734	–15.08152	0.0000
Y2(-3)	2.570461	0.280177	9.174407	0.0000
Y2(-4)	–0.59437	0.101043	–5.882406	0.0000
X	–1.44075	0.102946	–13.99523	0.0000
X(-1)	4.80445	0.413352	11.62315	0.0000
X(-2)	–6.15697	0.713737	–8.626373	0.0000
X(-3)	3.579989	0.5824	6.146962	0.0000
X(-4)	–0.78695	0.184977	–4.254323	0.0001
C	58285.1	49119.54	1.186597	0.2401
R-squared	0.99979	Mean dependent var		16721063
Adjusted R-squared	0.999758	S.D. dependent var		10131380
S.E. of regression	157577.5	Akaike info criterion		26.90651
Sum squared resid	1.47E+12	Schwarz criterion		27.23029
Log likelihood	–918.275	Hannan-Quinn criter		27.03496
F-statistic	31226.57	Durbin-Watson stat		1.661139
Prob(F-statistic)	0.0000			

Both the corrected coefficient of determination and the coefficient of determination in Table 8 reached 99% which gives explanatory power to the model.

4.8 Testing the Optimal Deceleration Period

The findings of determining the ideal lag time for the ARDL model of the relationship between DPD and Agricultural government investment are displayed in Figure 5 [23].

Based on the model's requirements, Figure 5 illustrates that the ideal lag period selected by the ARDL model is of order 4.4. The lowest value criterion for the ideal lag time is selected.

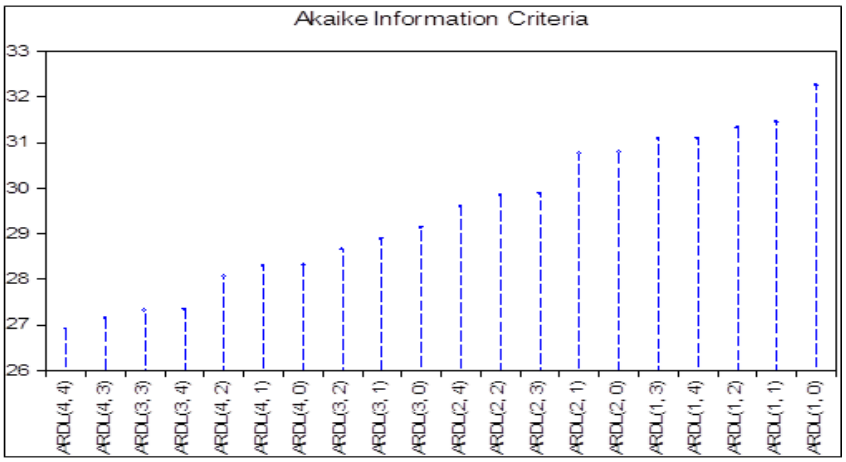

Figure 5. Testing the Optimal Deceleration Period.

4.9 Bounds Test for the Correlation between Variables

It is abundantly evident that the determined F-statistic value is 0.398669. At the 10% significance level, this number is less than the F-statistic's lower bound critical value, with a score of 4.040. This indicates that there was no proof of a cointegrating association between the variables at the time of the investigation. A non-significant effect of DPD on government investment. It confirms that the majority of this debt has not been directed by the government towards investment. The main motivations for borrowing by the Iraqi government have been to finance the budget deficit and fund the current, non-productive operational expenditures. Additionally, this debt has been subject to administrative and financial corruption, as well as weak oversight and auditing of how these funds are used. These reasons have led to the government having to pay the installments and interest on the debt, further increasing the budget deficit. The end result is the lack of a real impact of DPD on the investments made by the government.

This result was inconsistent with Abubakar's study, which used the ARDL model, which indicates that there is an effect of domestic debt on private investment, and this positive effect leads to a significant improvement in private investment in Nigeria. Zouhaier's study, which used the dynamic panel data model, indicates that the results of this paper are consistent the absence of an impact of public debt on investment for a number of developing countries.

The economic importance of these results helps us fully understand the management and policy-making of internal public debt towards government investment in agriculture and economic growth. These results provide important information about developments in the internal public debt of local authorities can be used and benefited from in analyzing the effectiveness of the impact of this variable on the economy. The results give insight into the health of the economy and enable us to interpret the facts because the internal public debt index is supposed to have a significant impact on agricultural investment and economic growth. The importance of the results of the standard study that we obtained facilitates the process of decision-making and participation and informing stakeholders and obtaining their comments, Such as researchers, employees, investors, and the government, in addition to the ease of obtaining study results (data, graphs, equations) through open access to them. The results are an answer to the questions of the research problem. The results enable us to explain the causes and phenomena studied. The importance of the results lies in bridging the scientific gap in research on this topic, and in forming a scientific product upon which researchers can rely in economic analysis.

5. Conclusions

The results indicate that the average contribution of DPD to the GDP during the study period from 2004 to 2022 reached 12.5%. This percentage is considered relatively low when compared to other developing economies. The results of the ARDL econometric analysis model reveal the impact of (X) DPD on Agricultural government investment (Y2) and economic growth (Y1). The results indicate that the variables were non-stationary at their original levels, but became stationary after taking the first difference, as confirmed by Dickey-Fuller (ADF) test. The R-squared reached 96%, and the adjusted R-squared was 95%, indicating a

highly acceptable explanatory power of the model for the variables (DPD) and (economic growth). The findings suggest the existence of a cointegrating relationship between DPD and economic growth. The error correction term has a value of –0.06224, which is negative and statistically significant at the 5% level. This implies that 6.224% of the short-run disequilibrium errors independent variable shocks caused can be corrected by the dependent variable within a single time period. A significant positive relationship is assigned by results between the variables in the short run. Specifically, DPD has a positive and significant (at the 1% level) effect on economic growth in the short run. A one-unit increase in DPD results to an increase in economic growth by 2.56957 units, and conversely, a one-unit decrease in DPD causes a decrease in economic growth by 2.56957 units, ceteris paribus. The results confirm the presence of correlation which is statistically significant and positive between the variables in the long run. Specifically, the DPD has there a positive and statistically significant (at the 5% level) effect on economic growth in the long run. It is statistically revealed that a one-unit increase in DPD leads to an increase in economic growth by 7.779335 units, and conversely, a one-unit decrease in DPD results a decrease in economic growth by 7.779335 units, ceteris paribus. Furthermore, the estimated model is free from the problems of heteroscedasticity and serial correlation in the residuals. The results also confirmed the validity of the functional form of the estimated model. The cumulative sums as the results showed are centered around their mean scores throughout the study period. This strongly indicates of the stability and consistency in the model's estimates between the short-run and long-run parameters of DPD and economic growth. This result is consistent with economic logic, as the government tends to utilize these debt funds for both operational and investment expenditures, which in turn are reflected in the growth of various economic sectors. The model's parameters are structurally stable, further strengthening the credibility of the findings for policy analysis and decision-making. According to the bounds test for the relationship between internal public debt (X) and Agricultural government investment(Y2), the alternative hypothesis, which states that there is cointegration between the variables, was rejected because there was no cointegration relationship between the two variables during the research period. The reason for this is that most of the percentage of internal public debt was directed to Ministry of Finance transfers to pay the wages of employees of self-financing companies (unproductive companies and losing companies), compensation claims related to property disputes, covering the federal budget deficit, building defense capabilities for the Ministry of Defense, granting loans to various entities, such as the Electricity Ministry, the Iraqi Commercial Bank to finance the Ministry of Agriculture (limited support for some crops), and the Ministry of Trade (to finance the food ration card program) and payments of contractors' and farmers' dues. The government's policy of using DPD for these transfer payment purposes crowded out investment, resulting in the lack of a significant effect of this debt on government investment. The study recommends the need for the Iraqi government to adopt a clear strategy that regulates the management of internal public debt by working to diversify sources of revenues and create productive economic sectors, and to set precise standards related to the foundations and conditions for using internal loans and how to use them and direct them in an optimal and efficient way that allows for increasing their effectiveness in Agricultural economic development. Working to mobilize the possible economic surplus and rationalize consumption in the public and private sectors, which allows for an increase in the savings rate and a reduction in the resource gap. Fiscal policy must have an economic reform program with a long-term strategy for internal public debt, developed on scientific and practical foundations, Which enables borrowing on concessional terms and works to keep the debt service within the economy's ability to bear it and within acceptable levels, And work to mobilize and direct these funds to sectors and branches of the national economy in order to develop the production structure, especially the agricultural sector, and get rid of the state of dependence on abroad to meet local demand.

Author Contributions

Saad A. Hammad and Noor Yousif Outhman are responsible for designing and reviewing the study idea, Mustafa Fadel Hamad is responsible for writing up the results, and Thakir Hadi Abdullah and Faisal Ghazi Faisal are responsible for collecting and analyzing data. Ali Abd Ulkareem contributed by helping to use the program Eviews9 and extracting the results. He also contributed to the design and production of the economic variables chart.

Funding

This research received no external funding.

Acknowledgments

We extend our thanks to Anbar University - College of Agriculture.

Data Availability

We obtained data from the Central Bank of Iraq (Department of Statistics and Research) and from the Ministry of Finance (Economic Department, Technical Information Department).

Conflict of Interest

The authors declare no conflict of interest.

References

[1] The World Bank, 2022 [Internet]. World development indicators [cited 10 May 2024]. Available from: https://data.albankaldawli.org/ (in Arabic).

[2] Niam, A., Saad, A., 2022. Political stability, corruption and its impact on the development of public debt and economic growth: a case study of Iraq for the period 2004–2020. Social Science journal, Res Militaris. 12(2), 4111–4127.

[3] Pattillo, C., Poirson, H., Ricci, L., et al., 2003. Through what channels does external debt affect growth?. Brookings Trade Forum. 229–277.

[4] Adai, N.S., 2016. Path analysis of public debt for the period (2010–2014) [Internet]. Fiscal Policy Division, Ministry of Finance, Iraq, 1-30. Available from: file: ///C:/Users/alsarh/Downloads/Documents/%D8%AA%D8%AD%D9%84%D9%8A%D9%84%20%D9%85%D8%B3%D8%A7%D8%B1%D8%A7%D8%AA%20%D8%A7%D9%84%D8%AF%D9%8A%D9%86%20%D8%A7%D9%84%D8%B9%D8%A7%D9%85%20%D9%84%D9%84%D9%85%D8%AF%D8%A9%20%D9%85%D9%86%202010%20%D8%A7%D9%84%D9%89%202014.pdf / (in Arabic).

[5] Abubakar, A., 2021. Effect of public debt on private investment in Nigeria: Evidence from an asymmetric dynamic model, Central Bank of Nigeria. Economic and Financial Review. 59(3), 59–86.

[6] Zouhaier, H., 2014. Debt and economic growth. International Journal of Economics and Financial. 4 (2), 440–448.

[7] Gurung, A., 2023. External debt and internal debt impact on the growth of the Nepalese economy. Open Journal for Research in Economics. 6(1), 13–24. DOI: https://doi.org/10.32591/coas.ojre.0601.02013g

[8] Haqa, M., Khan, A.A., Akram, M., 2020. Public debt, private investment, and economic growth: Empirical evidence from Pakistan. IIU Journal of Economics and Finance, 1(2), 35–48.

[9] CEPAL Review [Internet]. The impact of public debt on economic growth: an empirical study of Mexico (1994–2016) [cited 10 May 2024]. Available from: https://repositorio.cepal.org/server/api/core/bitstreams/54812966-778d-4837-b933-6ff405221ba0/content

[10] Pedro J., 2016. Local Governments Debt. Springer International Publishing: Cham. pp. 1–8. DOI: https://doi.org/10.1007/978-3-319-31816-5_2309-1

[11] Obiero, W.L., Topuz, S.G., 2023. The threshold effect of public and internal debt on economic growth: The case of Kenya. Current Research in Social Sciences. 9(1), 1–15. DOI: https://doi.org/10.30613/curesosc.1122651

[12] Paul, A., William, D., 2010. Economics (1st ed.). Lebanon Library Publishers: Lebanon. pp. 1–816.

[13] Al-Effendi, M. A., 2020. Macroeconomic theory and economic policy. Academic Book Center: Jordan. pp. 1–321. (in Arabic).

[14] Benine, I., 2019. The impact of Agricultural government investment spending on economic growth: An international study of oil economies (UAE, Saudi Arabia, Algeria), King Khalid University, Saudi Arabia, Balanced Development Conference 25–26 / 2019, 1–23. (in Arabic).

[15] O'Sullivan, A., Sheffrin, S.M., 2008. Microeconomics: Principles, applications, and tools. Pearson Education. 1–539.

[16] Assaf, N., 2023. New economic concepts and terminology. Dar Al-Yazouri for Publishing and Distribution: Amman. pp. 1–260. (in Arabic).

[17] Saad, A., Eman, K., 2021. Measuring and analyzing the impact of cooperative agricultural bank loans in supporting agricultural activity: a study in the Iraqi economy for the period 2004–2019. Tikrit Journal of Administration and Economics Sciences. 17(56), 397–413. DOI: https://doi.org/10.25130/tjaes.17.56.4.24 / (in Arabic).

[18] Central Bank of Iraq, 2004–2022 [Internet]. General Directorate of Statistics and Research [cited 10 May 2024]. Available from: https://cbi.iq/static/uploads/up/file-170012864033584.pdf / (in Arabic).

[19] Central Bank of Iraq, 2015 [Internet]. General Directorate of Statistics and Research, Annual Economic Report [cited 10 May 2024]. Available from: https://cbi.iq/static/uploads/up/file-152317788756444.pdf /(in Arabic).

[20] Ministry of Finance, 2022 [Internet]. Economic Department. Technical Information Section [cited 10 May 2024]. Available from: http://mof.gov.iq/pages/en/AbtGCTaxes.aspx (in Arabic).

[21] Central Bank of Iraq, 2022 [Internet]. General Directorate of Statistics and Research, Annual Statistical Bulletin [cited 10 May 2024]. Available from: https://cbi.iq/static/uploads/up/file-170367704385390.pdf/(in Arabic).

[22] Central Bank of Iraq, 2019 [Internet]. General directorate of statistics and research, Annual Economic Report,1-84 . Available from: https://cbi.iq/static/uploads/up/file-161329817033438.pdf/(in Arabic).

[23] Eviews [Internet]. EViews 9.5 for Window [cited 10 May 2024]. Available from: https://www.eviews.com/EViews9/ev9main.html