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Impacts of Climate Change on Public Expenditure for the Agricultural Sector of Selected OECD Countries

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Abstract: Agriculture is one of the sectors most affected by changes in weather patterns and extreme events. The agricultural sector in member countries of the Organization for Economic Cooperation and Development (OECD), despite having developed economies and advanced agricultural systems, are not immune to the negative impacts of rising temperatures, increased frequency of natural disasters such as droughts, floods and changes in rainfall patterns. The vulnerability, public nature, and externalities of the sector emphasize the importance of government fiscal support. The study explores the potential relationship between aspects of climate change, macroeconomics, and the level of public spending for the agricultural sector in selected OECD countries. Results from the GLS model shows that government spending and average temperature had significant negative impacts on public expenditure for agriculture, while the debt-to-GDP ratio, greenhouse gases from agriculture, and support for agricultural research and development have positive impacts.

Keywords: Climate change, impacts of climate change, agricultural sector, public expenditure, climate outcomes.

INTRODUCTION

Global climate change leads to many adverse consequences for the atmosphere, ocean, cryosphere and biosphere, and human beings. According to the IPCC report (2023), agriculture is one of the sectors most affected by changes in weather patterns and extreme events. Member countries of the Organization for Economic Cooperation and Development (OECD), despite having developed economies and advanced agricultural systems, are not immune to the negative impacts of rising temperatures, increased frequency of natural disasters such as droughts, floods and changes in rainfall patterns (OECD, 2023). Climate change not only threatens food production but also slows agricultural productivity growth (Cui *et al*., 2020). Agricultural sectors in OECD countries play an important role in the world food supply chain. Disruptions in agricultural production due to climate change can lead to volatile food prices, exacerbating global food insecurity (Gbadegesin *et al*. 2024). In addition, climate change also has negative impacts on the health of agricultural workers. Higher temperatures and heat stress are affecting the safety and productivity of agricultural workers, as well as their income and food security (EPA, 2025).

Agriculture accounted for 1.5–2.1% of total government expenditure between 2001 and 2022, while the sector contributed 3.2–4.3% of global GDP over the same period (FAO, 2024). Until recently, public expenditure supporting agriculture has prioritized important socio-economic issues, such as enhancing food security and livelihoods. However, improving climate outcomes has become a key factor in ensuring sustainable long-term growth in the agricultural sector. Depending on the policy instruments used, public expenditure can either promote or hinder the agriculture sector's climate change adaptation and mitigation potential, thereby enhancing or undermining the achievement of socio-economic objectives in the long term (Ilicic *et al*., 2021; Kejriwal, 2024).

To cope with the consequences of climate change, OECD governments are forced to increase spending on subsidy programs for people and crop insurance. In the United States, the cost of crop insurance programs in the period 2012-2022 averaged $10.58 billion, a significant increase compared to the average of the previous decade (the average direct cost was $5.85 billion in the period 2001-2011) (USDA, 2025). In addition, OECD countries also need to invest significantly in climate change adaptation measures such as building disaster prevention systems, upgrading infrastructure, researching and developing crop and livestock varieties, and implementing public awareness programs. These expenditures, although necessary and urgent, put considerable pressure on the government budget and potentially increase public debt if not managed sustainably (Yahaya *et al*., 2021). The impact of agricultural financial support policies on agricultural production, however, is not always positive. Some studies have shown that government agricultural subsidy policies can lead to overexploitation of resources and environmental pollution, such as excessive use

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of fertilizers and pesticides (Wu *et al*., 2019; Gao *et al*., 2021).

Although the problem has been widely recognized, in-depth studies on the specific impacts of climate change on public expenditure for the agricultural sector of OECD countries are still relatively limited. Many existing studies often focus on assessing the overall macroeconomic impact of climate change or analyzing specific aspects such as the cost of responding to a certain type of natural disaster. There is still a lack of empirical studies on the relationship between climate change and public expenditure for the agricultural sector at the national level. This study will provide empirical evidence and implications for effective budget expenditure in the agricultural sector in response to climate change.

RESEARCH BACKGROUND AND LITERATURE REVIEW

The observed impacts of past climate trends on crop production are evident in many regions of the world, with negative impacts more prevalent than positive ones (Porter *et al*., 2014). In the medium term – that is, until around 2030 – the positive and negative impacts on productivity may offset each other at the global level, but after this point, the balance will increasingly tilt toward the negative as climate change intensifies (FAO, 2016). Climate change is exacerbating water scarcity in already water-stressed areas and leading to an increased risk of agricultural droughts affecting crops (Un, 2025). In addition, global warming has led to a reduction in crop quantity and quality due to shortened growing seasons following rising temperatures (Kim, 2012). Climate change alters major production regions, creating a crisis for some areas but potentially an opportunity for others.

As for livestock, climate change affects livestock productivity, animal health and biodiversity, feed quality and quantity, and pasture carrying capacity (FAO, 2016). Higher temperatures cause heat stress in animals, which has a range of negative impacts: reduced feed intake and productivity, lower reproductive rates, and higher mortality rates. Heat stress also reduces animals' resistance to pathogens, parasites, and disease vectors (Thornton *et al*., 2009; Niang *et al*., 2014).

Fishery and aquaculture systems are susceptible to impacts from water temperature, oxygen depletion, sea level rise, pH reduction, and changes in productivity patterns (FAO, 2016). Inland fisheries and aquaculture yields are threatened by changes in rainfall and water management, increased pressure on freshwater resources, and the frequency and intensity of extreme weather events (Brander, 2007; Porter *et al*., 2014). Furthermore, small-scale fisheries in tropical, underdeveloped, and economically impoverished regions are particularly vulnerable to the impacts of climate change (Porter *et al*., 2014).

Similarly, climate change and climate variability threaten the provision of a range of vital environmental goods and services from forests (FAO, 2016). In addition, higher temperatures and changes in rainfall are increasing tree mortality rates through heat stress, drought stress, and pest outbreaks (Allen *et al*., 2010). The general trend for temperate forests until recently has been an increase in growth rates, due to a combination of extended growing seasons, higher atmospheric CO2 concentrations and nitrogen deposition, and forest management (Ciais *et al*., 2008). For humid tropical forests, many species are vulnerable to drought and fire mortality rates (FAO, 2016).

Climate change has a range of impacts on the rural economy including agricultural productivity, household income and property values, and it also affects agricultural infrastructure through changes in water resources available for agriculture (Kim, 2012). Climate change can reduce incomes at both household and national levels. Given the high dependence on agriculture for hundreds of millions of poor and rural populations vulnerable to food insecurity, the potential impacts on agricultural income – with far-reaching consequences across the economies of low-income and agriculture-dependent countries – are a major concern (FAO, 2016).

In short, the impacts of climate change on the agricultural sector are primarily reflected in temperature and rainfall, exhibiting a dual nature, creating both opportunities from positive impacts and costs from negative impacts.

According to FAO (2015), countermeasures that the agricultural sector can consider when facing the risks and challenges of climate change, particularly global warming, are divided into two main categories: mitigation measures aimed at reducing the scale and speed of climate change by reducing greenhouse gas emissions and absorption, and adaptation measures that acknowledge the inevitability of global warming, understand the

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impacts of climate change, and mitigate the damage it may cause.

Mitigation measures in agriculture include innovation and technology transfer, crop diversification, climate-smart farming practices to improve soil quality and reduce soil erosion (IPCC, 2014). The adaptation measures involve adjusting natural or human systems to respond to actual or anticipated climate stimuli or their impacts, helping to mitigate harm or exploit beneficial opportunities (IPCC, 2014). In agriculture, adaptation actions include technological responses, enhancing access to credit and other critical production resources for smallholder farmers, and strengthening institutions at the local and regional levels. Specific responses include developing new crop varieties adapted to changes in CO2, temperature, and drought, promoting climate risk management capacity, offsetting the economic impacts of land-use change, crop insurance, and information systems to support early warning and proactive planning. (Ilicic, 2021)

According to Yameogo *et al*. (2013), total public expenditure supporting the agricultural sector (including budg*et al*locations and actual expenditures) includes policy transfers supporting the development of the agricultural sector, and policy management costs. Public expenditure supporting the development of the agricultural sector is all public expenditure made to support the development of the agricultural sector, financed from the national budget, central or regional budget, regardless of which ministry implements the policy, and foreign aid, provided through local governments or specific projects implemented by international organizations. They include specific expenditure for agriculture and expenditure supporting agriculture.

The characteristics of agriculture, including its vulnerability, public nature, and externalities, emphasize the importance of government fiscal support for agriculture (Binlei *et al*., 2021). Effective public investments in agriculture such as input subsidies, value chain development, and extension services can help increase production, stabilize food supplies, and reduce import dependence, contributing to national food security (Bizikova *et al*., 2017).

Public spending on agriculture also plays an effective role in mitigating the impact of climate change on crop productivity, particularly by enhancing the positive impact of rainfall on maize and rice yields (Hao *et al*., 2024). Specifically, policies such as subsidies for the purchase of agricultural machinery in fiscal expenditure can accelerate the process of agricultural mechanization (Yang *et al*., 2023). Mechanization activities improve production efficiency and facilitate land circulation, while large-scale mechanized farming brings economies of scale, thereby increasing crop yield levels. In addition, measures such as converting high-yield agricultural land to suit mechanized production and mitigating drought and flood are also used to improve grain production efficiency and increase crop yield levels (Hao *et al*., 2024). Moreover, items such as cultivation guidance in fiscal expenditure for agriculture, through scientifically constructed cropping plans, provide long-term adaptation measures to global warming. Public expenditures supporting the agricultural sector have a positive impact on the sector's capacity to adapt to climate change as well as on greenhouse gas emissions (Ilicic *et al*., 2021).

In agricultural markets, in addition to factors such as public goods, externalities, monopolistic behavior and asymmetric information; the allocation of land and water resources between agriculture and the environment, the natural monopoly characteristics of agricultural infrastructure, asymmetric information between buyers and sellers regarding food quality and safety, and externalities related to the external costs of soil and water pollution arising from the agro-based food industry are also identified as leading to market failures (Alosoufe *et al*., 2025). Public spending can help overcome these failures, creating conditions for more efficient market operation (Rohne Till *et al*., 2022).

Public spending programs can provide income support, insurance, and training to farmers, helping them cope with risks and improve their livelihoods. In recent years, governments have become increasingly involved in supporting commercial agricultural (crop and livestock) insurance programs (Stoian *et al*., 2022).

HYPOTHESES

Average Temperature

Several previous studies have showed positive relationship between average temprature and public spending for the agricultural sector. Kahn *et al*. (2021) demonstrates that the costs associated with adaptation policies implemented to mitigate the adverse impacts of temperature change

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increase public spending related to the agricultural sector. Temperature change also increases climate-related public spending on disaster recovery and relief payments to households and unemployment benefits due to reduced yields (Giovanis *et al*., 2022).
H1: Temperature has a positive impact on public spending related to the agricultural sector.

Rainfall
Yahaya *et al*. (2021) shows the negative impact of rainfall on the budget balance by reducing revenue-generating outputs or increasing expenditure. The study of Leppänen *et al*. (2015) also supports this finding, suggesting that extreme rainfall significantly increases the budget deficit. This mainly occurs through off-budget spending in the form of relief and infrastructure reconstruction.
H2: Rainfall has a positive impact on public spending related to the agricultural sector.

Greenhouse Gases from Agriculture
Agricultural activities emit greenhouse gases, increasing pressure from international commitments (such as the Paris Agreement), leading governments to increase subsidies to encourage sustainable agricultural practices and reduce emissions (OECD, 2019). In addition, Balogh *et al*. (2023) examines the impact of subsidies under the European Common Agricultural Policy on greenhouse gas reduction in agriculture. Their results shows that public expenditures such as investment in research and development in the agricultural sector contribute to greenhouse gas reduction.
H3: Greenhouse gases from agriculture have a positive impact on public spending for the agricultural sector

Government Support for Agricultural Research and Development
Investment in agricultural R&D is often accompanied by subsidy programs to encourage farmers to adopt new solutions that help adapt to climate change (FAO, 2016). Dincă G *et al*. (2024) examines several variables representing agricultural subsidies and concludes that government support for agricultural research and development has the strongest impact on public spending.
H4: Government support for agricultural research and development has a positive impact on public spending for the agricultural sector.

Government Budget
Dincă G *et al*. (2024) found that public spending has a positive impact on agricultural support. The positive impact of government budget on agricultural subsidies is also consistent with the study conducted by Scown *et al*. (2020).
H5: Government budget has a positive impact on public spending related to the agricultural sector.

Debt-to-GDP Ratio
Uguru (2016) studies the significant relationship between public debt and government spending and found that public debt and government spending have a high correlation and a causal relationship. Research by (Dincă G *et al*., 2024) suggests that debt-to-GDP ratios have a positive impact on public spending. This result is also supported by Fatholahi (2023), who argues that public debt is also a strong determinant of government spending.
H6: Debt-to-GDP ratios have a positive impact on public spending related to the agricultural sector.

GDP Growth Rate
Strong economic growth generates larger budget revenues, allowing the government to increase agricultural subsidies to support adaptation and mitigation of climate change impacts (World Bank, 2010). This result is consistent with the research of Dincă G *et al*. (2024) which argues that GDP has a positive impact on public spending on agriculture.
H7: GDP growth rate has a positive impact on public spending for the agricultural sector.

Inflation Rate
According to studies by Ezirim *et al*. (2008), Garcia-Macia (2023), there is an interdependence between inflation and public spending in both the short and long term. Through analysis, the authors assert that an increase in inflation reduces public spending.
H8: Inflation rate has a negative impact on public spending related to the agricultural sector.

RESEARCH DESIGN

Data Collecting Methods
The research sample includes data from 15 OECD countries between 2010 and 2019. The period is chosen to avoid data perturbation due to the exogenous shocks, namely the 2008 global financial crisis and the impact of the Covid-19 pandemic. Data is collected from the OECD, the World Bank, the IMF, the FAO, and the Climate Change Knowledge Portal. Annual data is more suitable than monthly, or quarterly data for the selected variables such as GDP growth rate, debt-to-GDP, government spending. Annual data also

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helps avoid complicating the univariate distribution model due to various reasons such as variable instability, skewed distribution, or the presence of sequential correlations in the original data series.

Dependent Variable

The study uses agricultural subsidies (AGR_SUB) to represent government spending related to the agricultural sector. Agricultural subsidies (AGR_SUB) are total support (TSE) granted to the agricultural sector and include producer support (PSE), consumer support (CSE), and general service support (GSSE).

Independent and Control Variables

- GHG: Greenhouse gases from agriculture
- TEMP: Average temperature
- RAIN: Rainfall
- GOVE: Government spending
- GSARD: Government support for agricultural research and development
- DTG: Debt-to-GDP ratio
- GDP_GR: GDP growth rate
- INF: Inflation rate

RESEARCH RESULTS

Descriptive Analysis

Table 1: Descriptive analysis

Variable	Obs	Mean	Std. dev.	Min	Max
i	0				
t	150	2014.5	2.881904	2010	2019
AGR_SUBi	150	14585.97	23956.29	136.0463	96379.16
GDP_GR	150	2.935268	1.825017	-2.832775	11.20011
GOVE	150	33.83357	8.549961	17.17984	50.53583
INF	150	2.624486	2.590532	-1.143909	16.33246
DTG	150	63.12667	51.8129	8.6	236.4
GHG	150	73011.58	145994.8	621.466	629494
GSARD	150	482.6085	681.3948	5.824918	3086
TEMP	150	12.56747	8.563059	-4.61	25.73
RAIN	150	1192.154	730.5315	123.78	3534.81
countries	150	8	4.334968	1	15

***Source**: Compilation of the author*

The dependent variable AGR_SUBI represents the total fiscal support granted to the agricultural sector. Average agricultural support reached 14,585.97 (million USD), ranging from a minimum value of 136.05 (million USD) to a maximum value of 96,379.16 (million USD). The differences between observations are quite large, as shown by the high standard deviation (23,956.29), indicating diversity in the level of public spending on agriculture between countries and over time. This may stem from differences in climatic factors, the size of agricultural sector, different policy priorities between regions/countries or over time.

As for climate variables, temprature (TEMP) averages 12.57°C with a standard deviation of 8.563, ranging from -4.61°C to 25.73°C. This diversity reflects the varying climatic conditions among OECD countries. Rainfall (RAIN) averages 1,192.15, with a standard deviation of 730.53, ranging from 123.78 to 3,534.81. Large variations in rainfall can cause problems such as droughts or floods, affecting agricultural productivity and forcing governments to increase spending to mitigate damage.

Agricultural greenhouse gas (GHG) records an average value of 73,011.58, with very high standard deviation of 145,994.8). This reflects large differences in greenhouse gas emissions from agriculture among the selected OECD countries.

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Government support for agricultural research and development (GSARD) also has a large standard deviation of 681.95 while its average level is 482.6, indicating significant differences in the level of support for agricultural research and development. This may reflect different strategies for promoting innovation in the agricultural sector among countries.

The average GDP growth rate (GDP_GR) is 2.94%, with a standard deviation of 1.83%. The low standard deviation indicates relatively small variability in economic growth rates. However, the existence of both negative and positive GDP growth rates suggests different periods of recession and growth in the countries. The average inflation rate (INF) is low (2.62%) with a standard deviation (2.59%), but it is important to note the range of values, especially negative values (deflation), which can have varying impacts on spending decisions.

The average government spending (GOVE) is 33.83% of GDP, with a lower standard deviation (8.55%), suggesting a relatively stable level of total government spending. The DTG variable has a high average value (63.13%) with a large standard deviation (51.81%), showing significant differences in the level of public debt relative to the size of the economies among the observed entities. In 2019, Japan had the highest public debt-to-GDP ratio for the entire period (236.4% of GDP). Furthermore, the relatively high average value of DTG suggests that countries in the region may be under significant public debt pressure.

Regression Analysis

This study examines the Ordinary Least Squares (OLS), the Fixed Effects Model (FEM), and the Random Effects Model (REM) models to select the best among them.

First, OLS regression is conducted and the authors test for multicollinearity using the Variance Inflation Factor (VIF):

Table 2: Multicollinearity

Variable	VIF	1/VIF
GSARD	6.22	0.160839
GHG	4.44	0.225185
DTG	2.38	0.420948
GOVE	2.14	0.466811
TEMP	1.61	0.621291
RAIN	1.39	0.721389
GDP_GR	1.21	0.827329
INF	1.20	0.835195
Mean VIF	2.57	

Although the average VIF (2.57) is not very high, the GSARD variable has a noticeable degree of multicollinearity with a large variance inflation factor (VIF = 6.22). However, the VIF of the GSARD variable is still less than 10 and the estimated coefficients are still highly statistically significant. The GHG variable also has a moderate VIF (4.44). The remaining variables have relatively low VIFs, indicating few multicollinearity issues associated with them.

Subsequently, the authors perform an OLS model test and found that the model exhibited heteroskedasticity and autocorrelation. The authors use the Breusch-Pagan Lagrangian test to select the appropriate regression model between the OLS and REM models with the following pair of hypotheses:

- H0: The model has no random effects
- H1: The model has random effects

The test results showed that Prob > chibar2 = 0.0000 < 0.05, therefore rejecting H0 and accepting H1, thus the REM model is then chosen.

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In the next step, the authors use the Hausman test to select the FEM or REM model with the following pair of hypotheses:

• H0: There is no correlation between the explanatory variables and the random factor (The REM model is appropriate)

• H1: There is a correlation between the explanatory variables and the random factor (The FEM model is appropriate)

The Hausman test results show that Prob > chi2 = 0.0018 < 0.05, so H1 is accepted and H0 is rejected.

Therefore, the FEM model is more appropriate. The study then uses the Breusch-Pagan Lagrangian test to check for heteroskedasticity and the Wooldrige test to check for autocorrelation. Finally, the author uses the Generalized Least Squares (GLS) method to overcome the above deficiencies.

Finally, the Generalized Least Squares (GLS) method is used to correct the model's shortcomings, and the results obtained are as follows:

$AGR_SUB_{i,t} = 1939.8 - 188.7GOVE_{i,t} + 0.0554GHG_{i,t} + 98.93\Delta DTG_{i,t} + 171.1GDP_GR_{i,t} + 21.07INF_{i,t} - 156.1TEMP_{i,t} + 0.248 RAIN_{i,t} + 17.40GSARD_{i,t} \pm \delta t \pm \gamma t \pm \mu_{i,t}$

The GLS regression shows that government spending (GOVE) and average temperature (TEMP) have a significant negative impact on public spending for the agriculture sector (AGR_SUB), while debt-to-GDP ratio (DTG), greenhouse gas emissions from agriculture (GHG), and support for agricultural research and development (GSARD) have a positive impact. Factors such as GDP growth rate (GDP_GR), inflation rate (INF), and rainfall (RAIN) do not have a significant impact on government spending for the agricultural sector.

One notable finding is the statistically significant negative impact at the 1% level of government spending (GOVE) on agricultural support. When GOVE increases by 1%, total support for agriculture tends to decrease by $188.7 million. This result contradicts the research of Scown *et al*. (2020), which supported the idea that an increase in GOVE could lead to the allocation of more resources to agriculture, through direct subsidies, price support, or investment in research and development (R&D). The study also emphasises the role of GOVE in supporting agriculture, pointing out that EU common agricultural policy accounted for 38% of the EU budget between 2014 and 2020. However, the impact of GOVE on AGR_SUB is not uniform across regions. According to the research of Dincă G *et al*. (2024), when conditions in the southern EU are deteriorating for the agricultural sector, GOVE has a negative impact on AGR_SUB. Conversely, conditions in northern EU countries are favorable for agriculture, so GOVE has a positive impact on AGR_SUB. This may also imply that the impact of GOVE on AGR_SUB depends on the growth potential of the agricultural sector, geographical, climatic, and economic conditions of each region. Another explanation for this negative impact is that governments operate within budget constraints, so increasing spending in one sector often requires reduced or slower growth in another (Zucchi, 2023). Therefore, when the government increases spending on other sectors of the economy, resources allocated to agriculture tend to decrease. Furthermore, AGR_SUB may not be considered an efficient use of public funds, especially when comparing productivity gains across sectors, which often show that gains in non-agricultural sectors are more valuable, even when agriculture is initially the largest sector in terms of employment (Monteforte *et al*., 2019). Some countries, such as Australia and New Zealand, tend to adopt a free-market farming model, with less direct government intervention and fewer subsidies than other OECD countries (Edwards, 2023). This model has given these countries greater flexibility in responding to market fluctuations and demands, and has placed a significantly less burden on taxpayers. In addition, governments can reduce significant waste of government budgets by keeping subsidies low, reforming or eliminating subsidies that have a negative impact on the environment or provide distorted support. (OECD, 1998; Greenville J, 2020).

Similarly, the mean temperature (TEMP) also had a negative and statistically significant 5% impact on AGR_SUB, suggesting that rising temperatures do not boost public spending as expected, but may instead reduce agricultural spending. The result suggests that for every 1°C increase in mean temperature, total support for agriculture tends to decrease by -$156.1 million. This could be due to the fact that increased temperatures can increase crop yields through fertilization effects, expand double cropping due to increased growing time, reduce damage to winter crops due to low

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temperatures, and reduce heating costs for agricultural crops grown in covered farming facilities (Kim, 2012). This result supports the conclusion of Leppänen *et al*. (2015), who argued that temperature increases reduce regional public spending in cold regions, and that a 1°C annual temperature increase reduces budget spending by 2.6% at real prices. However, it contradicts the study by Kahn *et al*. (2021), which states that temperature differential changes increase the costs associated with adaptation policies implemented to mitigate the adverse effects of temperature change, thus increasing public spending.

Conversely, the debt-to-GDP ratio (DTG) showed a positive and statistically significant impact at the 1% level on AGR_SUB in the GLS model. When the debt-to-GDP ratio increases by 1%, total support for agriculture tends to increase by $98.93 million. This suggests that, in the context of high public debt, the government may increase spending on agriculture as a measure to support the economy or to ensure food security. This result is consistent with the initial hypothesis and similar to the conclusion of Dincă G *et al*. (2024) that debt-to-GDP ratio has a positive impact on public spending. Fatholahi's (2023) study also shows the same result, stating that public debt is also a strong determinant of government spending. Hammad *et al*. (2024), however, find that public debt does not have any significant impact on government investment in agriculture. Of the 15 OECD countries observed, two-thirds are developed countries. In developed countries, a high debt-to-GDP ratio may indicate the ability of advanced economies to manage and repay debt. Conversely, in developing countries, this ratio can indicate challenges to economic stability and debt repayment capacity. As the debt-to-GDP ratio increases, it may suggest that the country is borrowing more money to stimulate economic growth (Dave, 2024). Public debt also finances agricultural GDP growth through the modernization of farming practices, support for agricultural businesses, and improved productivity in the sector (Sogah *et al*., 2024).

The variables GDP_GR, INF, and RAIN did not show a statistically significant impact on AGR_SUB. This contradicts some previous studies, such as OECD (2023), which suggest that economic growth and inflation typically boost public spending due to more abundant financial resources or increased production costs. The relationship between public spending and inflation is positive and insignificant in the short term and negative and significant in the long term (George-Anokwuru *et al*., 2020). Conversely, the study by Ezirim *et al*. (2008) also demonstrates an interdependence between inflation and public spending in both the short and long term. The authors find that an increase in inflation reduces public spending. Giovanis *et al*. (2022) also find no significant impact of changes in rainfall on increased climate-related public spending for disaster recovery and relief payments to households and unemployment benefits due to reduced output. In contrast, research by Yahaya *et al*. (2021) shows a negative impact of rainfall on the budget balance by reducing revenue-generating outputs or increasing spending (Suthari & Manam, 2025).

CONCLUSION

The study explores the potential relationship between aspects of climate change, macroeconomics, and the level of public spending for the agricultural sector in OECD countries. Results from the GLS model shows that government spending and average temperature had significant negative impacts on public spending on agriculture, while the debt-to-GDP ratio, greenhouse gases from agriculture, and support for agricultural research and development have positive impacts. Factors such as GDP growth rate, inflation rate, and rainfall do not have significant impacts.

Although this study provides imperical results on the impacts of climate change and other macroeconomic factors on public spending related to the agricultural sector in several OECD countries, there are still some limitations that need further improvement in future studies. Firstly, the sample size of 150 is still limited, which may affect the representativeness of the study and reduce its reliability. Secondly, the reliance on secondary data may limit the detailed and in-depth insights into the complex factors related to public spending and climate change in the agricultural sector across individual countries.

To obtain a more complete and accurate picture, further studies should employ a combination of data collection methods, such as in-depth interviews with industry experts, along with detailed analysis of case studies across different OECD countries. Sample size should also be increased to enhance the reliability and representativeness of the findings. Additionally, future studies could incorporate geopolitical factors to assess the impact of climate change on

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public spending related to the agricultural sector in several OECD countries for a more comprehensive perspective.

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