Analyzing the Impact of Fiscal Reforms on Green Growth in the MENA Region

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ABSTRACT

This research examines the relationship between green financial reform and green growth in countries of the Middle East region, including Africa in particular. It studies the impact of green financial reforms, such as green tax reforms and government spending, on green growth as measured by carbon dioxide emissions. The study uses secondary data from 2012 to 2020 and the sample includes countries in the Middle East and North Africa region, specifically Egypt. Data analysis includes descriptive statistics and correlation matrices to estimate the relationships between variables. Research hypotheses are tested using regression models and key economic issues such as normality, autocorrelation, multiplicity, and heteroscedasticity are examined to ensure the robustness of the results. They are used positively and inferentially to apply quantitative measurement methods to analyze data. The study provides insights into the long-term effects of fiscal policies such as green tax reform and government spending on environmental and economic outcomes in the Middle East and North Africa region. The results show a strong positive relationship between green fiscal reform and its impact on green growth.

Keywords: Fiscal: Form; Green; Growth; Tax; Reform; Carbon Dioxide; Emissions.

1. Introduction

The concept of fiscal reform to support sustainable development presents a recent political position for several states in the Organization for Economic Cooperation and Development *(OECD)* and is linked to the growing agreement on the operationalization of economic instruments as a tool of environmental policy (Shmelev & Speck, 2018). Green fiscal reform, also referred to as ecological fiscal reform, is a set of policy measures integrating economic

instruments with ecological objectives. These measures aim to align fiscal policies with sustainability goals, as well as income-damaging instruments such as taxes and pricing on resource use or emissions. Accordingly, green fiscal reforms include government spending aimed at promoting green investment, such as sustainable infrastructure and financing clean technologies (Elshamy & Ahmed, 2017).

Today's global problems pose a serious threat. These include climate change, air pollution, melting ice, plastic pollution, rising sea levels, deforestation, agriculture, and animal husbandry. These problems are linked to human activity and have serious consequences, necessitating immediate action toward environmental sustainability, the promotion of green finance, environmentally friendly technology, and green growth (Citil, 2024).

Green growth focuses on making economic growth sustainable through technological progress, optimal resource use, and the reduction or elimination of carbon emissions. Green growth seeks to reconcile two conflicting needs: economic growth and poverty reduction, alongside the necessity to mitigate the negative environmental impacts of production activities (Citil, 2024).

Governments have various financial policies to achieve green growth, such as taxing fossil fuel use or emissions across different sectors to regulate energy consumption. Policies should also address advertisements that promote wasteful economic activities and environmental degradation while supporting sustainable production. Governments must also incorporate social and financial policies to achieve inclusive growth (Elshamy & Ahmed, 2017).

In conclusion, the interplay between green financial reform and carbon dioxide emissions is crucial for developing policies that not only reduce environmental impact but also contribute to green growth and sustained economic development. This study aims to examine these interactions and provide insights into how financial reforms can support the transition to a greener, more environmentally sustainable economy while reducing CO_2 emissions.

2. Theoretical Background

2.1 Green Fiscal Reform

Green fiscal reform refers to a set of taxation and pricing measures designed to generate government revenue while simultaneously advancing environmental objectives. These measures include environmental taxes, subsidies, and incentives aimed at promoting green investment (Elshamy & Ahmed, 2023). However, Shmelev and Speck (2018) define green fiscal reform as the reallocation of tax burdens, shifting them away from commercially viable and environmentally sustainable activities toward those that cause irreversible environmental damage.

According to Speck (2015), the primary focus of green fiscal reform is to restructure the national tax system by shifting taxation away from productive economic activities that cause environmental harm—such as pollution and excessive resource consumption—toward the taxation of environmentally harmful activities, including carbon emissions and waste generation. This shift encourages more sustainable behaviors, enhances resource efficiency, and promotes conservation efforts.

A key component of green fiscal reform is environmental tax reform, which involves the introduction of green taxes while simultaneously reducing other distortive taxes, such as income or payroll taxes. The goal is to incentivize environmentally responsible behavior without negatively impacting economic growth or employment (Gramkow, 2020).

One of the major challenges of fiscal reform is its long-term focus, which may conflict with the immediate economic and political priorities of policymakers, such as job creation and reducing social inequalities. As a result, policymakers must carefully balance short-term economic needs with long-term environmental objectives (Speck, 2015).

Key Dimensions of Green Fiscal Reform

Green fiscal reform plays a crucial role in promoting green growth. This study focuses on **two** key dimensions of green fiscal reform:

1. **Green Tax Reform**
2. **Government Spending**

Green Tax Reform

Green tax reform aims to shift the tax burden away from labor and toward environmentally damaging activities, particularly carbon dioxide (CO_2) emissions. This strategy seeks to achieve both environmental and economic objectives by encouraging sustainable practices and reducing pollution. Revenues generated from green taxes can be reinvested in the economy, reducing other tax burdens, such as those on income or employment, thus promoting job creation and economic growth (Rodríguez *et al.,* 2019).

A significant component of green tax reform is the carbon tax, which directly taxes carbon emissions and other greenhouse gases. The primary aim of this policy is to discourage polluting activities while promoting cleaner alternatives, ultimately contributing to climate change mitigation (Ploeg *et al.,* 2022).

Government Spending

Government spending is a critical tool for addressing environmental challenges and shaping economic growth. Public expenditure constitutes a substantial share of GDP, accounting for 25% to 59% of GDP across OECD countries in 2021 (OECD, 2023).

The impact of government spending on green economic growth can be both positive and negative. On one hand, public investments in human capital, technological advancements, and green infrastructure can significantly reduce emissions and improve environmental efficiency, fostering sustainable economic growth. On the other hand, excessive government spending in high-emission sectors can accelerate environmental degradation, hindering green growth (Yumei *et al.,* 2021).

Government expenditure plays a crucial role in supporting environmental policies, particularly those aimed at reducing pollution and promoting sustainable development. Strategic investments in renewable energy research, low-carbon policies, and environmental conservation programs can facilitate a transition toward a greener economy (Hossain, 2024).

2.2 Green Growth

The relationship between green finance and green growth has been widely studied, as green finance is generally regarded as a key driver of green growth. One crucial factor in this relationship is the role of renewable energy production, which serves as a catalyst for both green finance initiatives and sustainable economic development (Citil, 2024).

Green growth is a concept that seeks to achieve long-term sustainable economic development by improving resource efficiency and minimizing environmental degradation. It emphasizes the importance of economic cooperation and policy frameworks that foster growth while preserving natural assets, which are essential for human well-being (Barbier, 2016). According to the World Bank, green growth involves the efficient use of natural resources to support economic development. However, one of the greatest challenges is decoupling economic growth from environmental degradation. While some strategies focus on achieving relative decoupling, where growth continues with reduced resource consumption, the United Nations Environment Programme *(UNEP)* argues that absolute decoupling—fully separating economic growth from resource use and environmental impacts—is essential for true sustainability(Hickel & Kallis, 2020).

Green growth is particularly significant for countries heavily dependent on fossil fuels, as reliance on these energy sources contributes to CO_2 emissions, air pollution, and serious health risks associated with particulate matter exposure. These environmental challenges underscore the urgent need to transition toward a green economy, enhancing sustainability and mitigating environmental harm (Wang *et al.,* 2021).

Carbon Dioxide (CO₂) Emissions

CO_2 emissions refer to the release of carbon dioxide into the atmosphere as a result of human activities, including industrial processes, deforestation, and fossil fuel combustion (Raihan, 2023). These emissions are a primary contributor to global warming and environmental degradation, making their reduction a critical component of international sustainability efforts. Carbon dioxide is one of the major greenhouse gases, and its mitigation is central to the United Nations 2030 Agenda, which aims to eradicate poverty, promote sustainable development, and ensure environmental resilience under the 17 Sustainable Development Goals (*SDGs)* (García *et al.,* 2023). If left unchecked, CO_2 emissions pose severe and potentially irreversible threats to the environment, economic development, and long-term sustainability (Wang *et al.,* 2024).

3. Literature Review

3.1 The Relationship between the Influences of Green Fiscal Reform on Green Growth.

Hao *et al.,* (2021) aimed at studying the role of green growth in promoting a sustainable environment and the role of green growth in CO_2 emissions, especially in the presence of factors such as human capital and environmentally related taxes. The study used second-generation data methods using the regressive automatic distribution model with a group of seven countries from 1991 to 2017 theoretical and empirical results found that linear and non-linear terms of green growth reduce the emissions of B2 as human carbon dioxide emissions.

Hu *et al.,* (2023) examined the impact of green finance on carbon dioxide (CO_2) emissions in China by analyzing panel data from 30 provinces and municipalities between 2007 and 2020. Using mediation models and conditional process analysis, the study explored the relationship between green finance, technological innovation, and CO_2 emissions. The findings indicate that green finance has both a direct effect on CO_2 emissions and an indirect effect through technological innovation.

Similarly, Elshamy and Ahmed (2023) analyzed the impact of green fiscal reform policies on environmental sustainability and economic growth. Their study found that several developed countries have implemented green fiscal policies—such as carbon taxes, solid waste management taxes, and congestion taxes—which have contributed positively to sustainable growth and development in Europe.

Wang *et al.* (2024) investigated the role of fiscal policies in conserving energy and reducing CO_2 emissions using a multi-period variability model covering 248 observations from 2003 to 2019. Their findings suggest that energy-conserving fiscal policies significantly enhance CO_2 reduction, improve carbon efficiency, and promote green innovation, amplifying their impact on sustainable energy practices.

The literature review highlights various aspects of green fiscal reforms and their influence on green growth. Most existing studies conclude that fiscal instruments, including carbon taxes, green finance, and energy-preserving policies, play a crucial role in reducing CO_2 emissions and fostering sustainable development. Additionally, technological innovation and human capital are identified as key factors that enhance the effectiveness of these reforms. However, while developed regions provide strong empirical evidence of success, there remains a notable gap in examining these dynamics within the MENA region, where socio-economic and environmental conditions differ significantly.

This study contributes to the growing literature by analyzing the relationship between fiscal reforms and green growth in the MENA region. It places special emphasis on identifying region-specific fiscal strategies and explores effective approaches to accelerate green transition, tailored to the unique economic and environmental challenges of the region.

Based on that, the research hypothesis is set as follows:

H_1: There is a significant influence of green fiscal reform on green growth

H1.1: There is a significant influence of green tax reform on carbon dioxide (CO_2) emissions.

H1.2: There is a significant influence on government spending on carbon dioxide (CO_2) emissions.

4. Research Methodology

The primary objective of this study is to analyze the impact of green fiscal reform—specifically green tax reform and green government spending—on green growth, as measured by carbon dioxide (CO_2) emissions. To achieve this, the study adopts a positivist research philosophy and a deductive approach, facilitating the development and testing of research hypotheses.

A quantitative research method is employed, relying on secondary data collected from MENA region countries—including Algeria, Bahrain, Egypt, Iran, Iraq, Jordan, Kuwait, Lebanon, Libya, Morocco, Oman, Qatar, Saudi Arabia, Syria, Tunisia, the United Arab Emirates, and Yemen—for the period 2012 to 2020. The study applies regression models to examine the relationships among variables, ensuring the robustness of results by addressing key econometric issues such as normality, autocorrelation, multicollinearity, and heteroscedasticity.

The primary research variables in this study include:

- **Independent Variable:** Green fiscal reform, measured through green tax reform and green government spending.
- **Dependent Variable:** Green growth, assessed through carbon dioxide (CO_2) emissions.

According to these variables figure 1 shows the framework of the current study:

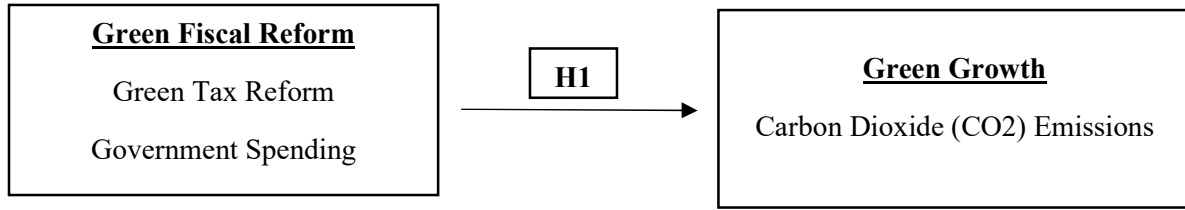| **Green Fiscal Reform**		**Green Growth**
Green Tax Reform	H1 →	Carbon Dioxide (CO2) Emissions
Government Spending		

Figure 1: Conceptual Framework

This study applies several measurement tools and models in testing the relationship between green fiscal reform, green growth, and control variables. The tools are founded on previous research but tailored to suit the context of this study.

1) Green Fiscal Reform
a) Green Tax Reform

To measure the effect of green tax reform on innovation, the following model by Gramkow (2015) was used:

$$GI_i = \beta_0 + \beta_1 TT_i + \beta_2 GS_i + \beta_3 AV_i + \beta_4 OC_i + \varepsilon_i$$

- **i:** industrial sector i

- **GI:** green innovation (percentage of firms that implemented advanced environmental management techniques)

- **TT:** total indirect tax burden net of subsidies (total tax burden net of subsidies as a proportion of added value in percentage terms)

- **GS:** government support for innovation (percentage of firms that received government support in the form of tax exemptions and/or subsidized public finance for innovation)

- **AV:** natural log of added value (expressed in Brazilian currency; Real)

- **OC:** natural log of employment (number of employees)

- **ε:** error term

b) Government Spending

The influence of government spending on green growth was assessed using a detailed model (Gramkow, 2015)

$$GI_i = \beta_0 + \beta_1 II_i + \beta_2 IPI_i + \beta_3 ICMS_i + \beta_4 GFRD_i + \beta_5 GFIL_i + \beta_6 GFP_i + \beta_7 GFKG_i + \beta_8 AV_i + \beta_9 OC_i + \varepsilon_i$$

- **II**: federal-level levy on imported products (expressed as a percentage of added value)

- **IPI**: federal-level levy on manufactured products (expressed as a percentage of added value)

- **ICMS**: state-level levy on the purchase or circulation of merchandise (expressed as a percentage of added value)

- **GFRD**: IR, IPI, and other tax exemptions and deductions for businesses carrying out Research and Development (R&D) (percentage of firms that received this fiscal incentive)

- **GFIL**: IPI exemptions for businesses carrying out R&D specifically in the hardware and automation industries (percentage of firms that received this fiscal incentive)

- **GFPU**: public finance for businesses carrying out R&D projects in cooperation with universities and research institutes (percentage of firms that received this support)

- **GFKG**: public finance for businesses carrying out R&D and acquisition of equipment and machinery (capital goods) (percentage of firms that received this support)

2) **Green Growth**
   a) **Carbon Dioxide (CO_2) Emissions**

The cubic function model by **Sun *et al.* (2022)** evaluates the effect of economic growth on CO_2 emissions:

$$LnCO2 = \alpha_0 + \alpha_1 LnGDP + \alpha_2 (LnGDP)^2 + \alpha_3 (LnGDP)^3 + \varepsilon_1$$

- **α_0:** Intercept.

- **$\alpha_1, \alpha_2, \alpha_3$:** Parameters for GDP in logarithmic form.

- **ε_1:** Random error term.

5. Finding and Results

The current section delves into the analysis of the collected data, structured into four comprehensive sections to provide a clear and detailed examination of the findings. The first section presents a descriptive analysis of the research variables, offering an initial overview of the data and underscoring key observations. This is followed by a thorough exploration of the normality testing of the research variables, including formal assessments through the Kolmogorov-Smirnov and Shapiro-Wilk tests, and informal evaluations by examining the Skewness and Kurtosis values. The subsequent section is dedicated to testing the regression assumptions, specifically focusing on multicollinearity, autocorrelation, and heteroscedasticity

within the data. Finally, the section concludes with testing the research hypotheses, employing the Spearman correlation test and the Generalized Least Squares (GLS) technique to validate the relationships proposed in the study.

5.1 Descriptive Analysis for the Research Variables

One of the fundamental areas of statistics research is descriptive statistics. It shows how the variables in a sample relate to one another and is frequently used to tidy up and compile dispersed data, essential for doing research and drawing inferential statistical comparisons. Descriptive analysis is a way to illustrate and understand the characteristics of a specific data set, providing short summaries about the sample and data measures (George and Mallery, 2018).

Table 1 presents the descriptive analysis of the variables addressed in the current study using the mean, minimum, maximum, and standard deviation. The mean value of green tax reform is 2.021 with a standard deviation of 0.830 with minimum and maximum values of 0.21 and 4.05 respectively. In addition, the mean value of government spending is -0.314 with a standard deviation of 0.853 and minimum and maximum values of -2.348 and 1.505 respectively. Moreover, the mean value of carbon dioxide (CO_2) emissions is 139608.204 with a standard deviation of 169540.889 with minimum and maximum values of 9719.7 and 637429 respectively.

Table 1 : Descriptive Analysis of Research Variables

	Minimum	Maximum	Mean	Std. Deviation
Green Tax Reform	.21	4.05	2.021	.830
Government Spending	-2.348	1.505	-.314	.853
Carbon Dioxide (CO2) Emissions	9719.7	637429.0	139608.204	169540.889

5.2 Normality Testing for the Research Variables

The term "normality test" refers to methods of statistical analysis that are based on data collection and can be parametric or nonparametric depending on how normally distributed the data are. When the data meets the normality requirement, a probability distribution curve is shown, with the highest frequency of occurrence close to the center and a decreasing frequency as one proceeds out from the center. According to Kim & Park (2019), one of the assumptions that need to be verified to assess if a data set is normal is the normality test.

According to the formal normality test, if the p-value is less than the chosen alpha level, which is usually 0.05, then the null hypothesis is rejected by performing Kolmogorov-Smirnov and Shapiro-Wilk tests, which find that the data do not follow a normal distribution. Regarding the results in Table 2, both the K-S test (p = 0.000) and the S-W test (p = 0.011) for the Green Tax Reform. As a result, p-values are below 0.05. The data about the Green Tax Reform is not normally distributed, and the null hypothesis is thus rejected. As for the results of Government Spending, it is demonstrated that both the K-S test (p = 0.006) and the S-W test (p = 0.007) show

p-values less than 0.05. As a result, the government spending data are not regularly distributed, and the null hypothesis is rejected. Finally, the results of Carbon Dioxide (CO2) Emissions revealed that the K-S test (p = 0.000) and the S-W test (p = 0.000) show p-values less than 0.05. Thus, the null hypothesis is rejected, and the Carbon Dioxide (CO2) Emissions data is not normally distributed.

Table 2 : Normality Testing for the Research Variables

	Kolmogorov-Smirnov[a]			Shapiro-Wilk		
	Statistic	df	Sig.	Statistic	df	Sig.
Green Tax Reform	.115	136	.000	.974	136	.011
Government Spending	.093	136	.006	.972	136	.007
Carbon Dioxide (CO2) Emissions	.256	136	.000	.683	136	.000

5.3 Testing Regression Assumptions

Regression analysis relies on certain assumptions to ensure their validity and reliability. Autocorrelation is assessed if the residuals are correlated with their previous values, which is especially important in three-time data. Dependents indicate the consistency of the variance of the residuals across different levels of the independent variables. Autocorrelation assesses whether residuals are correlated with past values, which is particularly relevant in time series data. Heteroscedasticity refers to the consistency of residuals' variance across different levels of independent variables. Multicollinearity occurs when the independent variables are closely correlated with each other, which can lead to instability in the model estimates and make it more difficult to assess the contributions of individual variables.

According to the results revealed in Table 3, the VIF of green tax reform and government spending is 1.139, which is less than 5. This suggests that there is not a problem regarding multicollinearity.

**Table 3 :** Multicollinearity Test for Research Variables

Variables	**VIF**
Green Tax Reform	1.139
Government Spending	1.139

According to Table 4, the Durbin-Watson values for this model are not close to two, as Green Tax Reform is 0.243, and Government Spending is 0.227. Therefore, both Durbin-Watson statistics are significantly less than 2, which means there is a strong positive autocorrelation in the residuals. The presence of positive autocorrelation implies a correlation between the regression model's residuals

Table 4: Autocorrelation Test for Research Variables

Variables	Durbin-Watson
Green Tax Reform	0.243
Government Spending	0.227

Heteroscedasticity Occurs when the variance of residuals in a regression model is not consistent across levels of the independent variables, violating the assumption of homoscedasticity, where the variance should be constant. This violation can lead to inefficient estimates and biased standard errors. Heteroscedasticity can be detected visually through scatter plots or residuals versus predicted values, where a funnel shape suggests heteroscedasticity and random scatter suggests homoscedasticity. Formal tests like Goldfeld-Quandt, according to the findings, and as illustrated in Figure 2, the associations between the variables are homoscedastic. The scatter plot in Figure 2 shows no clear pattern or funnel shape, confirming that the variance of the residuals remains constant across the predicted values. The validity and reliability of the regression model's predictions are demonstrated by the variance's consistency over the range of independent variable levels. This indicates that the statistical tests and confidence intervals for the regression coefficients are reliable, and the standard errors of the coefficients are not biased. Therefore, ensuring homoscedasticity supports the robustness and credibility of the regression analysis, making the model's conclusions more dependable.
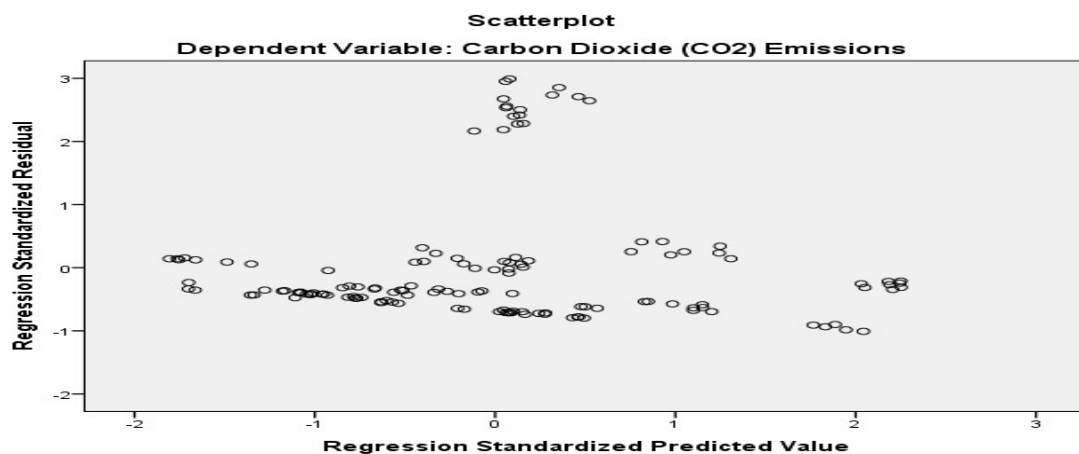
Figure 2: Scatter Plot for Heteroscedasticity

5.4 Testing Research Hypothesis

Table 5 shows the multiple regression model of Green Fiscal Reform (Green Tax Reform and Government Spending) and its effect on the dependent variable, which is Green Growth (Carbon Dioxide (CO_2) Emissions). The findings show that government spending has a statistically significant negative impact on carbon dioxide (CO_2) emissions, as indicated by the regression coefficient's value of -40212.24 and the p-value of less than 0.05 (p-value= 0.000). Additionally, since the regression coefficient (r= -53524.75) is less than zero and the p-value is less than 0.05 (p-

value= 0.000), it is determined that the green tax reform has a significant negative impact on carbon dioxide (CO2) emissions. Furthermore, the R Square value of 0.920 indicates that government spending and green tax reform account for 92.0% of carbon dioxide (CO2) emissions.

Therefore, the regression equation could be written as follows:

$$Co2 = 206568.1 - 40212.24\ GS - 53524.75\ GTR$$

The first hypothesis claims that: there is a significant influence of green fiscal reform on carbon dioxide (CO2) emissions is fully supported.

Table 5: Regression Model of the Effect of Green Fiscal Reform on Carbon Dioxide (CO2) Emissions

Dependent Variable: Carbon Dioxide (CO2) Emissions				
Variable	Coefficient	Std. Error	t-Statistic	Prob.
C	206568.1	3506.067	58.917	0.000
Government Spending	-40212.24	1198.851	-33.542	0.000
Green Tax Reform	-53524.75	4819.736	-11.105	0.000
R-squared	0.920	Mean dependent var		153500.0
Adjusted R-squared	0.919	S.D. dependent var		11664.34
S.E. of regression	3314.533	Akaike info criterion		19.071
Sum squared resid	1.461	Schwarz criterion		19.136
Log-likelihood	-1293.885	Hannan-Quinn criter.		19.097
F-statistic	769.448	Durbin-Watson stat		2.848
Prob(F-statistic)	0.000000			

The empirical study results of evaluating the research hypotheses by utilizing E-views to measure the variables concluded from the literature review are presented in Table 6.

Table 6: Summary of Research Hypotheses

Hypothesis	Description	Results
H1	There is a significant influence of green fiscal reform on green growth	Fully Supported
H1.1	There is a significant influence of green tax reform on carbon dioxide (CO2) emissions	Fully Supported
H1.2	There is a significant influence on government spending on carbon dioxide (CO2) emissions.	Fully Supported

6. Discussion and Recommendations

6.1 Research Discussion and Conclusion

This research aims to examine the relationship between green fiscal reform (i.e., green tax reform and government spending) and green growth (measured by carbon dioxide (CO2) emissions) in the MENA region. The study studies the basic hypothesis: the effect of the relationship between green fiscal reform on green growth. The results revealed that green tax reform significantly reduces carbon dioxide emissions and its effectiveness in mitigating environmental pollution. In addition, government spending also has a negative effect with statistical evidence on carbon dioxide emissions, which increases the renewal of the lessons of fiscal policy in supporting green growth on the potential of both green tax reform and government spending as key strategies to enhance sustainability in the Middle East and North Africa region. The results align with previous studies' results by Hao *et al., (2021*) and Elshamy and Ahmed (2023) that confirm the positive impact of green fiscal reforms, such as green tax reforms, in reducing CO2 emissions and promoting sustainable growth. Accordingly, the current study's results is consistent with previous studies on the significance of green fiscal reforms in fostering green growth and reducing environmental degradation.

6.1 Research Implications

The current study contributes to the understanding of the relationship between green fiscal reforms and green growth, measured by the reduction of CO_2 emissions, with a focus on the MENA region. The findings have important implications for policymakers, stakeholders, and researchers in providing practical guidance to design and implement effective fiscal policies that achieve sustainable development goals. Accordingly, the research implications offer the following:

Policy Implications for Stakeholders and Fiscal Policy Design

The research findings underpin that green fiscal reforms, including green tax reforms and environmentally oriented government spending, are contributory in reducing CO_2 emissions and engendering sustainable growth. Spending resources, which are gained from the green tax, on renewable energy projects, green infrastructure, and low-carbon technologies should be one of the main focuses of the policymakers in the MENA region. In such a way, governments are capable of maximizing environmental dividends from fiscal policies while responding to climate change challenges.

The study also identifies the relevance of sector-specific fiscal adjustments. Government expenditure should be apportioned in a targeted manner to spending sectors that are lower in carbon intensity-for example, renewable energy and greener technologies-and avoiding excessive expenditure on carbon-intensive spending sectors such as fossil fuel-based energy generation and heavy manufacturing industries. This will help decouple economic growth from environmental degradation and fiscal policy in line with sustainability goals.

Economic Growth as an Indicator of Fiscal Policy Impact

The study also reveals that economic growth is one significant factor in the relationship between government spending and CO_2 emissions. Policymakers should realize that when there is economic growth with a high rise, this factor increases the impact of government spending on the environment. Given this scenario, governments should adopt fiscal policies which address growth stimulation along with environmental protection. For example, the green tax incentives and subsidies for the adoption of clean energy in high-growth economies could be used as instruments for reducing carbon intensity in economic activities.

Structural and Long-Term Policy Shifts

The results are indicative that there is a long-run perspective in fiscal policy setting. While short-run and medium-run fiscal policies can strongly reinforce the nexus between economic growth and CO_2 emissions, structural shifts to sustainable growth models may break such a trend course. Green fiscal reforms, such as carbon taxes, emission trading systems, and subsidies for green technologies, should be given priority by governments as a means of gradually decoupling economic growth from environmental costs. Therefore, the result can be an enabling economic framework for growth that will also be sustainable and supportive of environmental objectives.

Implications for Sustainable Development

These findings make the case for incorporating sustainability within fiscal policy frameworks even stronger, in the context of related challenges of economic development and environmental protection. It should include fiscal measures by policymakers that would contribute to economic growth and give incentives toward a low-carbon economy. This will ensure that in the MENA region, economic development is aligned with long-term environmental considerations and plays its part internationally to help address the challenges of climate change.

Contributions to Theoretical Perspectives

The study contributes to the theoretical discourse by placing the findings in a larger framework of consideration of the relationship between economic development and environmental degradation. Results confirm that economic growth with green fiscal reforms is a mean to reach sustainable development, although the effectiveness of the latter depends on the content of the economic activities and the carbon intensity of the sectors targeted.

The implications of the research, therefore, underline that green fiscal reforms are one of the key means of sustainable development in the MENA region. In designing fiscal policies, policymakers must be careful; they need to focus on green growth: a reduction in CO_2 emissions and economic resilience. Embedding sustainability into the fiscal policy framework will allow governments to advance the twin imperatives of economic development and environmental protection and set a course toward long-term, low-carbon growth in the region.

6.2 Research Recommendations and Limitations

It has been known that most empirical studies include some limitations that might impact the research findings and prevent the generalization of the outcomes. According to the findings of investigating the relationship between green fiscal reform and green growth in the MENA region, the current research provides several recommendations for policymakers, as well as for governments, private sectors, and international organizations. The limitations of the current study can be summarized in the following:

- The study focuses on a limited set of variables, specifically the relationship between green fiscal reform, government spending, and CO2 emissions. Future research should include additional variables such as innovation, political factors, social awareness, or cultural impacts to gain a more comprehensive understanding of green growth.
- The study is limited to MENA countries. Future research should expand the scope and include a comparison between developing and developed regions to extract more diverse policy implications.
- The study relies on secondary data, which may have problems with completeness and reliability. Future research should use primary data such as surveys and interviews to gain practical insight and validate findings from secondary sources.
- The study covers the period from 2012 to 2020. The impacts may miss recent developments. Future research should consider a longer time frame.

The research provides several recommendations for decision-makers, including designing green tax policies to stimulate carbon reduction and adoption of renewable energy, integrating environmental standards into carbon policy, directing fiscal policy to support and develop renewable energy and clean technology infrastructure, securing economic growth policy with environmental sustainability and promoting green industries and the economy. The research also recommends monitoring and reviewing green financial reforms to continue their effectiveness, developing green financing tools such as the Green Year and investment funds that focus on climate, providing tax exemptions, subsidies, and accreditation to stimulate sustainable private sector practices, supporting training and capacity building programs for businesses, and setting global sustainability standards to create a unified approach to achieving environmental goals.

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المستخلص

يتناول هذا البحث العلاقة بين الإصلاح المالي الأخضر والنمو الأخضر في دول منطقة الشرق الأوسط، وخاصةً أفريقيا. ويدرس تأثير الإصلاحات المالية الخضراء، مثل الإصلاحات الضريبية الخضراء والإنفاق الحكومي، على النمو الأخضر مُقاسًا بانبعاثات ثاني أكسيد الكربون. استخدمت الدراسة بيانات ثانوية من عام 2012 إلى عام 2020، وشملت العينة دولًا في منطقة الشرق الأوسط وشمال إفريقيا، وتحديدًا مصر. وشمل تحليل البيانات إحصاءات وصفية ومصفوفات ارتباط لتقدير العلاقات بين المتغيرات. واختُبرت فرضيات البحث باستخدام نماذج الانحدار، كما دُرست قضايا اقتصادية رئيسية، مثل التوزيع الطبيعي، والارتباط الذاتي، والتعدد، وعدم تجانس التباين، لضمان متانة النتائج. واستُخدمت هذه الفرضيات بشكل إيجابي واستدلالي لتطبيق أساليب القياس الكمي لتحليل البيانات. وتقدم الدراسة رؤى ثاقبة حول الآثار طويلة المدى للسياسات المالية، مثل إصلاح الضرائب الخضراء والإنفاق الحكومي، على النتائج البيئية والاقتصادية في منطقة الشرق الأوسط وشمال إفريقيا. وتُظهر النتائج وجود علاقة إيجابية قوية بين إصلاح الضرائب الخضراء وأثره على النمو الأخضر .

الكلمات المفتاحية: المالية: الشكل؛ الأخضر ؛ النمو؛ الضرائب؛ الإصلاح؛ ثاني أكسيد الكربون؛ الانبعاثات.