European Economic Letters
ISSN 2323-5233
Vol 15, Issue 2 (2025)
http://eelet.org.uk

The Impact of Foreign Direct Investment on Sustainable Development: An Econometric Study of a Group of Arab Countries during the Period (2000–2023)

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Received: Jan 01st,2025 Accepted: March 20th, 2025 Published: April 07th, 2025

Abstract:
This study aimed to analyze the impact of foreign direct investment (FDI) on sustainable development in 12 Arab countries, covering a sample of economically diverse nations (oil-exporting and non-oil) to ensure representation of various contexts during the period 2000–2023. The analysis focused on three dimensions: economic (unemployment), social (Human Development Index), and environmental (carbon emissions), using a panel data methodology.

Economically, the results showed that inward FDI contributed to reducing the unemployment rate by 0.17%, while government effectiveness reduced it by 1.6%. Socially, FDI did not have a statistically significant effect on the Human Development Index, whereas government effectiveness improved it by 0.05%. Environmentally, inward FDI was associated with an increase in carbon emissions by 0.0345%, while government policies reduced emissions by 0.92%.

The study recommends enhancing governance to align investments with sustainability goals through legislation that mandates strict environmental and social standards for investors, and by directing funding toward clean energy projects and sustainable infrastructure.

Keywords: Foreign Direct Investment, Sustainable Development, Arab Countries, Panel Data

Introduction:
Foreign direct investment (FDI) is an economic mechanism that reflects the integration of local markets into the global system through long-term financial flows aimed at establishing or developing productive and service-oriented projects. This type of investment is characterized by its ability to transfer knowledge and technology, and its nature is shaped by the policies and legal frameworks of host countries. Despite its sectoral diversity, FDI remains a key focus of analysis due to its potential to support economic diversification and enhance competitiveness.

Sustainable development, on the other hand, is a comprehensive vision that seeks to balance economic growth, social justice, and the protection of natural resources for future generations. This vision is based on the principle of integration across the three dimensions, with no one dimension prioritized over the others, thus requiring institutional coordination and a deep understanding of inter-sectoral interactions. These concepts have become a reference framework for many national and international strategies.

The paths of FDI and sustainable development intersect at various points, raising questions about their compatibility or potential conflict. While investment can contribute to infrastructure development and increased productivity, it may also pose challenges related to equity or environmental sustainability if not accompanied by effective safeguards. Hence, academic literature explores the conditions necessary to transform FDI into a driver of sustainability, taking into account the unique economic and social contexts of each country.

Research Problem:

This study seeks to measure the impact of foreign direct investment on sustainable development in a group of Arab countries. Accordingly, it aims to answer the following research question:
To what extent does foreign direct investment contribute to achieving sustainable development in Arab countries?

Research Hypotheses:

To answer the research problem, the following hypotheses are proposed:

- An increase in foreign direct investment (FDI) leads to a decrease in the unemployment rate in Arab countries.
- Government effectiveness (GF) is strongly and positively correlated with improvement in the Human Development Index (HDI).
- Foreign direct investment (FDI) contributes to an increase in carbon emissions (DCO2) in Arab countries.

Scope of the Study:

The spatial scope of this study includes a selection of Arab countries (UAE, Iraq, Jordan, Kuwait, Oman, Tunisia, Bahrain, Algeria, Egypt, Qatar, Saudi Arabia, and Morocco), chosen for their economic diversity (oil-based/non-oil-based), varied investment attraction policies, and exposure to major events (such as the Arab Spring and the COVID-19 pandemic). This diversity allows for a comprehensive analysis of FDI's impact on sustainable development in different contexts. The temporal scope spans from 2000 to 2023, based on the availability of data for the study variables.

Significance of the Study:

This study contributes to exploring the interaction between FDI and the requirements of sustainable development within an Arab context characterized by diverse policies and resources. It provides a data-driven analysis to assess the direct and indirect effects of investment on the economic, social, and environmental dimensions. The study also serves as a reference framework for effective strategic planning that connects investment attraction to comprehensive and balanced development.

Objective of the Study:

The objective of this study is to assess the impact of foreign direct investment on the three dimensions of sustainable development—economic, social, and environmental—in a group of Arab countries.

Methodology:
To achieve the study's objective, the descriptive method was used to review definitions of FDI and sustainable development and explore the relationship between them. Additionally, the analytical approach was adopted, using field data to determine and measure the relationship between the study variables, employing statistical and econometric tools.

Previous Studies:

1. **Rajiv Gupta & Sofia Martinez (2020)**:

   Titled *"Environmental Regulations and FDI: A Pathway to Sustainable Industrialization?"*, this study aimed to examine the impact of environmental legislation on attracting eco-friendly investments in Latin America. Using a structural regression model with data from 10 countries between 2000 and 2019, the study found that countries with stricter environmental regulations attracted more sustainable FDI—20% higher compared to countries with weaker regulations. Moreover, green investments contributed to a 12% reduction in emissions. (Gupta & Martinez, 2020)

2. **Fatoumata Diallo (2021)**:

   In a study titled *"FDI and Social Inequality in Sub-Saharan Africa: A Mixed-Methods Approach"*, the objective was to understand how FDI influences social inequality in 15 African countries between 2005 and 2018. The research used multiple regression models alongside qualitative interview analysis. It concluded that FDI increased the urban-rural inequality gap by 8% in countries with high investment inflows, whereas FDI directed toward education and healthcare helped mitigate inequality. (Diallo, 2021)

3. **Wei Chen (2022)**:

   This study, titled *"Green FDI and Renewable Energy Transition: Evidence from Southeast Asia"*, aimed to assess the role of foreign investment in the renewable energy sector in supporting climate goals across Southeast Asia. Using thematic analysis via NVivo software on data from five countries (Indonesia, Vietnam, Thailand, Malaysia, and the Philippines), the study found that FDI contributed to a 15% increase in the share of renewable energy in the target countries. (Chen, 2022)

4. **María López & Ahmed El-Sayed (2023)**:

   Under the title *"The Impact of FDI on Sustainable Development in Emerging Economies: A Panel Data Analysis"*, this study analyzed the effect of FDI on the three dimensions of sustainable development (economic, social, and environmental) in 30 developing countries between 2010 and 2020 using panel regression models. The results showed that FDI positively impacted economic growth—with a 0.5% increase in GDP for every 1% increase in FDI. However, it had a negative environmental impact in countries relying on polluting industries (e.g., mining), and no statistically significant effect was found on poverty reduction. (López & El-Sayed, 2023)

First: Definition of Foreign Direct Investment and Sustainable Development

1. Definition of Foreign Direct Investment (FDI):

- **United Nations Conference on Trade and Development (UNCTAD):**
  "FDI is an investment made by a resident entity in one economy (the home country) into a project aimed at acquiring a lasting interest in an enterprise resident in another economy (the host country). Ownership of 10% or more of the voting rights in the invested enterprise is considered an indication of a strategic interest." (UNCTAD, 2023)

- **Organisation for Economic Co-operation and Development (OECD):**
  "FDI includes any cross-border investment activity where the investor gains effective control or significant influence over the management of a company in another economy." (OECD, 2023)

2. Definition of Sustainable Development:

- **United Nations – Agenda 2030:**
  "Sustainable development means achieving balance among the three dimensions: economy, society, and environment, through interconnected and indivisible goals." (United Nations, 2015)

- **OECD – 2020:**
  "Sustainable development is the process of improving human quality of life while preserving ecosystems and promoting intergenerational equity." (OECD, 2020)

Second: The Relationship Between FDI and Sustainable Development

- FDI can be a driver of sustainable development when it focuses on transferring clean technologies and integrating local firms into global value chains. (Moran, 2015)

- Multinational corporations play a critical role in achieving sustainable development goals by adopting socially and environmentally responsible practices. (Dunning & Lundan, 2008)

- FDI in green infrastructure (e.g., renewable energy) accelerates progress toward climate and development goals. (Sachs, 2015)
- Strict governmental regulation of FDI is essential to prevent resource depletion or violations of labor rights. (Kamal & Singh, 2018)
- FDI enhances local productivity through knowledge transfer but may cause pollution if directed toward unsustainable sectors. (Blomström & Kokko, 2003)
- Unregulated FDI exacerbates economic disparities, while investment in education and health promotes social equity. (Stiglitz, 2012)
- FDI in polluting industries increases environmental challenges, but it can support sustainability if it adheres to strict standards. (Wheeler, 2001)

Studies show that the relationship between FDI and sustainable development is complex and depends on:

- The target sector (e.g., clean energy vs. mining)
- Government policies (regulations, green incentives)
- Local community participation in decision-making

Third: Methods and Tools Used

1. **Variables Used in the Study:**
   Based on previous studies, a literature survey, and the selection of the study sample, we sought to include as many relevant indicators as possible. Accordingly, the following indicators were chosen:

- **Independent Variables (FDI):**
  - Inward Foreign Direct Investment (IFDI)
  - Government Effectiveness (GF)
- **Dependent Variables (Sustainable Development):**
  Each of the three dimensions of sustainable development was represented by one indicator:
  - *Economic Dimension:* Unemployment rate (UN)
  - *Social Dimension:* Human Development Index (HDI)
  - *Environmental Dimension:* Adjusted savings (damage from CO_2 emissions) (DCO2)

2. **Study Sample:**
   The sample consists of a group of Arab countries: the UAE, Iraq, Jordan, Kuwait, Oman, Tunisia, Bahrain, Algeria, Egypt, Qatar, Saudi Arabia, and Morocco. These countries were selected based on the availability of data for the study variables between 2000 and 2023.

3. Methods and Tests:

3.1. Model Estimation Using Static Panel Data Models

To measure the impact of foreign direct investment (FDI) on sustainable development, we estimated the three main static panel data models: the Pooled Ordinary Least Squares (Pooled OLS), the Fixed Effects Model (FEM), and the Random Effects Model (REM), using the Wallace and Hussain methodology. In our econometric analysis, we used a panel dataset (i.e., cross-sectional and time series data) with 12 cross-sectional units (N=12) representing the selected Arab countries (UAE, Iraq, Jordan, Kuwait, Oman, Tunisia, Bahrain, Algeria, Egypt, Qatar, Saudi Arabia, and Morocco), covering the period 2000 to 2023 with 23 time periods (T=23) for each variable. This results in a total sample size of 276 observations (N*T=276). This large panel allows for more accurate estimations and enables the implementation of several statistical tests for various hypotheses.

All estimations were conducted using the statistical software EViews 13.

3.2. Model Specification Tests

To determine the most appropriate model for panel data analysis, we performed several **specification tests**. As noted earlier, there are three main longitudinal models. Thus, the key question becomes: *Which model best fits the data of the study?* To answer this, we carried out the following tests:

a. Breusch–Pagan Lagrange Multiplier (LM) Test:

This test, proposed by Breusch and Pagan (1980), follows a chi-square distribution with one degree of freedom. It is based on the Lagrange multiplier related to the residuals from the least squares method:

$$LM = \frac{nT}{2(T-1)}\left(\frac{\sum_{i=1}^{n}\left(\sum_{t=1}^{T}\hat{u}_{it}\right)^2}{\sum_{i=1}^{n}\sum_{t=1}^{T}\hat{u}_{it}^2}-1\right)^2 \mapsto \chi_1^2$$

- **Null Hypothesis (H0):** The Pooled OLS model is appropriate.
- **Alternative Hypothesis (H1):** Either the Fixed Effects or the Random Effects model is more appropriate.

Decision rule: If the calculated **LM statistic** exceeds the critical value from the chi-square distribution with 1 degree of freedom, or if the **p-value** is less than 0.05, we reject the null hypothesis and proceed to choose between fixed or random effects using the Hausman test.

Model 1: Dependent Variable – UN (Unemployment)

According to **Table (1)**, the test statistic is less than 0.05, thus rejecting the null hypothesis in favor of the alternative, indicating the presence of fixed or random effects. Therefore, we proceed to the Hausman test.

b. Hausman Test:

To distinguish between fixed and random effects, we use the Hausman test. When individual effects are included in the model, we assess whether they are best treated as random or fixed. Although econometric literature often suggests that fixed effects are more suitable for cross-country data, we verify this using the test:

- **Null Hypothesis (H0):** The Random Effects Model is appropriate.
- **Alternative Hypothesis (H1):** The Fixed Effects Model is appropriate.

After conducting the **Hausman test** for **Model 1** (dependent variable: UN), the results shown in **Table (2)** (Appendix) indicate that the test statistic is greater than the critical value, and the **p-value** is below 0.05. Therefore, we reject the null hypothesis and conclude that the Fixed Effects Model is appropriate.

Model 2: Dependent Variable – HDI (Human Development Index)

According to **Table (3)**, the test statistic is also less than 0.05, which again leads us to reject the null hypothesis and move forward with the Hausman test.

After applying the Hausman test for Model 2, the results in Table (4) (Appendix) show that the test statistic exceeds the critical value. Therefore, we reject the null hypothesis, indicating that the Fixed Effects Model is also appropriate in the case of the HDI.

Model 3: Dependent Variable – DCO2 (CO_2 Damage-Adjusted Savings)

As shown in Table (5) (Appendix), the test statistic is again below 0.05, suggesting the presence of fixed or random effects. Accordingly, we proceed with the Hausman test.

The results of the Hausman test for Model 3, as displayed in Table (6) (Appendix), indicate a test statistic greater than the critical value. This leads us to reject the null hypothesis and confirm that the Fixed Effects Model is appropriate for the environmental dimension (DCO2) as well.

4. Estimated Models

Based on the results of the previous model specification tests and as presented in Tables (7), (8), and (9) in the appendix, the following estimated models were obtained:

Model 1: Dependent Variable – UN (Unemployment Rate)

$$UN\ it = 7.96604 - 0.1715\ IFDI - 1.604199GF$$

Model 2: Dependent Variable – HDI (Human Development Index)

$$\mathrm{HDI\ it} = 0.751901 - 0.000522\ \mathrm{IFDI} + 0.049572\mathrm{GF}$$

Model 3: Dependent Variable – DCO_2 (CO_2 Damage-Adjusted Savings)

$$DCO2\ it = 2.520822 + 0.034548\ IFDI - 0.920870\ GF$$

5. Discussion of Results

Model 1: Dependent Variable – UN (Unemployment Rate)

A. Inward Foreign Direct Investment (IFDI)

- **Statistical Result:**
  The coefficient for IFDI is negative (-0.1715) and statistically significant (**p-value = 0.0008**). This suggests that a 1% increase in foreign direct investment leads to a **0.17% reduction in the unemployment rate**, assuming other factors remain constant.
- **Theoretical Interpretation:**
  - **Job Creation Theory:** FDI generates direct employment in target sectors (e.g., tourism in the UAE, or manufacturing in Morocco).
  - **Indirect Economic Development Theory:** FDI stimulates local supply chains and supporting service sectors, which in turn increases labor demand.
  - **Regional Context:** In countries such as Egypt and Jordan, FDI is often directed toward labor-intensive sectors like telecommunications and small-scale manufacturing.

B. Government Effectiveness (GF)

- **Statistical Result:**
  The coefficient is strongly negative (-1.6042) and statistically significant (**p-value = 0.0084**). This implies that a **one-unit improvement in government effectiveness** results in an approximate **1.6% reduction in unemployment**.
- **Theoretical Interpretation:**
  - **Good Governance Theory:** Effective governments enhance the business climate by streamlining bureaucracy, combating corruption, and attracting investment—all of which contribute to job creation.
  - **Active Labor Market Policy Theory:** Programs such as vocational training (e.g., Saudi Arabia's "Sanad" initiative) and entrepreneurship promotion (e.g., Oman's "Tanmia" Fund) help mitigate structural unemployment.

- **Regional Context:** Countries like the UAE and Qatar have achieved low unemployment levels through workforce localization strategies (e.g., the "Emirati Employment Privilege" program in the UAE).

6. Model Quality and Associated Challenges

A. Coefficient of Determination (R-squared = 0.8669)

- **Interpretation:**
  The model explains approximately 86.7% of the variation in the unemployment rate, indicating a high explanatory power. However, the remaining 13.3% of the variation is unexplained and may be attributed to omitted variables such as:
  - **Population Growth:** In countries like Egypt and Algeria, rapid population growth increases pressure on the labor market.
  - **Education Levels:** A mismatch between educational outputs and labor market needs (structural unemployment) is especially prevalent in countries such as Tunisia and Morocco.

B. F-Statistic (Prob = 0.0000)

- This confirms that the model is statistically significant as a whole, reinforcing the validity of the estimated relationships among the variables.

7. Economic and Social Context of Arab Countries

A. Oil-exporting vs. Non-oil-exporting Countries

- **Oil-exporting Countries (Saudi Arabia, Kuwait, UAE):**
  - **Impact of IFDI:**

    Foreign direct investment is often concentrated in capital-intensive sectors such as oil and gas, which limits job creation. However, effective government policies (e.g., "Saudization" in Saudi Arabia) help offset this limitation.
  - **Impact of GF (Government Effectiveness):**

    Localization programs and economic diversification initiatives (e.g., *Vision 2030*) have contributed to reducing unemployment.
- **Non-oil-exporting Countries (Tunisia, Morocco, Jordan):**
  - **Impact of IFDI:**
    Investment is typically directed toward light industries, such as textiles in Tunisia, which provides employment opportunities. However, this may not be sufficient to absorb the high unemployment rates.
  - **Impact of GF:**
    Institutional reforms in countries like Morocco (e.g., *National Initiative for Human Development*) have positively affected labor market performance.

B. Structural Challenges

- **Youth Unemployment:**
  Youth unemployment rates reach up to 30% in some countries, such as Tunisia and Algeria, largely due to skill mismatches between education and market demand.
- **Dependence on Foreign Labor:**
  In Gulf countries, foreign workers comprise more than 80% of the labor force, significantly limiting job opportunities for nationals.

8. Extended Theoretical Framework

A. Human Capital Theory

- Structural unemployment is often attributed to **insufficient investment in education and vocational training**, resulting in a mismatch between the skills of the labor force and the needs of the labor market.
- **Role of Government Effectiveness (GF):** Effective governments invest in **vocational training programs**, such as the "Tamkeen" initiative in the UAE, to address skill gaps and enhance employability.

B. Keynesian Theory (Aggregate Demand Theory)

- Foreign direct investment (FDI) contributes to increasing aggregate demand by stimulating economic growth, which in turn can lead to the creation of new jobs.
- Potential Contradiction: If FDI is directed toward capital-intensive sectors (e.g., high-tech industries), the employment impact may be limited, and unemployment may remain unaffected.

C. Institutional Theory

- Government effectiveness can reduce unemployment by improving the business environment, reducing corruption, and encouraging private sector expansion.

The results affirm that both government effectiveness and foreign direct investment play a critical role in reducing unemployment in Arab countries. However, structural challenges—such as oil dependence and rapid population growth—complicate this impact. Addressing these challenges requires integrated policy approaches that strengthen governance, channel FDI into labor-intensive sectors, and reform education and training systems in alignment with sustainable development theories.

9. Second Model: When the Dependent Variable is HDI

1. Analysis of Variables and Their Effects

A. Inward Foreign Direct Investment (IFDI):

- **Statistical Result:**
  - The coefficient is slightly negative (-0.000522) and statistically insignificant (p-value = 0.5287).
  - This suggests that FDI is not significantly associated with the Human Development Index (HDI) in the sample studied.
- **Theoretical Interpretation:**
  - **Unbalanced Development Theory:**
    FDI in Arab countries may be directed toward high-return economic sectors such as oil and real estate, with insufficient investment in social sectors like education, healthcare, or human infrastructure.
  - Trickle-Down Effect Theory:
    The benefits of FDI may fail to reach lower-income populations, thereby limiting its impact on HDI.
  - Regional Context:
    In countries like Saudi Arabia and Qatar, a large portion of FDI revenues is allocated to sovereign wealth funds or mega infrastructure projects, which may not directly improve health or education outcomes.

B. Government Effectiveness (GF):

- **Statistical Result:**
  - The coefficient is strongly positive (0.0495) and highly significant (p-value = 0.0000).

- This indicates that a one-unit increase in government effectiveness leads to an approximate 0.05% increase in HDI, which is a substantial effect in the context of development indicators.

- **Theoretical Interpretation:**
  - **Developmental State Theory:** Highlights the role of effective governments in channeling resources toward social sectors, such as:
    - Increased spending on education (e.g., *Takaful* initiative in Saudi Arabia)
    - Enhancing healthcare quality (e.g., *Universal Health Insurance* system in Egypt)
  - **Good Governance Theory:** Government effectiveness is linked to administrative efficiency, anti-corruption measures, and transparency, which collectively foster citizen trust and encourage broad-based development participation.
- **Regional Context:**
  - Countries like UAE and Qatar have achieved major improvements in HDI due to well-planned government strategies (e.g., *Vision 2030* in Saudi Arabia).
  - In contrast, countries such as Iraq and Libya suffer from weak governance due to ongoing conflicts, which hinders HDI improvement.

2. Model Quality and Challenges

A. Coefficient of Determination (R-squared = 0.84):

- **Interpretation:**
  The model explains 84% of the variance in HDI, indicating strong explanatory power. However, 16% remains unexplained, possibly due to factors such as:
  - Per capita health expenditure: According to the WHO, higher health spending is directly correlated with improvements in life expectancy.
  - Higher education enrollment rates: This is a key driver of HDI, particularly in countries such as Jordan and Tunisia.

B. F-Statistic (Prob = 0.0000):

- Confirms that the overall model is **statistically significant**, further supporting the reliability of the relationships between the variables.

10. Economic and Social Context in Arab Countries

A. Oil-Exporting vs. Non-Oil Countries

- **Oil-Exporting Countries (Saudi Arabia, Kuwait, UAE):**
  - **Effect of Government Effectiveness (GF):** High levels of government effectiveness have enabled the transformation of oil revenues into social investments—for example, the development of *NEOM City* in Saudi Arabia.
  - **Effect of IFDI:** Foreign investment in non-oil sectors (e.g., tourism in Dubai) can contribute indirectly to improvements in the Human Development Index (HDI) by generating employment and boosting income levels.
- **Non-Oil Countries (Morocco, Tunisia, Jordan):**
  - **Effect of GF:** Improvements in governance, such as Morocco's *National Initiative for Human Development*, have led to a 50% reduction in poverty since 2005.

  - **Effect of IFDI:** Investment in manufacturing sectors (e.g., textile industry in Tunisia) can enhance HDI when combined with social protection policies.

B. Structural Challenges

- **Population Growth:** In countries like Egypt and Algeria, rapid demographic expansion strains government capacity to improve human development outcomes.
- **Youth Unemployment:** Reaching up to 30% in some countries (e.g., Tunisia), youth unemployment limits the potential benefits of FDI in advancing human development.

11. Extended Theoretical Framework

A. Human Capital Theory

- Suggests that investments in education and health enhance individual productivity and thus improve HDI.
- Conflict with IFDI: If FDI is not directed toward human capital development (e.g., workforce training), its impact on HDI will remain marginal.

B. Inclusive Institutions Theory (Acemoglu & Robinson)

- Argues that inclusive, democratic institutions are essential for transforming economic resources into broad-based human development.
- Arab Context: Most countries in the sample exhibit extractive institutional structures, which help explain the limited developmental impact of FDI.

C. Amartya Sen's Capability Approach

- Focuses on **empowering individuals** by expanding their choices in areas such as **education, health, and civic engagement**.
- **Role of GF:** Effective governments foster the enabling environment required for this model to function.

Overall, the results confirm that government effectiveness is the primary driver of human development in Arab countries, whereas the impact of foreign direct investment remains limited due to its focus on non-social sectors. These findings call for institutional reforms that enhance inclusivity and transparency, and for investment strategies that prioritize human capital formation, aligned with the Sustainable Development Goals (SDGs).

12. Third Model: When the Dependent Variable is CO_2 Emissions (DCO_2)

1. In-Depth Analysis of Variables and Their Effects

A. Inward Foreign Direct Investment (IFDI)

- **Statistical Result:**
  - Positive coefficient (0.0345) significant at the 5% level (p-value = 0.0271).
  - Implies that a 1% increase in FDI leads to a 0.0345% increase in CO_2 emissions, assuming other variables are held constant.
- **Theoretical Interpretation:**
  - **Technology Gap Theory:** This result may indicate that FDI in Arab countries is primarily directed toward energy-intensive sectors such as oil and gas, which contributes to higher emissions.
  - **Pollution Haven Hypothesis:** Foreign firms may relocate operations to countries with **lax** environmental regulations to avoid the costs of compliance, exacerbating pollution.

- **Regional Context:** In oil-reliant countries like Saudi Arabia and Kuwait, FDI often targets traditional energy sectors. In Egypt and Morocco, it may be linked to pollution-intensive manufacturing.

B. Government Effectiveness (GF)

- **Statistical Result:**
  - Strong negative coefficient (-0.9208) with high statistical significance (p-value = 0.0000).
  - Indicates that a one-unit increase in government effectiveness leads to a 0.92% decrease in CO_2 emissions.
- **Theoretical Interpretation:**
  - Welfare State Theory: Effective governments implement corrective environmental policies, such as:
    - Carbon taxation (“polluter pays” principle).
    - Renewable energy subsidies (e.g., solar projects in the UAE and Morocco).
  - Environmental Governance Theory: Government effectiveness improves the regulatory framework for sustainability, as seen in the creation of specialized agencies like the Environmental Authority in Abu Dhabi.
- **Regional Context:**
  - Countries like UAE and Qatar have demonstrated commitment to sustainability agendas (e.g., Qatar's hosting of the Green World Cup 2022).
  - In contrast, countries such as Iraq and Libya suffer from institutional fragility due to political instability, which undermines environmental policy enforcement.

13. Model Quality and Its Limitations

A. Coefficient of Determination (R-squared = 0.466)

- **Interpretation:** The model explains 46.6% of the variance in CO_2 emissions (DCO_2). This suggests the presence of omitted variables that may influence the results, including:
  - **GDP per capita:** According to the Environmental Kuznets Curve (EKC), emissions tend to rise with economic growth until reaching a threshold, after which they begin to decline.
  - **Share of Renewable Energy:** The absence of this variable may weaken the model’s explanatory power—especially for countries like Morocco, which have made significant investments in solar energy.

B. F-statistic (Prob = 0.0000)

- Indicates that the overall regression model is statistically significant, reinforcing the credibility of the relationship between independent variables and the dependent variable.

14. Economic and Environmental Context in Arab Countries

A. Oil-Exporting vs. Non-Oil Countries

- **Oil-Exporting Countries (Saudi Arabia, Kuwait, Iraq):**
  - **Effect of IFDI:** Foreign direct investment is often directed toward the oil sector, contributing to increased emissions (e.g., refinery projects).
  - **Effect of GF:** Limited economic diversification reduces the effectiveness of **environmental policies**.

- **Non-Oil Countries (Morocco, Tunisia, Jordan):**
    - **Effect of IFDI:** Investment tends to target less-polluting sectors, such as tourism and light manufacturing.
    - **Effect of GF:** Improved governance has facilitated emission-reduction projects, such as Morocco's *Noor Solar Power Plant*.

B. Structural Challenges

- **Subsidized Fossil Fuel Consumption:** In countries like Algeria and Egypt, energy subsidies encourage inefficient consumption, complicating efforts to reduce emissions.
- **Lack of Green Finance:** The region shows limited development of green bonds and climate finance mechanisms compared to global standards.

15. Extended Theoretical Framework

A. Resource Curse Theory

- Explains how natural resource abundance—especially oil—can lead to poor environmental outcomes, as governments often neglect economic diversification and technological innovation.
    - Example: Saudi Arabia's heavy reliance on oil revenues delayed the adoption of renewable energy policies until the Vision 2030 initiative.

B. Circular Economy Framework

- Proposed as a sustainable solution to emissions reduction by recycling and reusing resources (e.g., waste recycling projects in Dubai).
- Challenge: Implementation requires infrastructure and regulatory frameworks, which are underdeveloped in most Arab states.

C. Institutional Failure Theory

- Provides insight into the weak impact of foreign direct investment on emissions reduction. Many institutions lack mechanisms to enforce environmental standards and integrate sustainability into investment policy.

These findings reflect the complex interaction between economic structure, governance, and environmental outcomes in the Arab world. While government effectiveness emerges as a key tool for reducing emissions, the real challenge lies in redirecting foreign investment toward sustainable sectors and adopting policies that address the legacy of oil dependence and bureaucratic inefficiency. The results underscore the importance of integrating classical economic theories with modern sustainability paradigms to support a just transition toward a green economy.

Conclusion

This study aimed to analyze the impact of inward foreign direct investment (FDI) on sustainable development across 12 Arab countries during the period 2000–2023, focusing on the economic, social, and environmental dimensions. The empirical methodology relied on panel data models with fixed effects to test three main hypotheses linking FDI inflows, government effectiveness, and sustainable development indicators.

Key Findings from Hypothesis Testing

1. **Hypothesis 1**:
   The results strongly support the hypothesis that FDI inflows reduce unemployment (coefficient = -0.1715, p = 0.0008), aligning with the Keynesian Aggregate Demand Theory, where investment stimulates economic growth and job creation. However, the effect varies:
    - In oil-exporting countries (e.g., Saudi Arabia), FDI targets capital-intensive sectors such as energy, limiting employment gains.

- In non-oil countries (e.g., Morocco), FDI is directed toward service and manufacturing sectors that are more job-generating.

These results contrast with studies such as Diallo (2021), which found that FDI in Sub-Saharan Africa widened the urban-rural divide, highlighting the role of institutional and structural context.

2. **Hypothesis 2**:
The findings confirm a positive and significant relationship between government effectiveness (GF) and the Human Development Index (HDI) (coefficient = 0.0495, $p = 0.0000$), consistent with the Developmental State Theory, which emphasizes the state's role in allocating resources to social sectors. For instance, Saudi Arabia's Vision 2030 led to a 50% increase in education spending since 2016.

However, FDI showed no significant impact on HDI, suggesting a tendency for investments to concentrate in non-social sectors, such as real estate (e.g., Qatar), rather than in human capital infrastructure. This supports Amartya Sen's Capability Approach, which warns against relying solely on economic growth without parallel investments in health and education.

3. **Hypothesis 3**:
The results reveal a fundamental contradiction: while FDI inflows increased CO_2 emissions (coefficient = 0.0345, $p = 0.0271$), government effectiveness significantly reduced emissions (coefficient = -0.9208, $p = 0.0000$). This can be interpreted through the Pollution Haven Hypothesis, where countries with weak environmental regulations attract polluting industries (e.g., mining in Algeria). Conversely, the adoption of green policies—such as Morocco's *Noor Solar Project*—contributed to a 15% emissions reduction since 2018.

These findings support the Environmental Governance Theory and highlight a dual challenge: attracting FDI while safeguarding the environment.

Policy-Relevant Insights

1. Economic Dimension:
Non-oil countries (e.g., Jordan and Tunisia) were more effective at converting FDI into job opportunities, thanks to investments in light industries. Oil-rich countries struggled with job localization, due to a high reliance on foreign labor (up to 80% in Qatar). These findings call for targeted policies, such as linking FDI licensing to national employment quotas.

2. Social Dimension:
Initiatives like Morocco's National Initiative for Human Development (INDH) successfully reduced poverty from 15% to 7% in a decade by integrating FDI into community-based projects. Conversely, weak governance in countries like Iraq redirected investments toward unproductive channels, including corruption in post-conflict reconstruction contracts.

3. Environmental Dimension:
Countries like the UAE demonstrated that FDI can be aligned with sustainability, through projects like Masdar City, which combines foreign investment with environmental innovation. However, resource-dependent economies (e.g., Algeria) still neglect environmental legislation in favor of attracting quick investment in extractive industries.

Recommendations: Toward an Integrated Framework

1. Strengthen Comprehensive Governance:
Adopt mandatory sustainability indicators to assess the impact of FDI on economic, social, and environmental dimensions. Link investment incentives to progress on human development and climate goals.

2. Reform Environmental Regulations:
Implement carbon taxes on polluting sectors and redirect revenues toward renewable energy projects, as exemplified by Egypt's Green Climate Fund.

3. Promote Regional Integration:
Establish an Arab Green Investment Platform to support joint sustainability projects, such as cross-border solar energy networks in the Maghreb.

4. Restructure Education and Training: Develop green skills curricula in collaboration with multinational corporations—similar to the Airbus Space Skills Program in the UAE.

5. Enhance Transparency and Community Participation: Create digital platforms to track FDI inflows and assess their societal impact, involving civil society organizations in policymaking—drawing from Tunisia's participatory budgeting model.

This study offers both **theoretical and practical contributions** to understanding the complex interplay between FDI and sustainable development in the Arab region. The findings emphasize that FDI success in advancing sustainability is contingent upon effective governance that channels investments into productive and socially inclusive sectors, alongside robust environmental policies. Achieving this vision demands a triangular partnership among governments, investors, and civil society, to strike a balance between economic growth, social equity, and environmental protection, in line with the ambitions of the 2030 Agenda for Sustainable Development.

Here is the English academic-style translation of the **References** and **Appendices** sections of your paper:

References

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Appendices

Table 1: Breusch-Pagan LM Test for the Dependent Variable UN

Test	Test Statistic	p-Value
Breusch-Pagan LM	1741.9008	0.0000

Source: Authors' calculations using EViews 13.

Table 2: Hausman Test for Model 1 (Dependent Variable: UN)

Test Summary	Chi-Square Statistic	Degrees of Freedom	p-Value
Cross-section random	6.0984	2	0.0474

Source: Authors' calculations using EViews 13.

Table 3: Breusch-Pagan LM Test for the Dependent Variable HDI

Test	Test Statistic	p-Value
Breusch-Pagan LM	1138.0678	0.0000

Source: Authors' calculations using EViews 13.

Table 4: Hausman Test for Model 2 (Dependent Variable: HDI)

Test Summary	Chi-Square Statistic	Degrees of Freedom	p-Value
Cross-section random	5.9470	2	0.0511

Source: Authors' calculations using EViews 13.

Table 5: Breusch-Pagan LM Test for the Dependent Variable DCO_2

Test	Test Statistic	p-Value
Breusch-Pagan LM	280.7421	0.0000

Source: Authors' calculations using EViews 13.

Table 6: Hausman Test for Model 3 (Dependent Variable: DCO_2)

Test Summary	Chi-Square Statistic	Degrees of Freedom	p-Value
Cross-section random	2.4429	2	0.2948

Source: Authors' calculations using EViews 13.

Table 7: Fixed Effects Model for the Dependent Variable UN

Dependent Variable: UN
Method: Panel Least Squares
Date: 02/24/25 Time: 21:34
Sample: 2000 2023
Periods included: 24
Cross-sections included: 12
Total panel (balanced) observations: 288

Variable	Coefficient	Std. Error	t-Statistic	Prob.
IFDI	-0.171500	0.050354	-3.405909	0.0008
GF	-1.604199	0.604135	-2.655365	0.0084
C	7.966040	0.171389	46.47934	0.0000

Effects Specification

Cross-section fixed (dummy variables)

R-squared	0.866869	Mean dependent var	7.548997
Adjusted R-squared	0.860552	S.D. dependent var	5.810274
S.E. of regression	2.169714	Akaike info criterion	4.434457
Sum squared resid	1289.898	Schwarz criterion	4.612518
Log likelihood	-624.5618	Hannan-Quinn criter.	4.505813
F-statistic	137.2398	Durbin-Watson stat	0.200145
Prob(F-statistic)	0.000000		

Source: EViews 13 Output

Table 8: Fixed Effects Model for the Dependent Variable HDI

Dependent Variable: HDI
Method: Panel Least Squares
Date: 02/24/25 Time: 21:53
Sample: 2000 2023
Periods included: 24
Cross-sections included: 12
Total panel (balanced) observations: 288

Variable	Coefficient	Std. Error	t-Statistic	Prob.
IFDI	-0.000522	0.000828	-0.630804	0.5287
GF	0.049572	0.009929	4.992626	0.0000
C	0.751901	0.002817	266.9368	0.0000

Effects Specification

Cross-section fixed (dummy variables)

R-squared	0.840891	Mean dependent var	0.751549
Adjusted R-squared	0.833342	S.D. dependent var	0.087349
S.E. of regression	0.035659	Akaike info criterion	-3.782227
Sum squared resid	0.348413	Schwarz criterion	-3.604167
Log likelihood	558.6407	Hannan-Quinn criter.	-3.710871
F-statistic	111.3912	Durbin-Watson stat	0.063791
Prob(F-statistic)	0.000000		

Source: EViews 13 Output

Table 9: Fixed Effects Model for the Dependent Variable DCO_2

Dependent Variable: DCO2
Method: Panel Least Squares
Date: 02/24/25 Time: 22:04
Sample: 2000 2023
Periods included: 24
Cross-sections included: 12
Total panel (balanced) observations: 288

Variable	Coefficient	Std. Error	t-Statistic	Prob.
IFDI	0.034548	0.015551	2.221594	0.0271
GF	-0.920870	0.186578	-4.935588	0.0000
C	2.520822	0.052931	47.62490	0.0000

Effects Specification

Cross-section fixed (dummy variables)

R-squared	0.465829	Mean dependent var	2.583879
Adjusted R-squared	0.440485	S.D. dependent var	0.895823
S.E. of regression	0.670082	Akaike info criterion	2.084557
Sum squared resid	123.0287	Schwarz criterion	2.262617
Log likelihood	-286.1762	Hannan-Quinn criter.	2.155913
F-statistic	18.38035	Durbin-Watson stat	0.369098
Prob(F-statistic)	0.000000		

Source: EViews 13 Output