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Green Economy as a Mechanism to attract Foreign Investment and Achieving the Requirements of Sustainable Development in Egypt

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Abstract:
This study measured the impact of the independent variables represented in the state's capacity to produce and generate renewable energy, along with the nation's absorption of foreign investment, to examine the role of the green economy and clean energy sources as a mechanism to attract and increase foreign investments in the renewable energy sector, which contributes to achieving sustainable development in Egypt with its four dimensions: economic, social, environmental, and technological. The results showed a favorable and statistically significant effect in both the short and long terms. The determination coefficient R2 was found to be 99%, which means that the green economy indicators in Egypt account for 99% of changes in the fourdimensional indicators of sustainable development. In addition to demonstrating the significance of the regression connection overall according to the Fc test (112.8479), it explains 85.5% of changes in foreign direct investment. Additionally, it has demonstrated the long-term co-integration between the green economy, net foreign direct investment, and sustainable development.
Keywords: Green economy, renewable energy, foreign direct investment, sustainable development, Egypt, relationship estimation.

I. Introduction

The global call has become a reality of the need to transition to a sustainable green economy; to mitigate climate change globally, to protect the ecosystem by reducing carbon emissions, and to increase investment targeting of the clean and renewable energy sector (International Energy Agency, 2022). By 2023, global investment in sustainable energy will have reached $1.7 trillion. According to research, this is greater than investments in fossil fuels at all phases. (2023, International Energy Agency). Annual worldwide renewable energy investment climbed by 24% between 2021 and 2023, led by clean energy sources and electric vehicles, compared to a 15% growth in investment in fossil fuels.

In addition, Egypt was one of the first African countries to attract energy investments. Where Egypt, South Africa, Morocco, Egypt, and Kenya attracting almost 75% of the continent's overall energy investments. It has important sectors that are appealing to energy investors: solar energy, which accounts for approximately 16% of Egypt's installed solar power generation capacity and the highest capacity of any African country (International Renewable Energy Agency, 2022); Egypt is one of the countries in the solar belt, which is one of the most suitable areas for the application of solar energy. Furthermore, there are potential wind-speed zones in Egypt that are suitable for large-scale projects. In 2020, Egypt's combined wind power generating capacity was around 21% of the overall African continent. Morocco and South Africa.

Egypt is also one of the most industrialized nations on the African continent, due to the Nile, which is one of the world's longest rivers, and green hydrogen is a key choice in the transition to renewable energy sources (IRENA, 2021). Particularly in difficult-topower areas, where some African countries, including Egypt, Mauritania, Morocco, Namibia, Nigeria, and South Africa, have developed strategies to capitalize on renewable and abundant green hydrogen resources, as well as their productive potential at competitive global costs (IRENA, 2020a).

II. Research Problem

The study problem is the dependency of most nations on the traditional economy based on traditional energy, which does not take into consideration the environmental factor, which has led to the destruction of the ecosystem. Hence, it is crucial to create awareness of the vital role of the green economy in achieving sustainable development and environmental conservation and to support the sustainable development plan (Egypt Vision 2020– 2030) as well as the 2020–2050 climate plan for reducing carbon emissions. In addition, there is a worldwide energy crisis as a result of the Russian Ukrainian war, which has led to a sharp spike in conventional energy prices in the light of increasing demand and supply shortages owing to the disruption of supply chains. Energy Outlook.

III. Research Importance

The study's importance comes from the importance of adopting and applying the strategic shift to a green economy and clean renewable energy in achieving sustainable development requirements, which has become the primary concern of all countries in the world, especially as the planet is exposed to climate change attacks and an attempt to mitigate carbon emissions. Poverty eradication, equity, and gender equality (2022) are covered by the mitigation and adaptation strategy and Egypt's Vision 2020–2050 for Climate Change, as well as Egypt's Vision for Sustainable Development 2020–2030. A green economy also plays a crucial role in developing development as an economy that re-uses resources more sustainably by recognizing the interrelationships between the environment and the economy and attaining sustainable.

In addition to The green economy as a mechanism for attracting foreign direct investment, because it provides new investment opportunities, enhances the business climate, and gives the host country access to global markets. It is expected that the green economy will continue to play an important role in attracting foreign direct investment in the coming years.

IV. Research Objectives

The study objectives are:

- i to gain knowledge of the concept and importance of a green economy. Egypt's strategy for the transition to a green economy, contained in the document on sustainable development, is in line with Egypt's Vision 2030. The energy reality in Egypt the reality of foreign direct investment (FDI) in Egypt
- ii to identify the role of the green economy in attracting foreign direct investment and achieving sustainable development in general and in Egypt in particular;
- iii to measure the impact of the green economy on sustainable development in Egypt.
- iv measuring the impact of the green economy on direct foreign investment in Egypt.
- v measuring the impact of direct foreign investment on sustainable development in Egypt,
- vi producing applicable conclusions and recommendations.

VI. Research hypothesis

Three main hypotheses can be presented as follows:

- There is a positive impact of the green economy on net FDI flows in Egypt.
- There is a positive impact of the green economy on the achievement of sustainable development requirements in Egypt.
- Foreign direct investment (FDI) has a positive impact on achieving sustainable development requirements in Egypt.

VII. Research Limitation

There are two important frameworks for the limits of study: a. Spatial limits:
The spatial limits of the study are their application to the Arab Republic of Egypt. Time limits: Time limits are the application of the study to Egypt during the period 2000–2021, according to available data.

VIII. Research Methodology

To achieve the research objectives, the researcher used the following methods:

- Descriptive approach: this approach was used to identify and characterize the concepts of green economy, sustainable development, and the reality of the green economy in egypt.
- Analytical approach: this approach was used to analyze the indicators of the green economy and its temporal evolution in egypt, as well as its impact on sustainable development. The researcher also used A combination of deductive, inductive, and modern scientific approaches. The modern scientific

approach relies on the use of econometrics to build and formulate a standard model for assessing, measuring, and analyzing the impact of the green economy on attracting foreign investment and achieving sustainable development through some of its indicators in egypt.

- E-views 12 package: the researcher used the e-views 12 package to test the stability of the time series of study variables and the unit root test for the period 2000-2021 to determine their Complementarity and to avoid the problem of spurious regression.

IX Data Sources

Some sources will be used to collect data for the study: ➢. GGGI GREEN Growth Institute Global data ➢ Statements by the World Bank.

- Global development reports.
- Reports of the New and Renewable Energy Authority ➢ World Investment Reports.
- Climatescope.org reports. ➢ . General Authority for Investment and Free Zones.
- International Energy Agency. ➢ The General Authority for Investment and Free Zones.

X. Literature Review

Although the subject of the study has been updated, it has been examined in several previous studies, as follows: Chiu-Lan Chang and Ming Fang (2023 discussed the impact of the participatory economy and clean green energy on sustainable development in China. The RESEARCHER used the modern scientific method of studying the relationship between variables, where they represented the dependent variables sustainable development, renewable energy production and consumption, foreign investment, and inflation, with the results showing a positive relationship between variables, which shows that renewable energy production and consumption and foreign direct investment in them support sustainable development.

The relationship between the green economy and energy efficiency was confirmed by a study (Jie Zhu et al., 2023), which aimed to measure the impact of the participatory economy on energy efficiency and sustainable development in China. The main variables of the study on sustainable development were in the form of average per capita GDP at constant prices, unemployment, population growth rate, and inflation rate, which are dependent on the independent energy efficiency variable expressed by dividing total energy consumption into GDP. The most important hypotheses of the study were the positive impact of the participatory economy on sustainable development in China and energy efficiency. The results of the study showed the impact of energy efficiency on economic development without sustainable development. Although China has achieved significant achievements in terms of the participatory economy, it has not been able to achieve sustainable economic development and energy efficiency, with fossil fuels dominated by its energy structure, raising serious concerns about sustainability in China as well as linking investors to the rate of growth, which tends to rely on traditional energy, such as coal and oil, with its declining prices and increased renewable energy costs.

A study (Di Xuan et al., 2023) also aimed to study whether globalization, the green economy, population growth, and financial development preserve the use of natural resources in the BRICS countries (Brazil, Russia, India, China, and South Africa). During the period (1990–2021), where independent variables represent globalization, the green economy, population growth, and \financial development, the dependent variables are Total rents from natural resources are total rents for oil, natural gas, coal, minerals, and forests. The results of the study show that the relationship between the green economy and natural resource rents is negative and unethical, indicating that the green economy reduces rents for natural resources while the development of the financial sector and population growth increase such rents.

In addition to the Suaad Hadi Ataai study, which attempted to analyse the relationship between the green economy and sustainable development, the study showed that the green economy is a long-term strategy aimed at achieving economic recovery in the country and improving the standard of living of the individual, as well as reducing pollution, reducing carbon emissions, and promoting the use of alternative energy. The study found that the green economy must be dealt with at two levels through states: the first level, which is the microlevel, by paying attention to environmental investments that reduce pollution risks, and the second level, the macro-level, by studying environmental problems and reducing their impact.

A study (Acosta et al. 2020) also discussed the role of sustainability goals in protecting natural capital in countries across five regions of Africa, the Americas, Asia, Europe, and Australia, where performance is measured based on indicators, pillars, and dimensions related to green growth. The protection of natural capital consists of 12 indicators compiled to form three pillars, including environmental quality, greenhouse gas emissions reduction, biodiversity and ecosystem protection, and cultural and social value. The protection of natural capital is one of the four dimensions of the green growth index and has been framed to link it to other dimensions of green growth, including the effective and sustainable use of green resources, economic opportunities, and social integration.

XI. Research Contribution

Having reviewed previous studies, we can identify several gaps covered by the present study:

A spatial gap: the current study covers Egypt. Some of the previous studies were conducted by states other than Egypt.

Time gap: according to the most recent data, the period in question (2000–2021).

This study has sought to introduce some variables that it considers necessary and whose impact cannot be ignored, such as the sustainable development index, the FDI index, and the renewable energy investment index, as well as some indicators of the seventh sustainable development goal, expressed by the use of clean energy for cooking purposes, the ratio of renewable energy consumption to total energy, CO2 emissions, and the measurement of its impact on sustainable development in its four dimensions, as well as certain controlled variables such as unemployment rate, capital formation rate and net trade. Standard gap: using the modern science approach, s measuring the impact of independent variables on dependent variables study (El Hedi ,2014) "Effects of urbanization on economic growth and human capital formation in Africa".

The Concept of A Green Economy:

The concept presented for the term green economy has been called green economy by this name because it is an economy based on the use of renewable energy in contrast to the traditional economy, which is entirely dependent on oil and fossil fuels that pollute the environment (Masoud, 2019). UNEP also knows that it is an economy that results in improved human wellbeing and social equity, reduces environmental risks as well as the scarcity of ecological resources, reduces carbon emissions, increases resource efficiency, covers all social groups, and requires investment in rebuilding education and skills (United Nations Programme, 2011).

XII. Green Economy Importance

The importance of the green economy is due to the increasing global problems expected by 2050, which can be limited to several fundamental points (GGI, 2017):

1. Addressing environmental challenges by reducing greenhouse gas emissions, as well as improving the management and efficiency of resource use, reducing the volume and better management of waste, protecting biodiversity, and also halting the depletion of forests and fisheries
2. Stimulating economic growth: green investments accelerate global economic growth, especially in the long run, to outpace the growth rate that may result from that prevailing scenario.
3. Poverty eradication and job creation, as the transition to a green economy result in significant opportunities for a number of green jobs in various economic sectors. Investments in agriculture will also return to make it more ecologically friendly while easing rural poverty and limiting rural population relocation to cities. It will also assist to tackle the issue of food security. The green economy, on the other hand, is projected to reduce water and energy poverty by rationalising natural resource usage and decreasing investment in green infrastructure such as renewable energy services, drinking water, and sanitation.

The green economy is also critical in addressing serious environmental challenges, accelerating economic growth, achieving social equity, and reducing poverty, so educational institutions must play an important role in bringing about changes in attitudes, behaviours, and practises so that they are more responsible for integrating the green economy.

Measuring the green economy:

After we have reviewed the concept of a green economy by many international environmental and climate organizations and actors and its importance and the need to transform it into one, we must find out how to measure the green economy and how best to measure it in preparation for the standard study. The Green Growth Index is the first measure of the green economy and is a composite index developed by the Global Green Growth Institute (GGI Green Growth

Institute Global). It covers 115 countries and consists of 36 sub-indicators set up in four main dimensions:

Acosta, 2019.

➢ effective and sustainable use of resources. ➢ protecting natural capital. ➢ Green economic opportunities ➢ Social inclusion.

This indicator is based on the division of the world into five major regions, namely, Africa, Europe, Asia, America, and Australia, and the application and measurement of the indicator for each of the five former regions. According to the four dimensions referred to, however, this indicator is relatively recent. The continent of Africa is also considered to be one of the weakest regions in the Green Economy Index. Botswana comes first with a balance of 45.88 points, followed by Tanzania with a balance of 44.32 points, Mauritius with a balance of 42.63 points, and Egypt is tenth in the Africa region with a balance of 36.74 points for 2019.

XIII. The Transition Strategy for The Green Economy in Egypt

The mechanisms for moving towards a green economy, consisting of increasing reliance on clean energy and reducing dependence on fossil fuels, are a clear strategy adopted by the Egyptian government with a view to transforming with sustainable development. Egypt's energy sector is dependent on fossil fuels. Oil and natural gas contribute about 95% of Egypt's total energy consumption, despite Egypt's abundant renewable sources of energy, especially wind, solar, hydropower, and biomass. Since 1970, the Egyptian Government has undertaken to develop the programme and technology necessary for the development of those resources, in cooperation with many states and international institutions such as France, Germany, Spain, Japan, and others.

According to fiscal policy and its tax and tax support tools, the capital components of renewable energy are allocated to a value-added tax estimated at only 5% instead of 14%, according to the Value-Added Tax Act. With regard to support, the Ministry supports energy by making the difference between cost and sale price. Trade policy: In accordance with President's Decree No. 549 of 2020, a customs tax of 2% of the value or import tax established, whichever is lower, is imposed on equipment imported for power supply plants or natural gas, components, and spare parts for renewable energy systems. Monetary policy and instruments: The Investment Bank provides loans to renewable energy projects at a 16% interest rate and allows rescheduling, which is one of the biggest constraints corresponding to renewable energy projects. In February 2017, the Central Bank added the new and renewable energy sector to the 2016 Medium Enterprises and Enterprises Initiative (the Pound200 billion Initiative), with the aim of encouraging banks to finance small and medium enterprises. The initiative of January 11, 2016 grants companies and small and micro enterprises credit facilities at a reduced rate of return of 5%. The initiative of February 22, 2016 also provided medium- and long-term funding for medium- and long-term enterprises at a reduced rate of return of 7%.

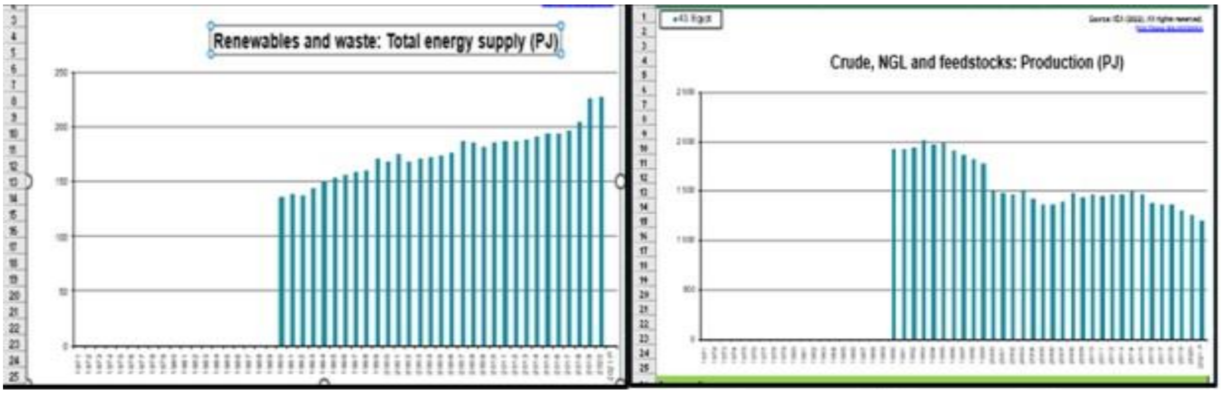
Energy Reality in Egypt:

The concept and importance of renewable energy: Renewable energy can be defined as that naturally present in nature (Bullam, 2019). In addition to being renewable and non-executable, it only needs to be converted from natural energy to another, where it is easily used by technology, provided that its production rate is higher than its consumption (Bolam, 2017). Renewable energy is also characterized as an unsustainable and unpolluted source of the environment, including solar energy, wind energy, water energy, organic energy, and tidal energy. It is also important that they be a clean and safe source with no radiation effects, as well as a renewable, sustainable, and inexhaustible source (Mahamed Ammara, 2011).

XIV. Evolution of Egypt's Energy Mix During the Period 1990–2020:

Egypt's energy mix has evolved, including both conventional and renewable energy, during the period 1990–2020. The following table presents the total energy supply from each energy mix, such as petroleum, natural gas, electricity, coal, and heat, as well as renewable energy. The total energy supply can be calculated from the following relationship: Total energy supply = production + imports minus exports

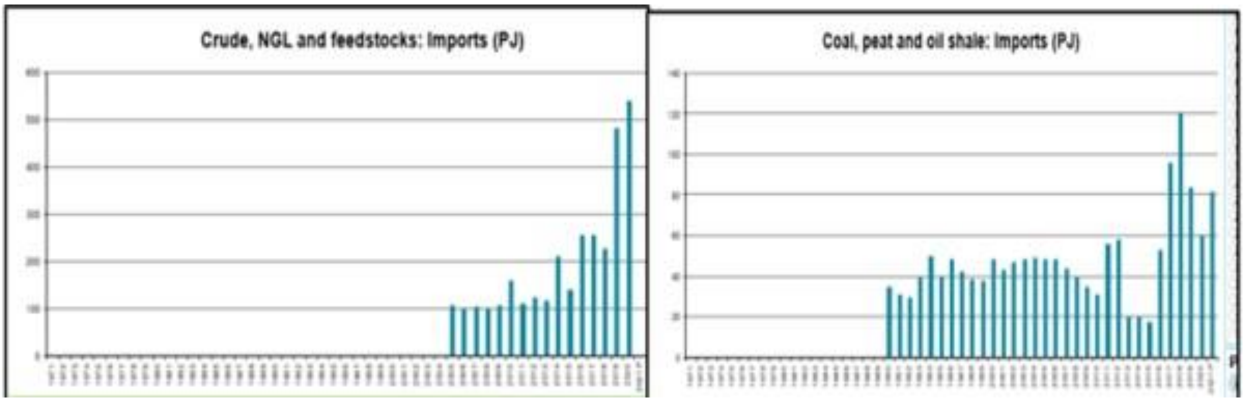
The supply of renewable energy supplies is increasing in Egypt during the period 1990–2020, showing an increase in Egypt's dependence on renewable energy, with a value of 136.6932003 Beta Jule in 1990 and an increase of 227,87253 Beta Jule in 2020.



Source: IEA (2022). available at: https://www.iea.org/terms

Fig. 1. Renewable energy supply and crude oil production

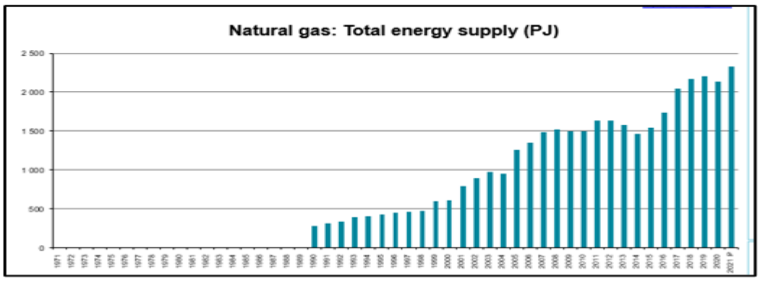
Although Egypt's crude oil production declined during the period (1990–2020), with production of 1935.4364 beta-joules in 1990 and production declining to 1202.9743 beta-joules in 2020, supply increased over the same period because the oil gap (increased demand over supply) offset the decline in production through imports, with about 482.2533 beta-joules imported in 2019, and imports increased to 540.2502 in 2020, the highest value during the period. The same is true of coal, from which production is decreasing during the period. The state is forced to compensate for the lack of production through imports in order to cover the gap between supply and demand and domestic consumption. Egypt's imports of coal in 1990 amounted to 34.50 betajoules. It continued to increase until 2018 to 120.67 beta-joules, the highest value of imports during the period. This explains why Egypt ranked 28th globally among coal importers with 554,923.5 tons of coal per year.



Source: IEA (2022). available at: https://www.iea.org/terms

Fig. 2. Egypt imports of coal and petroleum during the period (1990-2020)

Egypt's production of both thermal and nuclear energy is nonexistent, but it has been able to attract foreign investment from Russia in the amount of $25 billion for the first nuclear plant in the mena region, equivalent to 85% of its funding. Egypt finances the rest of the 15% construction cost, with Egypt repaying the loan in 43 semi-annual instalments at an interest rate of 3% per year for 22 years.



Source: IEA (2022). available at: https://www.iea.org/terms

Fig. 3. Egypt imports petroleum during the period (1990-2020)

Although renewable energy has been present in Egypt's energy mix since 1990, it remains the lowest,, and this component must be increased in the energy mix in order to balance energy supply and demand and reduce the market gap while protecting the environment, achieving sustainable development requirements, and responding to the global call for a green economy.

XVIII. The Evolution of the Renewable Energy mix in Egypt:

Egypt's interest in adopting a clean energy adoption strategy with an increase of 20% of the 2022 energy mix, as confirmed by the Bloomberg Global Agency in its Climate Scope report, the second highest rate of clean energy flows during the past decade, as presented in its climate change index of 28 years 2018 to 24 years 2019, has also helped to provide more than 10,000 direct and indirect opportunities for action during the project period.

The following table shows the combination of reliance on renewable energy for Egypt during the period (2017–2021), showing a gradual increase in reliance on solar thermal energy and photovoltaic power for electricity and heat generation as opposed to the phasing out of hydropower, where the value of hydroelectric power generated in 2017 was about 13545 g, then decreased to 12569 J. For the year 2021, the energy generated from the sun (sun heaters) was 157056 G. In 2017, its value increased during the period to 173536c. It's 2021.

It is also clear from the previous table that biofuels were relied upon as a renewable energy source only in 2020, when the government began implementing a 3.5m biofuel plant. And it's an investment for the private sector. The New and Renewable Energy Authority Report 2022 shows Egypt's electricity production scheme for renewable energy, with a total of 20% of total wind energy at a rate of 12%, the sun at a rate of 2%, water at a rate of 6%, and the rest 80% of thermal fuel. The state is developing an electricity production strategy in 2035 with about 42% renewable energy (22% solar, 14% wind, 2% water, 4% solar concentrates), 3% nuclear energy, and 55% thermal energy (New and Renewable Energy Authority, 2019). As is clear from the strategy to be applied for 20325, increased reliance on the sun as a natural and renewable resource for electricity production, as well as increased reliance on nuclear energy, With regard to wind power utilisation, there are existing 1375megawatt wind power plants, which include the 545megawatt Zafara station, the 580-megawatt oil mountain, and the 250-megawatt Suez Gulf, as well as the 250-megawatt station under implementation (New and Renewable Energy Authority, 2023).

XIX. Global investment in Energy

International investment in SDG-related sectors increased in developing countries in 2020, with infrastructure, energy, water and sanitation, and agricultural and food systems Health and education are increasing the number of development projects. (World Investment Report, 2023) Investment in clean energy techniques has also significantly exceeded that of conventional (fossil fuel) energy as a result of the global energy crisis left by the Russian-Koran war, increased security concerns, and the search for more sustainable options, according to the IEA World Energy Investment 2023 report. Annual investment in clean energy is expected to increase by 24% between 2021 and 2023, driven by renewable energy sources and electric cars, compared with a 15% increase in investment in fossil fuels over the same period. But more than 90% of this increase comes from developed economies and China, which poses a serious risk of global energy divides if clean energy shifts are not moved anywhere else. Table 3 shows global investment in clean energy during the period (2015–2023).

Table I: shows global investment in clean energy during the period (2015-2023)

Year	Invest.in Reenable En.	Invest.in Fossil fuels
2015	1074	1319
2016	1132	1105
2017	1129	1114
2018	1137	1109
2019	1225	1066
2020	1259	839
2021	1408	914
2022	1617	1002
2023	1740	1050

Source: World Energy Investment report 2023 https://www.iea.org/data-and-statistics/charts/global-energyinvestment-in-clean-energy-and-in-fossil-fuels-2015-2023

From the table and the above figure, global investments in clean energy sectors increased markedly during the period (2015–2023), amounting to $1074 billion in 2015 and continuing to increase to about $1740 billion in 2023, while investments in fossil fuels tended to decline during the same period, amounting to some $1319 billion in 2015 and then to $1050 billion in 2023.

XX. Foreign Direct Investment in the Renewable Energy Sector in Egypt:

Egypt is one of the most energy-consuming countries in the African continent (International Energy Agency, 2022), owing to the increase in the number of people and their multiple needs, in addition to industrialization and development processes, making it a fertile market for foreign investment, especially in the area of clean energy, following the growing global awareness of the importance of a green economy. Egypt has fully supported the need to phase out traditional energy in preparation for building a clean and sustainable energy system that relies on renewable but at the same time cost-competitive sources (International Energy Agency, 2022).

The Netherlands was the largest investor in Egypt's renewable energy sector during the period 2009–2018. It alone accounts for about 52 percent of total foreign direct investment in renewable energy in Egypt, followed by Britain, France, Spain, and the United Arab Emirates.

XXI. The Green Economy as a mechanism for attracting foreign investment:

Foreign investment is of great importance to developing countries, especially in light of the lack of domestic sources of finance and the escalation of domestic and external debt indicators, making it the only way to create sources of financing for development processes, as confirmed by the New Classical Theory (Sow, 1956), which recognised that increased foreign investment leads to a transitional increase in average per capita income, despite its limited long-term impact, while the theory of domestic growth has shown the effective role of FDI in economic development through technology transfer. Developing countries are therefore competing in trying to create a climate conducive to attracting foreign direct investment through stimulating and attractive legislation, as well as to improve their international image in development, competitiveness, and transparency indicators, thereby ending the preservation of the environment and the ecosystem by trying to remove all obstacles to the transit of foreign investment. With a view to achieving a qualitative leap in the economy.

The green economy attracts foreign direct investment in Egypt in several ways, including:

- Creating new investment opportunities: The green economy provides new investment opportunities in sectors such as renewable energy, sustainable transportation, waste management, and the circular economy. These sectors are of great interest to foreign investors looking for sustainable investment opportunities.
- Improving the business climate: The green economy enhances the business climate in Egypt by improving environmental quality, providing new job opportunities, and promoting innovation. These factors make Egypt more attractive to foreign investors.
- Accessing global markets: The green economy gives Egypt access to global markets interested in environmentally friendly products and services. This creates new opportunities for Egyptian exports and contributes to economic growth.

Here are some examples of how the green economy attracts foreign direct investment in Egypt:

- In the renewable energy sector: Egypt has attracted significant foreign investment in the renewable energy sector, as it seeks to increase the contribution of renewable energy to the energy mix to 42% by 2030.
- In the sustainable transportation sector: Egypt has attracted investment in the sustainable transportation sector, as it seeks to increase the share of public transportation to 60% by 2030.
- In the waste management sector: Egypt has attracted investment in the waste management sector, as it seeks to treat 90% of solid waste by 2030.

The Egyptian government recognizes the importance of the green economy in attracting foreign direct investment, and has taken several steps to support the green economy, including:

Launching the 2030 Green Economy Strategy: The strategy includes a set of measures to promote the green economy in Egypt.

Adopting the new investment law: The law includes special investment incentives for green projects. Establishing the Egyptian Sovereign Fund: The fund invests in green economy projects.

XXII. Domestic and Foreign Investments in Renewable Energy in Private Enterprises:
The private sector has invested in the renewable energy sector, represented by Penban projects with a capacity of 50 m.And, in addition to solar cell stations above the surfaces with a 30-m complex capacity.From the following figure, foreign investment is higher than its Egyptian counterpart in the sector ' s renewable energy projects, estimated at 88% by Pound1444.41 million, while Egypt ' s contribution is estimated at only 12% of total private enterprise investments at Pound197.13 million.

Despite the lack of contributions from foreigners to private renewable energy projects from the beginning of the school period until 2014, it began to participate by £15.15 million in 2015, gradually increasing to £312.53 million in 2017, falling to £108.12 million in 2018, and increasing to £963.01 million in 2019. By contrast, Egyptian investment began at £0.05 million in 2009, then ceased until 2012, was stable until 2014 at £0.05 million, and began to move gradually up until 2018, when it reached its highest value during the school period of £121.3 million, again decreasing in 2019 to £22.64 million.

Table II shows Foreign contribution to capital flows of newly established companies in different sectors during the period (2009-2019) in millions of dollars

year	Telec & Inf. Technology	Constru.	Fina.	Services	Agric.	Tour.	Inds.
2009	996.01	500.62	345.69	358.94	36.25	366.76	377.9
2010	27.03	423.11	2092.79	149.35	1282.59	94.78-	1263.23
2011	16.38	256.59	168.71	479	204.2	71.08	264.67
2012	14.19	30.29	394.33	438.29	37.97	30.22	825.8
2013	199.53	48.43	916.4	353.08	153.22	12.2	366.9
2014	6.51	496.81	366.86	574.81	61.88	165.18	733.14
2015	35.12	949.96	661.22	415.06	84.18-	137.78	1060.71
2016	42.16	275.33	97.29	725.34	13.39	19.20-	668.54
2017	19.92	248.3	548.23	344.43	29.49	80.02	509.65
2018	31.34	169.75	0.46	232.74	53.22	62.35-	0.74
2019	13.25	3.69	168.00	15.33	0.82	15.73	35.89

Source: general authority for investment and free zones. Available at https://www.investinegypt.gov.eg/flip/library/PDFs/reports/q22022/Q2%20(2).pdf

The role of the green economy in the realisation of Egypt's vision for 2020–2030:
Egypt ' s Vision 2020-2030 included several goals aimed at achieving sustainability through reliance on renewable energy as an alternative to conventional energy, strengthening energy efficiency technology, as well as improving energy efficiency; the transition to a green economy and reliance on renewable energy contribute to the domestic supply of increased energy demand, with the development of clean and safe sources of other traditional energy for additional production and manufacturing, as well as employment opportunities, and achieving a balance between present and future generations and thus achieving economic, social, environmental and technological dimensions, which can be illustrated in the following points**.**

XXIII. The role of the green economy in achieving the seventh SDI7 dimension of sustainable development
The green economy's contribution to reaching the seventh SDI7 pillar of sustainable development: Sustainable development indicators include 17 subindicators known as sustainable development goals, which include those that achieve the economic dimension and eradicate poverty, as well as those that achieve the social dimension, human development, health, and education, as well as those that achieve the environmental dimension, reducing carbon emissions, access to clean water, and the use of clean energy, including in terms of technology and innovation. The seventh sustainable development objective is the use of clean energy, since growing dependence on clean energy from renewable sources contributes to the attainment and operationalization of sustainable development

goals. Egypt had met several long-term development objectives, such as quality education, clean water, responsible production and consumption, and so on.

Table III: shows the evolution of Egypt's sustainable development index during the period (2000-2023)

Year	Sustainable Development Index	SDI 7 access to renewable energy at appropriate prices			
		Electricity % Access	Clean energy % access	*Co2 from fuel combustion*	The contribution of renewable energy to total energy
2000	65.16	97.7	83.5	1.79	3.5
2001	65.17	97.34	86.7	1.46	3.5
2002	65.22	97.54	89.4	1.38	3
2003	65.17	98.8	92	1.54	3
2004	65.28	97.91	93.85	1.46	3
2005	65.31	99.4	95.5	1.49	2.6
2006	65.61	99.04	96.7	1.50	2.5
2007	66.31	98.47	97.6	1.45	2.7
2008	66.54	99.8	98.2	1.46	2.92.6
2009	66.85	98.87	98.8	1.42	2.3
2010	66.91	99.4	99.1	1.15	2.3
2011	66.25	99.45	99.4	1.25	2.4
2012	67.08	99.7	99.55	1.17	2.4
2013	67.15	99.85	99.7	1.14	2.5
2014	68.1	99.8	99.8	1.18	2.4
2015	66.39	99.3	99.8	1.09	2.3
2016	66.2	100	99.8	1.15	2.2
2017	67.7	100	99.9	1.19	2.3
2018	68.14	100	99.9	1.18	2.3
2019	68.31	100	99.9	1.21	2.4
2020	69.20	100	99.9	1.22	2.4
2021	69.46	100	99.9	1.23	2.3
2022	69.62	100	99.9	1.24	2.4
2023	69.62	100	99.9	-	-

Source: Sustainable Development Report 2023, available from HTTPS://DASHBOARDS.SDGINDEX.ORG/RANKINGS

The above table shows that Egypt sustainable development index is increasing, reflecting Egypt constant pursuit of sustainable development requirements and objectives, particularly in attracting investment in new and renewable energy. The index reached 65.16 in 2000 and increased to 69.62 in 2023, and for the seventh SDI target of providing clean energy at appropriate prices to all people, Egypt has made significant progress in two indicators and is trying to address the remaining indicators. It is divided into four main indicators:

1. Access to electricity.
2. Access to clean fuel and cooking technology.
3. CO2 emissions from fuel combustion for total electricity output.
4. The contribution of renewable energy to total energy consumption.

Egypt has been able to achieve indicators I and II of the seventh dimension of sustainable development (SDI7), with 100 per cent electricity access to the population since 2015, and 99.9 per cent access to clean fuels and cooking technology in 2020, according to the Sustainable Development Report 2023, while the third and fourth indicators have not been fully achieved but are striving to achieve them; these objectives are linked to reducing carbon dioxide emissions from fuel combustion and increasing the contribution of renewable energy to Egypt ' s total energy mix.

Although Egypt has striven to achieve sustainable development dimensions, particularly the provision of clean and renewable energy at appropriate prices to all people, many challenges remain that hinder the progress of the Egyptian government in this area, such as sniping finance, which is one of the most important challenges facing the green economy. The contribution of clean energy was about 3.5 percent of total energy consumption, a very modest figure, but it declined during the period 2000–2023 to 2.4 percent in 2022. The decline in the contribution of renewable energy to total energy consumption, despite increased foreign and domestic investment, may indicate how much more energy is needed by Egypt to finance development processes and increased production and manufacturing, especially as populations increase and their need for more energy for cooking, transportation, refrigeration, and heating increases.

As shown by the CO2 emissions index from fuel combustion that declined during the period (20002023), although CO2 emissions from fuel combustion declined from total electricity output, they were still below the safe limits on health and the environment, with CO2 from fuel combustion reaching 1.79 terawatts per hour in 2000 and dropping to 1.15 terawatts per hour in 2010, increasing to 1.25 terawatts per hour in 2011, swinging between the increase and the decrease until 1.24 terawatts per hour in 2022.

Reliance on renewable energy to reduce carbon emissions and equivalent conventional energy: about 4.3 million metric tonnes of oil equivalent were saved in 2022, plus 11.1 million metric tonnes of carbon dioxide per year as a result of reliance on renewable energies to generate electricity and heat for industrialization and development, thus having the economic dimension of providing fuel used as well as another environmental dimension of reducing carbon emissions.

XXIV. Measuring the impact of a green economy on attracting foreign investment and achieving sustainable development

The researcher introduced variables into the SPSS 24 multi-standard regression programme to determine the moral relationship between dependent and independent variables and thus move to step wisebased regression to identify the most relevant and influential variables in dependent variables. These variables have been stabilized. The dependent variables are those of sustainable development in their four dimensions (economic, social, environmental, and technological) and represent, respectively, the average per capita GDP at constant prices, average per capita carbon emissions, life expectancy at birth, and participants in the DSL Internet service, while independent variables represent renewable energy generation, renewable energy consumption, electricity generation from renewable energy, clean energy access for most of the population and its use in cooking, equity of direct and indirect foreign investment.

XXV. Time series stabilisation test for study variables:

The RESEARCHER relied on Standard E-VIEWS 12 to test the stability of time series to ensure that they were not rooted in the unit root test, with the assistance of ADFk and KPSS tests as follows:

Table III stationary of time series data for variables (ADF) and (KPSS) analysis for Egypt (2000-2021)

Var.	Augmented Dickey–Fuller						(KPSS(			
	level			First difference			level		first difference	
	intercept	intercept &trend	none	intercept	intercept & trend	none	intercept	intercept & trend	intercept	interce & trend
GDPper	1.2754	9234 275** 88747			2281	06769	.549739 **0.19222 ** 0.63577 6			0.10938
CO2per	58128 0.7932738307			17842	135075	.602836	** 0.4368 0.138950 0.219636			0.16297
LIFEX	1.7325 17191 200552 2.0297				272382	.43717	*0.56791 ***0.1417 0.271695			0.09809
DSL	2.948	4.5303	2.87956	*6.651	*10.621	*6.2104	0.529**	0.0946	0.174	0.1165
CONREN.	1.715	-2.199	-0.463	*7.218	*-7.516	*-7.386	0.519**	0.1978**	0.525**	0.1449**
GENREN	0.291	-3.163	2.911	-3.751	-3.650	-1.124	0.537**	0.1793**	0.452***	0.10419
HYDCON	1.487	4.303**	3.448*	-3.662	4.0114**	4.568*	0.35****	0.098	0.240999	0.137***
CLEANCO	3.948*	4.061**	-0.8673	-4.822*	-1.9057	-5.1987*	0.353***	0.353345	0.548**	0.1719**
OKFDI	1.783	3.928**	1.676***	-3.962*	-3.174	-4.291*	0.579**	0.065	0.085	0. 567*
FPI	-3.00	-2.219	-0.551	3.685**	-2.496	-3.727	0.135	0.085	0. 8312*	0.84*
TRADE	1.715	-2.199	-0.463	-7.218*	-7.516*	-7.386*	0.283	0.162	0.156	0.074
critical values (tabular)										
1%	-3.859	98307	2.685718	3.831511 -	4.532598	-2.692358	0.7390	0.216	0.739	0.216(
5%	-3.408	.658446	1.959071	-3.098	3.673616	-1.960171	0.4630	0.146	0.463	0.146
10%	-2.661	.268973	1.607456	2.655194 -	-3.2773	-1.607051	0.3470	0.1	0.347	0.119(

Source: E-VIEWS 12 program outputs

The tests were conducted in three stages:

1. Fixed limit phase without temporal direction

Intercept

2. Steady border phase and temporal trend 3. A phase without a fixed direction and a time trend. As a result of which some of the time series of variables in question are stable at the level, some of them are stable at the first team according to the KPSS test, this drives us to use the self-degradation model of the time gaps distributed (AUDL) Auto-Regressive Districtd Lag Model, which is done in two phases:
   1. "Test Bound Border Test"
   2. ARDL VECM error correction methodology Nativity: The chain is static and there is no root of the unit = 0 H0:

Alternative hypothesis: The chain is non-sustained and has a root for unit H1: > 0

If the calculated tcal is less valuable than the Ttap scale at a moral level of 1%, 5%, 10%, the chain in this case becomes zero-degree stable, code I. (0) The relationship between standard model variables can be expressed as follows:

SUSTAINABILITY=B0+B1 LCONREN. +B2 L GENREN +B3 LHYDCON +B4 LCLEANCOOK + B5 LFDI + B6 LFPI+ B7 LTRADE +ET……………(1)

XXVI. Estimation of the model (ARDL): After the time series of variables in question were stabilized and the appropriate test type was determined, the ARDL test was found to be appropriate for the stability of some time series at I0 and some at I1. For periods of delay, it is determined by the programme during the analysis. VIII. Results of the study:

With data on the statistical package 12 EVIEWS, the results of the analysis were as follows:

I. Measuring the impact of the green economy on net FDI:

In measuring the impact of the green economy on net FDI, the results were as follows:

XXVII. Results:

First: Measuring the impact of the green economy on net foreign direct investment:

When measuring the impact of the green economy on net foreign direct investment, the results were as follows:

1. In the short term:

The coefficient of determination R2 = 88.5%, which means that green economy indicators explain 88.5% of net foreign direct investment flows in Egypt.

The significance of the regression relationship as a whole was confirmed according to the Fc test (4.192914).

Regarding the D.W statistic, which was estimated at (2.023405), it falls between the minimum and maximum limits, making it difficult to judge whether there is a problem of autocorrelation between errors or not. When conducting a test for both serial correlation between residuals using E-VIEWS, error variance test, the F value was insignificant, resulting in the rejection of the null hypothesis that there is serial correlation between residuals and the acceptance of the alternative hypothesis that there is no serial correlation between residuals.

2. In the long term (cointegration test):

The F-statistic value = 7.857927, which is higher than the minimum and maximum limits, confirms the existence of a cointegration relationship in the long term between the green economy and net foreign direct investment.

Therefore, it is clear from conducting the statistical analysis that the first hypothesis is significant, as the more the reliance and orientation towards the green economy, the more the attraction of foreign direct investment, which means the acceptance and realization of the first hypothesis of the study.

Secondly: Measuring the impact of the green economy on sustainable development in its four dimensions:

1. Measuring the impact of the green economy on sustainable development in its economic dimension, expressed by the average per capita gross domestic product at constant prices (GDPPER) By entering the independent variables represented in the state's ability to produce and generate renewable energy (GENREN), in addition to the state's ability to generate electricity from renewable energy (HYDCON) and move away from traditional sources in electricity generation, in order to reduce carbon emissions in line with the mitigation and adaptation strategy and Egypt's vision 2020-2050 for climate change, as well as the extent to which clean energy reaches most of the population and its use in cooking, which means the proportion of the population dependent on clean and renewable energy (CLEANCOOK), in addition to the variable of the amount of consumption of renewable energy (CONREN) inside Egypt in the standard package E-VIEWS 12 and measuring its impact on the dependent variable expressed by the average per capita gross domestic product (GDPPER), which is one of the best indicators for measuring the performance of an economy for a country. The results resulted in the following:

The value of the determination coefficient R2 = 99%, which means that green economy indicators explain 99% of the changes in the average per capita gross domestic product in Egypt.

The significance of the regression relationship as a whole according to the Fc test (112.8479). Regarding the D.W statistic, which was estimated at (1.839154), it falls between the lower and upper LIMITS, making it difficult to judge whether there is a problem of autocorrelation between errors or not. See Appendix Table (2) Residual test:

When conducting the serial correlation test between the residuals using E-VIEWS, the value of F was not significant, resulting in the rejection of the null hypothesis that there is serial correlation between the residuals and the acceptance of the alternative hypothesis that there is no serial correlation between the residuals. See Appendix Table (2)

The same is true for the error variance test, where the error variance test was conducted and it was found to be homogeneous. See Appendix Table (3) Long-term common integration test:

The value of F-statistic = 8.003941, which is higher than the lower and upper limits, which confirms the existence of a long-term common integration relationship between the independent variables and the dependent variable.

2. **MEASURING THE IMPACT OF THE GREEN ECONOMY ON SUSTAINABLE DEVELOPMENT IN ITS SOCIAL DIMENSION, EXPRESSED BY THE AVERAGE LIFE EXPECTANCY AT BIRTH FOR THE INDIVIDUAL IN EGYPT (LIFEX)**

By entering the independent variables mentioned above in the standard package E-VIEWS 12 and measuring its impact on the dependent variable expressed by the average life expectancy at birth for the individual in Egypt (LIFEX), the results are as follows:

The value of the determination coefficient R2 = 99%, which means that green economy indicators explain 99% of the changes in life expectancy at birth in Egypt. The significance of the regression relationship as a whole according to the Fc test (1628.084). Regarding the D.W statistic, which was estimated at (1.832657), it falls between the lower and upper limits, making it difficult to judge whether there is a problem of autocorrelation between errors or not. See Table (IV)

Table (IV)

F-Bounds Test		Null Hypothesis: No levels relationship		
Test Statistic	Value	Signif.	I(0)	I(1)
		Asymptotic: n=1000		
F-statistic	289.3824	10%	2.63	3.35
k	2	5%	3.1	3.87
		2.5%	3.55	4.38
		1%	4.13	5

Source: E-VIEWS 12 program outputs

When testing for long-term common integration:

The value of F-statistic = 289.3824, which is higher than the lower and upper limits, confirming the existence of a long-term common integration relationship between the independent variables and the dependent variable. Here is a more concise translation:

The second section of this study examines the impact of the green economy on sustainable development in its social dimension.

The study found that green economy indicators explain 99% of the changes in life expectancy at birth in Egypt. The study also found that there is no problem of autocorrelation between errors and that the error variance is homogeneous. Finally, the study found that there is a long-term common integration relationship between the independent variables and the dependent variable.

3. Measuring the impact of the green economy on sustainable development in its environmental dimension, expressed by the average per capita carbon emissions in Egypt (CO2per)

By entering the independent variables mentioned above in the standard package E-VIEWS 12 and measuring its impact on the dependent variable expressed by the average per capita carbon emissions in Egypt
(CO2per), the results are as follows:

The value of the determination coefficient R2 = 69%, which means that green economy indicators explain 69% of the changes in per capita carbon emissions in Egypt.

The significance of the regression relationship as a whole according to the Fc test (92.64725).

Regarding the D.W statistic, which was estimated at (2.437460), it falls between the lower and upper limits, making it difficult to judge whether there is a problem of autocorrelation between errors or not. See Table (V)

Table (v)

R-squared	0.997692	Mean dependent var	2.052222
Adjusted R-squared	0.986924	S.D. dependent var	0.756747
S.E. of regression	0.086535	Akaike info criterion	-2.181623
Sum squared resid	0.022465	Schwarz criterion	-1.439647
Log likelihood	34.63461	Hannan-Quinn criter.	-2.079314
F-statistic	92.64725	Durbin-Watson stat	2.437460
Prob(F-statistic)	0.001612		

*Note: p-values and any subsequent tests do not account for model selection.

***Source**: E-VIEWS 12 program outputs*

When testing for long-term common integration:

The value of F-statistic = 42.36778, which is higher than the lower and upper limits, confirming the existence of a long-term common integration relationship between the independent variables and the dependent variable. Here is a more concise translation:

The third section of this study examines the impact of the green economy on sustainable development in its environmental dimension.

The study found that green economy indicators explain 69% of the changes in per capita carbon emissions in Egypt. The study also found that there is no problem of autocorrelation between errors and that the error variance is homogeneous. Finally, the study found that there is a long-term common integration relationship between the independent variables and the dependent variable.

4. **Measuring the impact of the green economy on sustainable development in its technological dimension, expressed by the number of subscribers to land internet service in Egypt (DSL)**

By entering the independent variables mentioned above in the standard package E-VIEWS 12 and measuring its impact on the dependent variable expressed by the number of subscribers to land internet service in Egypt (DSL), the results are as follows:

The value of the determination coefficient R2 = 99%, which means that green economy indicators explain 99% of the changes in the number of subscribers to land internet service in Egypt.

The significance of the regression relationship as a whole according to the Fc test (6989.577). Regarding the D.W statistic, which was estimated at (2.486761), it falls between the lower and upper limits, making it difficult to judge whether there is a problem of autocorrelation between errors or not. When testing for long-term common integration:

The value of F-statistic = 42.36778, which is higher than the lower and upper limits, confirming the existence of a long-term common integration relationship between the independent variables and the dependent variable.

XXVIII. Recommendations

In the light of the above findings, it is recommended that the researcher:

1. The State must develop an effective strategy to ensure that the green economy is adopted because of its considerable economic and environmental benefits in both the short and the long term, with firm legislation on environmental and investment abuses to further attract more direct foreign investment to the renewable energy sector.
2. Work to overcome the difficulties of green transformation in Egypt, particularly the energy cost factor.

3. Attention to scientific research on renewable energy and the environment due to climate change resulting from increased carbon emissions. Therefore, a shift must be made to clean and environmentally friendly renewable energy.
4. To emphasize that the strategy of industry takes into account environmental requirements and promotes a green economy and innovation.
5. Promote domestic investment in renewable energy for both the public and private sectors.
6. Encourage international cooperation in support of developing countries, particularly in the area of technology transfer, green finance, microfinance, trade and investment, and the dissemination of best practices in climate change adaptation and mitigation mechanisms. Emphasis should be placed on the role of the United Nations and its various agencies, particularly in supporting the concept of a green economy in member countries.
7. The trend towards nuclear power generation in addition to underground thermal energy; their multiple advantages, and these areas are not adequately supported.
8. To promote the export of renewable energy of the countries of North Africa and the Middle East. Work hard to enter the market for the export of solar energy so that Egypt can take the lead in this area.

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Supplements

Table 1

Model selection method: Akaike info criterion (AIC)

Dynamic regressors (4 lags, automatic): GENREN CONREN

Fixed regressors: C

Number of models evaluated: 100

Selected Model: ARDL(4, 4, 3)

Variable	Coefficient	Std. Error	t-Statistic	Prob.*
GDPPER(-1)	-0.237657	0.254146	-0.935121	0.4027
GDPPER(-2)	4.705562	0.931312	5.052614	0.0072
GDPPER(-3)	-3.207544	1.781178	-1.800799	0.1461
GDPPER(-4)	-1.667517	1.185031	-1.407150	0.2321
GENREN	184.6214	63.60772	2.902499	0.0440
GENREN(-1)	20.53203	62.42237	0.328921	0.7587