The Effect of an Exchange Rate Movements on Net Inflows of Foreign Direct Investment during the Period 1974-2023:

An Empirical Study on Egypt[1]

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ABSTRACT

Foreign direct investment (FDI) is considered one of the most important mechanisms for stimulating economic growth and contributing to economic development and facilitates the transfer of advanced technology to the host country. The significance of the exchange rate lies in the fact that it is the initial link between the investor and the host country. Additionally, Egypt's goal with a Devaluation of currency rate regime was to attract capital inflows while also allowing the economy to absorb external shocks and increase exports.

This study aims to reach the effect of Exchange Rate movements on net inflows of Foreign direct investment in Egypt during the period (1974-2023). The research is based on the hypothesis that there is a statistically significant relationship between the Exchange Rate movements in the Egyptian economy and net inflows of Foreign direct investment. The researcher has adopted a descriptive-analytical econometric approach. The econometric model is based on the cointegration technique and the Autoregressive Distributed Lag (ARDL) model to estimate the long-term relationships, and the Error Correction Model (ECM) to estimate the short-term relationships.

The long-term results indicate the existence of a cointegration relationship among the model's variables, and that the net inflows of Foreign direct investment is negatively affected by Exchange Rate movements during the study period, Which means that the devaluation of the currency attracts foreign investment to Egypt. This result is reached along with the significant and positive effect on net inflows of FDI of the following variables; GDP growth rate, Trade openness and Lending interest rate. And Inflation rate has a negative and non-statistically impact on net inflows of foreign direct investment and foreign reserves has a positive and non-statistically impact on net inflows of foreign direct investment. From these results, some policy implications and recommendations are provided. The short-term results are also consistent with the long-term results, with some minor differences. Additionally, the model has a high explanatory power.

Keywords: *Exchange Rate movements, Net Inflows of Foreign direct investment, cointegration approach, ARDL Model, and Error Correction Model (ECM).*

[1] Received in 7/12/2024, accepted in 29/12/2024.

1. INTRODUCTION

Developing countries, including Egypt, strive to attract foreign direct investment (FDI), which is considered one of the most important mechanisms for stimulating economic growth and contributing to economic development. FDI helps to bridge the foreign exchange gap and plays a significant role in adding new production capacities through the establishment of new projects or the modernization of existing ones (Liu & Islam, 2020) . Additionally, it facilitates the transfer of advanced technology to the host country. For these reasons, countries face intense competition in attracting FDI (Elazhary, Eltayb, & Hashem, 2024)

FDI plays an important role in capital accumulation, increasing the efficiency of human capital and improvement of skills and experience. Moreover, it has positive impacts on economic growth. It takes part in increasing exports and decreasing imports (under given conditions). Consequently, it improves balance of payments and investment efficiency. It increases the level of domestic savings and decreases unemployment. (Khalil, 2015)

It can be noted that the sectoral distribution of FDI inflows in Egypt during the period 2008-2022, for example. The Oil & Gas sector remains the largest FDI recipient, receiving about 61 % of total FDI inflows. The second largest sector is the service sector, receiving about 20 % of total FDI inflows, while the agriculture sector received an average of only 0.05% of total FDI, while the industry sector received around 7%. This indicates a bias in FDI towards rentier sectors at the expense of real economy sectors, reflecting a structural imbalance in the sectoral distribution of FDI. It also suggests that the primary objective of FDI in Egypt is to exploit the country's natural resources rather than working on manufacturing these resources within the country (Zidan & Mahmoud , 2024).

Countries generally seek to attract FDI by influencing its determinants to make them more attractive and competitive for foreign investors. FDI determinants are numerous and include: GDP growth rate, the inflation rate, the interest rate, the degree of trade openness, the size of foreign exchange reserves, and other factors (Alharthi, 2024).

Exchange rate behavior is one of the many factors influencing FDI activity. Both the levels and movements of exchange rates are significant. Exchange rates can affect the total flow of FDI and the allocation of this investment spending among the countries (Sabry, 2017).

It can be argued that a depreciation of the host country's currency makes it more attractive for foreign firms to invest in the host country, as the cost of capital is relatively cheap. Therefore, a depreciation of the host country's currency increases FDI inflows into the country. Moreover, foreign firms can achieve a higher level of capital since their wealth does not change. The effect of exchange rate movements on a foreign firm's wealth is known as the relative wealth channel. In the presence of imperfect capital markets, relative wealth is said to have an effect on FDI. In other words, when the host country's currency depreciates, foreign firms become wealthier even though their wealth does not change (Goldberg, 2009).

Additionally, it is said that the impact of exchange rate levels on foreign direct investment differs in with regards to the short and long terms. For example, it has been found that in the short term, there is an insignificant relationship between exchange rate levels and foreign direct investment. However, in the long term, this relationship exists and is significant. This long-term relationship is as follows: an increase in the host country's currency value leads to a decrease in foreign direct investment in the host country. This is also related to the concept of the wealth effect. Therefore, when the host country's currency appreciates, inflows of foreign direct investment decrease (Ogun & Egwaikhide, 2012).

On the other hand, it is argued that an appreciation of the host country's currency, measured in real effective exchange rate terms, encourages an increase in foreign direct investment in the host country. This is because the expected returns on investment in a country are likely to increase as the value of that country's currency rises. (Fadl & Ghoneim, 2020).

Furthermore, it is argued that the relationship between foreign direct investment and exchange rate levels or movements is complex. The type of operations a company undertakes in the host country is said to determine its reaction to exchange rate movements (ALBA, WANG, & PARK, 2010) . For instance, if a

foreign company intends to produce and sell its products in the host country, an appreciation of the host country's currency may stimulate more foreign direct investment. This is especially true if the company imports inputs from abroad. Therefore, whether it is the expected or current appreciation of the host country's currency, this leads to a decrease in input costs and attracts more foreign direct investment. However, if the foreign company intends to produce in the host country and then export its products to another country, an appreciation of the host country's currency may deter foreign direct investment. This is because the foreign company's products will be more expensive when sold abroad due to the appreciation of the host country's currency (Anyanwu & Yameogo, 2015).

Given the ongoing debate regarding the relationship between the exchange rate and FDI at both theoretical and empirical levels, and considering the continuous increase in the US dollar exchange rate in the Egyptian economy, this study aims to examines the impact of the exchange rate movements on net inflows of FDI into the Egyptian economy, especially since Egypt has witnessed significant movements in foreign direct investment inflows during the period (1974-2023) and to determine whether the continuous depreciation of the Egyptian Pound during this period contributed to attracting more foreign direct investment to Egypt and to develop recommendations for attracting foreign direct investment to Egypt and to ensure the stability of the Egyptian pound .

1.1 Research Problem

The problem of this research can be summarized in analyzing the effect of exchange rate movements on net inflows of FDI during the period of 1974 to 2023. During this period, the government adopted an open-door policy in 1974 to stimulate economic growth, modernize the Egyptian economy, and encourage both domestic and foreign investment. Subsequently, Egypt implemented an economic reform program in line with International Monetary Fund (IMF) policies in 1991. Further agreements with the IMF were signed in 2016 and 2022, leading to multiple decisions to devalue the Egyptian pound and raise interest rates. Additionally, the government introduced measures related to customs duties, imports, and exports to promote exports and attract foreign investment.

Research Objective: investigates the relationship between exchange rates movements and net inflows of FDI during the period (1974-2023), aiming to determine whether the continuous depreciation of the Egyptian Pound during this period contributed to attracting more foreign direct investment to Egypt and to develop recommendations for attracting further foreign investment to Egypt and to ensure the stability of the Egyptian pound.

The importance of the research lies in the following: The exchange rate, which represents the value of a foreign currency relative to the domestic currency, plays a crucial role in shaping foreign direct investment (FDI). While a depreciating currency can offer cost advantages, it may also create uncertainty, discouraging foreign investors who seek stability and predictability. A depreciated currency provides a locational advantage, but foreign investors generally prefer stable conditions. Exchange rates play a vital role in maintaining international competitiveness and serving as a benchmark for domestic price levels. A country's competitiveness is inversely related to the value of its currency. Exchange rate instability directly affects the attractiveness of imports and exports, production levels, the balance of payments, and reserves. Fluctuations in exchange rates create risks that contribute to uncertainty in currency values.

1.2 Research Hypothesis

The research is based on the following hypothesis :There is a significant negative effect of exchange rate movements on net inflows of FDI in Egypt during the period (1974-2023).

To test the hypothesis and achieve the research objectives, we used the quantitative methodology besides descriptive methodology. the quantitative methodology in this research depended on building an econometric model using the co-integration method Autoregressive Distributed Lag Model (ARDL) to determine the long-run correlation between variables, while the short-run effects are estimated by Error Correction Mechanism (ECM) method, this research was applied by software EViews.

The rest of the Research is organized as follows: the next section presents a literature review providing the previous studies of impact of exchange rate

Liberalization volatility, other determinants, on FDI. Section three explains Exchange rate evolution and foreign direct investment in Egypt. In the fourth section explains, Data and Methodology. In the Fifth section Findings and Analysis are addressed and analyzed then the Results and Recommendation section summarizes the major findings and emphasizes the recommendations.

2. LITERATURE REVIEW

2.1 Theoretical Framework

This section presents the theoretical framework for the relationship between foreign direct investment and exchange rate movements. These movements can be in the form of an increase or decrease in the exchange rate. In this way, exchange rate movements act as a risk faced by foreign companies when deciding to operate in the host country. The relationship between exchange rate movements and FDI is viewed from two perspectives: risk aversion and real options. The first perspective suggests that uncertainty about expected profits increases with increased exchange rate movements. This perspective aligns with the theory that foreign firms are risk-averse and seek to avoid risk. Consequently, when risks associated with expected profits increase, they will not invest. Increased exchange rate movements (risk) tend to increase uncertainty about the value of expected profits. Therefore, FDI in the host country decreases as exchange rate movements increases (OSINUBI & AMAGHIONYEODIWE, 2009) .

The second perspective, real options, offers an alternative viewpoint on the same concept. First, it assumes that foreign firms are risk-neutral, meaning they do not consider risk when making their investment decisions. Second, foreign firms tend to postpone their investment decisions in the host country due to uncertainty about expected profits. In other words, foreign firms prefer to gather more information about the exchange rate before making an investment decision in the host country. In other words, this model highlights the dynamic problem faced by firms: whether to invest abroad now or wait for a future period. This illustrates a trade-off between investing now or in the future in the case of irreversible capital investment, the value gained from postponing the foreign investment decision is higher than any potential lost profits. This is especially

true under conditions of high exchange rate movements (Abd-El Atti, Salah , & Rashid , 2021).

It is commonly believed that an increase in exchange rate movements in the home country leads to an increase in FDI inflows to the home country. Consequently, firms would have the option to produce in a country with lower exchange rate movements. However, when the impact of real exchange rate movements on FDI is examined in relation to developing countries, a negative relationship is revealed. This implies that an increase in real exchange rate movements decreases FDI inflows into the host country. The same negative relationship between exchange rate movements and FDI has been found in developed countries such as the United Kingdom and other European countries (Dhaka, Nag , & Pradhan , 2010).

From another perspective, exchange rate movements may encourage FDI inflows. This is conditional on the cost of delaying the investment decision in the host country being extremely high. In other words, there is a very high opportunity cost associated with postponing the decision. This is because the impact of increased exchange rate movements is relatively small compared to the expected revenues from this investment. Furthermore, exchange rate movements are also examined through its impact on horizontal and vertical FDI. In the case of horizontal FDI, exchange rate movements are seen as having a positive impact. This is because horizontal FDI occurs in economies with similar characteristics, especially developed economies. On the other hand, exchange rate movements are seen as having a negative impact on vertical FDI (Fadl & Ghoneim, 2020).

2.2 Previous Studies

Several empirical studies have examined the relationship between foreign direct investment and exchange rate movements, considering both the level and volatility of the exchange rate. We will review several of these studies.

2.2.1 Busse, Hefeker, & Nelgen (2010)

This study's aims to find out the relationship between exchange rate regime for FDI flows. This study reveals that there is a strong and significant effect from fixed exchange rates on bilateral FDI flows in developed economies, but no

significant effect for developing countries. Developing countries do not receive larger inflows of FDI if they resort to a hard peg to their currency as a policy choice, because fixed exchange rates in developing countries are less credible than in developed countries this could explain that their effect is rather weak in these countries.

2.2.2 Cambazoğlu & Güneş (2014)

This study analyses the relationship between FDI inflows in Turkey and the real exchange rate during the period 2007- 2015. For this purpose, the study employed a bound test cointegration approach that is based on the Autoregressive Distributed Lag Model (ARDL). The results obtained from a long-term analysis revealed that there is a cointegration relationship between the exchange rate level and FDI inflows in Turkey. The rise in the real exchange rate level represents appreciation of the domestic currency for Turkey, causes a decrease in the foreign direct inflows. if domestic currency depreciates sharply, the international price of domestically owned enterprises also falls; and then, foreign firms divert their investments to Turkey and There is not any statistically significant correlation exists between foreign direct investment inflows and short-term exchange rate levels.

2.2.3 Degong, Ullah, & Ullah (2023)

This paper highlights the determinants of Chinese FDI in Pakistan. The study applies auto-regressive distributive lag (ARDL) for the short-run and long-run equilibrium during the period 1990 to 2017. Empirical results indicate that exchange rates, inflation and corruption have a significant negative impact on China's outward FDI in the host country. Conversely, rule of law and transparency have a weak association with China's outward FDI. this study shows that that countries with less inflation are more attractive to Chinese investors. and corruption has a negative and significant nexus with Chinese FDI.

2.2.4 Adewale & Bosede (2024)

This study identifies the relationship between exchange rates and (FDI) in Nigeria during the period 1981 - 2021. using a Fully Modified Ordinary Least Squares (FMOLS) regression analysis. the study findings indicate a significant

positive correlation between exchange rates and FDI. On the contrary, the study finds a positive but statistically insignificant association between trade openness and FDI. and a negative relationship between interest rate and FDI, and a positive statistically insignificant between inflation rates and FDI. and statistically significant negative relationship between human capital and FDI, which indicates the importance of human capital development in attracting foreign investment.

2.2.5 Sabry(2017)

This paper aims to identify the relation between FDI and exchange rate, this is done by examining the relationship between a set of variables and foreign direct investment. We found that GDP, interest rates, exchange rates, and inflation all have a positive relationship with FDI. Stable inflation rate also has a positive long-run impact on FDI. This is because investors seek stable prices in order to generate revenues, and a depreciation of the Egyptian pound increases inflation, which reduces their real incomes. It also increases the cost to importers and pay higher prices for their imports.

2.2.6 Fadl & Ghoneim (2020)

This study identifies the relation between FDI and exchange rates. Regression analysis revealed a strong positive correlation between the exchange rate and foreign direct investment, indicating that a depreciation of the domestic currency stimulates foreign direct investment. There is also a significant positive impact of trade openness, per capita GDP growth, urban population, and natural resource wealth on FDI. Therefore, the government should focus on devaluing the currency, encouraging trade openness, growth of per capita GDP, urban population, and natural resource endowments to attract FDI.

2.2.7 Abd-El Atti, Salah, & Rashid(2021)

the study aims to measure the impact of relative exchange rate volatility on inward FDI to Egypt as well as investigating the impact of other relative dimensions on inward Foreign direct investment to Egypt .For this purpose, it used a Generalized Method of Moments (GMM) estimation approach. According to the results, the size of the market in both the home country and the

host country has a significant positive impact on foreign direct investment inflows into Egypt. bilateral trade, Geographic distance, relative cost of borrowing, labor productivity, and corruption are found to be statistically significant for inward FDI to Egypt.

2.2.8 Ibrahim (2024)

the study aims to test the relationship between foreign direct investment flows and exchange rate liberalization, during the period 1990-2020, where the Autoregressive Distributed Lag (ARDL) model was used. The study concluded that foreign direct investment is positively correlated with the devaluation of the Egyptian pound, and there is a relationship between inflation and foreign direct investment, as well as a relationship between growth in per capita income and foreign direct investment.

A review of previous studies reveals multiple studies that have examined the impact of exchange rate on foreign direct investment and the relation between exchange rate and foreign direct investment. However, this study is distinguished by:

- The study examines the effect of exchange rate movements on net foreign direct investment inflows, rather than on gross foreign direct investment
- the long time period over which it analyzes the relationship between the exchange rate and foreign direct investment (1974-2023), and using time series analysis through the cointegration technique, the ARDL model, and the ECM model.
- it also tries to provide some recommendations to increase foreign investment flows into the Egyptian economy and ensure Egyptian pound stability.
- The study also examined the impact of other variables on net foreign direct investment inflows, such as GDP growth rate, Trade openness, Lending interest rate, Inflation rate and foreign reserves.

3. EXCHANGE RATE EVOLUTION AND NET INFLOWS OF FDI IN EGYPT

Egypt's foreign exchange rate policies have passed several main periods, starting with the nationalization period and the state intervention policy in economic life during the 1960s, This was followed by the economic openness policy and the open door policy during the 1970s, then the period of initial attempts at economic reform as a response to external shocks in the 1980s, until the period of comprehensive economic reform and the economic reform and structural stabilization program began in the early 1990s (Ahmed, 2021) , and finally, the so-called period of economic liberalization, which resulted in the liberalization of the Egyptian pound exchange rate and leaving it free to be determined by the forces of supply and demand.

During the period 1974-2023, The Egyptian government has also implemented various policies to attract foreign investment, starting with Law No. 43 of 1974, which was a real beginning to encourage Arab and foreign capital (Khalil, 2015) , and ending with Law No. 72 of 2017. The study period 1974 to 2023, can be divided as follows:

3.1 Open Door Period (1974-1979)

The government adopted the open-door policy in 1974 to stimulate economic growth, modernize the Egyptian economy, and encourage both domestic and foreign investment. During this period, the state used a package of measures such as tax exemptions, protection from nationalization, and allowing the transfer of profits without restrictions. Consequently,oil revenues, Suez Canal fees, tourism, and remittances from Egyptian workers abroad increased (Mohamed, 2010).

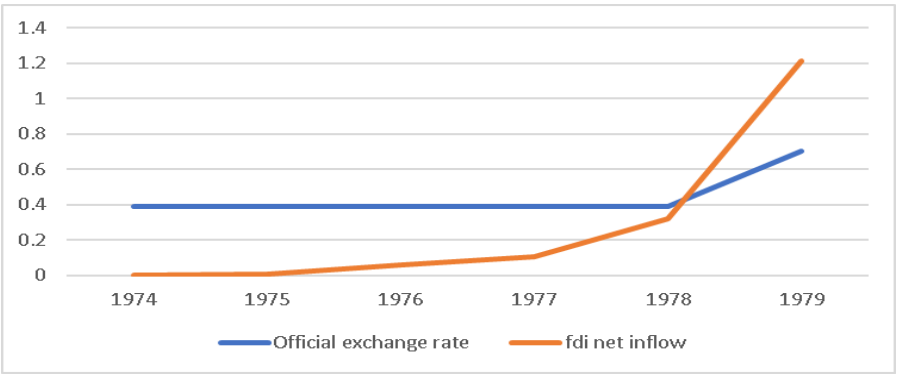

Figure 1:the evolution of Exchange Rate and net inflow of FDI during the period 1974-1979

Source: (worldbank, 2024)

Figure No. (1) shows the evolution of Exchange Rate and net inflow of FDI, during the period 1974-1979. This figure reveals that The Egyptian pound was pegged at 0.39 per US dollar throughout this period, with the exception of 1979 when it depreciated to around 0.7 EGP/USD and net inflow of FDI also began to gradually increase, reaching about $1.2 billion in 1979.

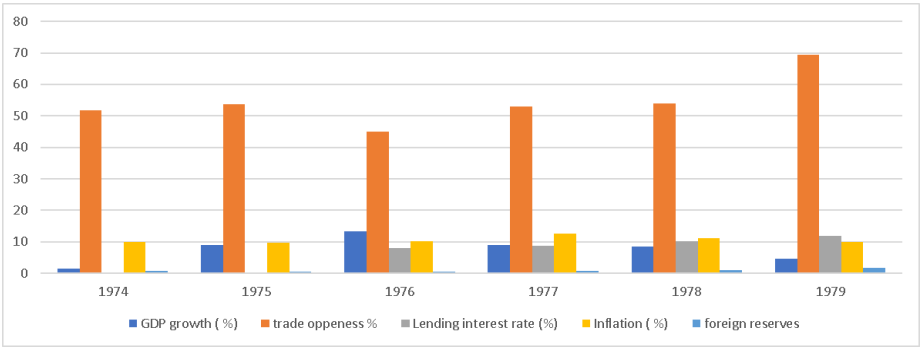

Figure 2: the evolution of GDP growth, trade openness, lending interest rate, inflation rate and foreign exchange reserves during the period 1974-1979

Source: (worldbank, 2024)

During this period, the growth rate (GDP growth) increased from about 1.5% in 1974 to about 4.5%, in 1979 Egypt's openness to the outside world increased, with trade openness increasing from 51.6% in 1974 in 1974 to 69.4%, in 1979 the lending interest rate rising from 8% in 1976 to 12%, in 1979 the inflation rate remained relatively stable at around 10%, and Egypt's foreign exchange reserves rising from $0.70 billion in 1974 billion to $1.79 billion in 1979, As illustrated in No. (2)

3.2 Start of Economic Reforms (1980-1989)

At this period, the Egyptian economy suffered from the external shock in 1986 resulting from the sudden shortage in revenues, especially after the sharp decline in oil prices. The economy started to face serious difficulties such as: GDP growth rate declined, reaching 3.8 %; fiscal deficit reached 23 % GDP. In 1987, the government started a macroeconomic reform program in coordination with the IMF and the World Bank, aiming at reducing external and internal imbalances. As a result ,there were some improvements in the multiple exchange rate regime: exchange rates were reduced from at least five different rates to three, the Egyptian pound was gradually devalued by 22 % in nominal terms, to reach about 0.86 EGP/USD in 1989, As illustrated in No. (3) and a free exchange market was established (Mohieldin & Kouchouk, 2004).

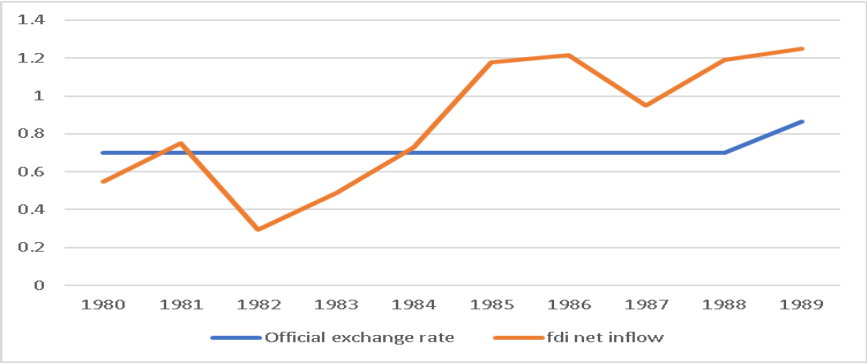

Figure 3: the evolution of Exchange Rate and net inflow of FDI during the period 1980-1989

Source of data: (worldbank, 2024)

During this period, net inflows of FDI decreased significantly in 1982 to about $0.29 billion, then began to increase to about $1.2 billion in 1986, then it decreased in the following year, before increasing again to reach approximately 1.25 billion dollars in 1989, As illustrated in No. (3)

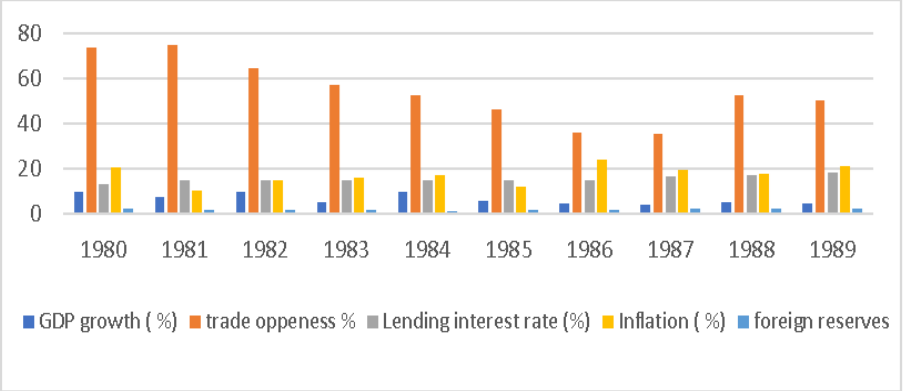

Figure 4: the evolution of GDP growth, trade openness, lending interest rate, inflation rate and foreign exchange reserves during the period 1980-1989

Source: (worldbank, 2024)

During this period, the growth rate decreased from about 10% in 1980 to about 4.9%, in 1989 Egypt's trade openness also decreasing from 73% in 1980 in 1974 to 50%, in 1989 the lending interest rate rising from 13% in 1980 to 18%, in 1989, The inflation rate decreased during this period, but then increased again to reach about 21% in 1989. and Egypt's foreign exchange reserves remained relatively stable at around to $2.4 billion During this period, As illustrated in No. (4)

3. 3 Economic Reform Period (1990-2002)

In 1991, Egypt adopted an Economic Reform and Structural Adjustment Program in agreement with the International Monetary Fund (IMF), to improve and stabilize macroeconomic variables. The exchange rate has been a central pillar of economic policy since the Economic Reform and Structural Adjustment Program of the 1990s, serving as a nominal anchor to stabilize other macroeconomic variables. This comprehensive program included measures such as financial sector reform, subsidy reduction, interest rate liberalization, price decontrol, and exchange rate unification where the exchange rate is determined

in a single free market, under a new exchange rate system based on pegging the Egyptian pound to the US dollar on a managed floating basis, with the price being determined by market forces and limited intervention by the monetary authority in the foreign exchange market, trade liberalization, public sector reform, and a commitment to reduce the budget deficit, especially after recognizing that the partial reforms of the early 1980s and the debt rescheduling in 1987 were insufficient (El Beblawi, 2008).

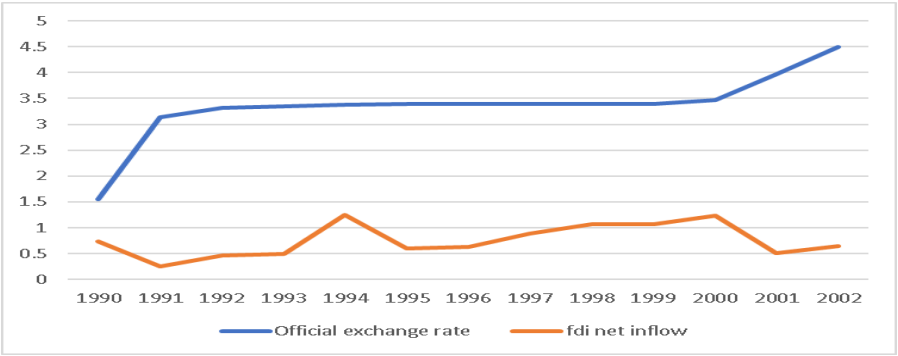

Figure 5: the evolution of Exchange Rate and net inflow of FDI during the period 1990-2002

Source of data: (worldbank, 2024)

These measures contributed to the depreciation of the Egyptian pound against the US dollar, reaching approximately 3.1 Egyptian pounds per dollar in 1991 and maintaining the exchange rate at approximately 3.3 Egyptian pounds to the US dollar during the period 1991-2000, as shown in Figure No. (5) reducing inflation expectations, and significantly improving the government's budget deficit, which decreased from around 20% of GDP in 1991 to about 1% in 1997 .International reserves represent one of the monetary policy tools used by the central bank to intervene in the market as part of measures to defend the stability of the exchange rate and the financial and banking system, and Increased resilience to external shocks and address imbalances in the foreign exchange market (Kenawy, 2009). Foreign exchange reserves at the central bank increased from approximately $3.6 billion in 1990 to more than $14 billion in 2002, as shown in Figure No. (6).

Towards the end of the 1990s, the Egyptian pound experienced depreciation and instability. Egypt went through a period of liquidity crisis and recession that put significant pressure on the Egyptian pound, with the exchange rate reaching 3.9 pounds to the dollar in 2001 and 4.5 pounds in 2002, compared to about 1.5 pounds in 1990, as shown in Figure No. (5). As a result of the aforementioned conditions and the lack of sufficient flexibility in exchange rate, wage, and price policies to restore macroeconomic balance, the Egyptian government decided to shift from Fixed adjustable exchange rate system to a managed floating exchange rate system (Mohieldin & Kouchouk, 2004)

Figure No. (5) shows a generally upward trend in the exchange rate of the Egyptian pound against the US dollar starting from 1990, following the liberalization of the foreign exchange market and the removal of administrative controls. The authorization of exchange companies to buy and sell foreign currency alongside banks contributed to this trend. The managed floating exchange rate policy for the Egyptian pound helped maintain relative stability against the dollar, particularly until 2001 (Mohamed, 2010) , as shown in the figure No. (5). This reflected the stability of the foreign exchange market despite some minor fluctuations, as the Central Bank intervened in the foreign exchange market since its liberalization in 1991.

Despite the reforms undertaken during this period, net inflows of FDI decreased from about $0.73 billion in 1990 to about $0.64 billion, in 2003, As illustrated in No. (5)

Figure No. (6) :the evolution of GDP growth, trade openness, lending interest rate, inflation rate and foreign exchange reserves during the period 1990-2002

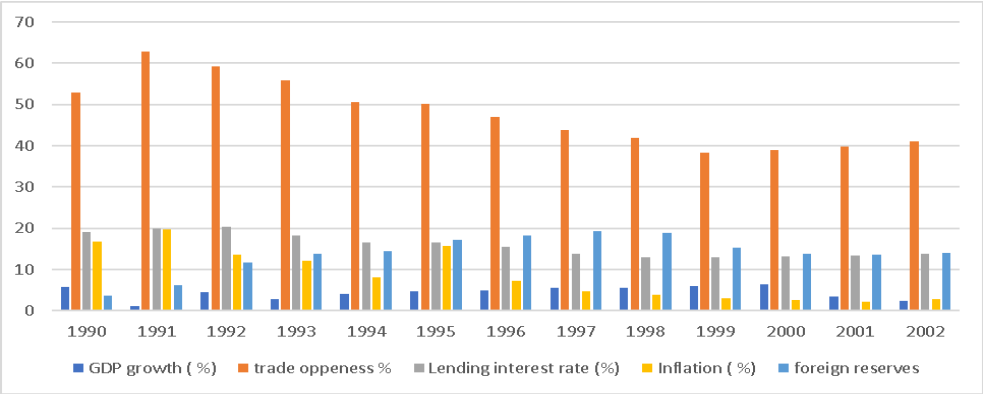

Figure 6: the evolution of GDP growth, trade openness, lending interest rate, inflation rate and foreign exchange reserves during the period 1990-2002

Source of data: (worldbank, 2024)

During this period, the growth rate decreased from about 5.6% in 1990 to about 2.3%, in 2002 Egypt's trade openness also decreasing from about 53% in 1990 to about 41%, in 2002 the lending interest rate decreasing from 19% in 1990 to about 13.7%, in 2002, The inflation rate decreased during from about 16.7% in 1990 to about 2.7% in 2002. and Egypt's Foreign exchange reserves increased to reach around to $14 billion in 2002, As illustrated in No. (6)

3.4 Continuation of Economic Reforms (2003-2010)

As part of completing the economic liberalization process and addressing the inconsistencies in macroeconomic policies resulting from the fixed exchange rate, and to avoid using international reserves to defend the value of the national currency against the dollar, as well as to relieve the Central Bank of the burden of intervening in the foreign exchange market to influence the value of the Egyptian pound, thereby preserving an adequate level of foreign reserves to secure the country's strategic needs, and given the continuous depreciation of the Egyptian pound and the numerous distortions in the foreign exchange market, it was decided on January 29, 2003, to adopt a free floating exchange rate system, abolish the central rate of the dollar, and liberalize the exchange rate of the Egyptian pound within the free market. Banks were given the freedom to determine the buying and selling prices of foreign currency within the free foreign exchange market (Massoud & Willett, 2014). This was accompanied by a

decline in the value of the Egyptian pound against the dollar by approximately 30% in 2003, reaching about 5.8 EGP/USD, compared to its value in 2002, as shown in Figure No. (7)

During 2004, the Central Bank adopted a more flexible policy in the foreign exchange market, which had a positive impact on activating and strengthening the liberalization of the foreign exchange market, such as intervening to provide the necessary foreign currency for individuals' needs, and adopting a non-expansionary monetary policy. This was accompanied by the launch of new savings instruments by banks with attractive interest rates in Egyptian pounds, which encouraged saving in Egyptian pounds. Interest rates continued to rise to exceed the high inflation rates caused by the floating of the Egyptian pound and the introduction by the Central Bank of new monetary instruments such as overnight deposits and repurchase agreements (Repo) (Ezzat, 2018).

Among the most important factors that supported confidence in the measures taken to strengthen the stability of the foreign exchange market was the Central Bank's launch of the interbank dollar market on December 23, 2004. The Central Bank's adoption of inflation targeting as a pillar of medium-term monetary policy helped eliminate the parallel dollar market and reduce the informal market (Massoud & Willett, 2014), leading to a decline in the value of the dollar against the pound; the exchange rate reached 5.4 pounds per dollar in 2008, compared to 6.19 pounds per dollar in 2004. This coincided with a large surplus in the services and transfers balance of the current account in the balance of payments. In addition, foreign currency inflows from tourism, the Suez Canal, and remittances from Egyptians working abroad increased. Foreign exchange reserves also increased significantly, reaching about $34.3 billion in 2008, as shown in Figure No. (8)

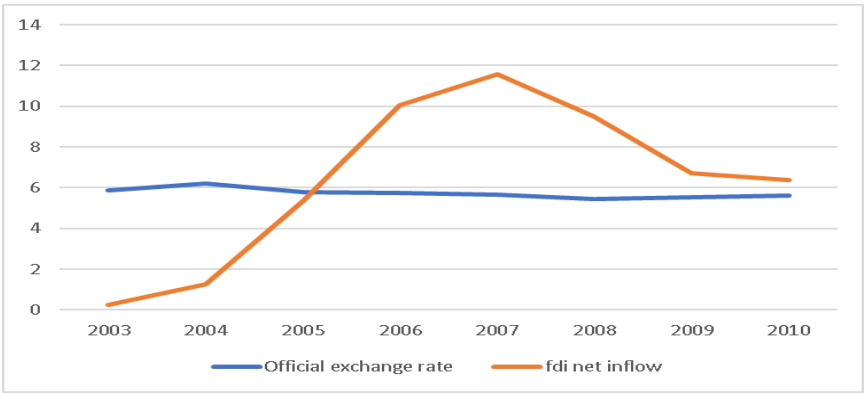

Figure 7: the evolution of Exchange Rate and net inflow of FDI during the period 2003-2010

Source of data: (worldbank, 2024)

Figure No. (7) clearly shows the stability of the Egyptian pound against the US dollar during the period 2003-2010, despite minor fluctuations due to various government interventions to influence the demand for foreign currency. The exchange rate of the pound against the dollar reached about 5.8 EGP/USD in 2003 and reached about 5.6 EGP/USD in 2010, which is attributed to the contribution of the Central Bank's managed floating exchange rate policy in achieving a degree of relative stability for the pound against the dollar. It can be said that during this period, Egypt followed a free-floating exchange rate system (Morsy & Levy, 2014).

And This period Egypt witnessed a significant increase in net inflows of FDI to Egypt, as these flows increased from about $0.23 billion in 2003 to about $6.3 billion in 2010., As illustrated in Figure No. (7)

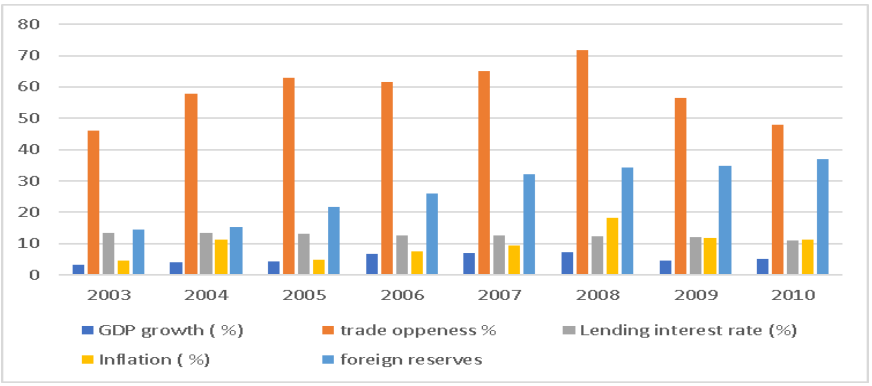

Figure 8: the evolution of GDP growth, trade openness, lending interest rate, inflation rate and foreign exchange reserves during the period 2003-2010

Source of data: (worldbank, 2024)

During this period, the growth rate increased from about 3.2% in 2003 to about 5.1%, in 2010, Egypt's trade openness also increased from about 46% in 2003 to about 47%, in 2010 the lending interest rate decreasing from 13.5% in 2003 to about 11%, in 2010, The inflation rate increased during from about 4.5% in 2003 to about 11.2% in 2010. and Egypt's Foreign exchange reserves increased to reach around to $37 billion in 2010, As illustrated in Figure No. (8)

3.5 Post-January 25 Revolution Period (2011-2023)

The uncertainty and lack of political, economic, and security stability following the January 25, 2011 revolution led to a decline in foreign direct investment, tourism revenues, and a widening of the trade and budget deficits. This, coupled with the uncertainty surrounding the investment climate in Egypt, resulted in a depreciation of the Egyptian pound against the US dollar, reaching approximately 5.9 pounds in 2011 and 6.1 pounds in 2012 due to the state of anticipation and stagnation that prevailed in the country after the January 25 events (Morsy & Levy, 2014) ,As illustrated in Figure No. (9).

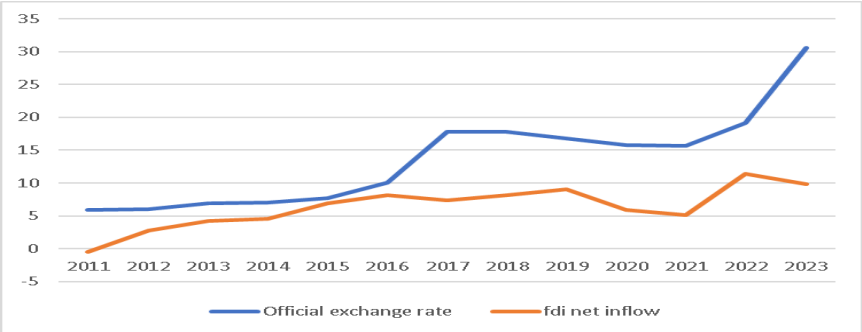

Figure 9: the evolution of Exchange Rate and net inflow of FDI during the period 2011-2023

Source of data: (worldbank, 2024)

In an effort to enhance the efficiency of the foreign exchange market and rationalize the use of foreign exchange reserves after reaching a critical level of approximately $15.6 billion, the Central Bank decided on December 30, 2012, to introduce a new mechanism through periodic auctions for the purchase or sale of US dollars (FX Auctions) in which banks submit their bids. This mechanism complements and supports the interbank dollar mechanism. In 2014, the Central Bank imposed a maximum daily and monthly cash deposit limit in foreign currency, aiming to eliminate the parallel market and limit speculation on the dollar (such as setting daily withdrawal limits of around $10,000 per day and $50,000 per month and other measures (Central Bank of Egypt, 2016) , but it was canceled in February 2015 due to its negative impact on exports and domestic industries. This situation contributed to the expansion and prosperity of the black market for foreign currency (International Monetary Fund, 2017), and a decline in international reserves from approximately $18.6 billion in 2011 to about $15.8 billion in 2015, as shown in Figure No. (10)., which show the decline in international reserves, and the decline in the exchange rate of the pound to 7.7 pounds per dollar in 2015. This is due to the decline in tourism revenues and foreign direct investment, as well as net outflows of portfolio investments of $7.1 billion after the January 25 revolution.

The dollar crisis in official banks worsened, as they struggled to meet customer demands. This allowed the black market to flourish, as evident in Figure No. (9)., which show that during this period, the official exchange rate of the Egyptian

pound continued to decline against the US dollar in the official market and at a faster rate in the black market. As a result, there were two exchange rates in the official and black markets. Consequently, the Central Bank of Egypt devalued the Egyptian pound in March 2016.

On March 14, 2016, the Central Bank of Egypt devalued the Egyptian pound by approximately 31%, setting the exchange rate at around 10 Egyptian pounds to 1 US dollar. This move aimed to correct the misalignment between the Central Bank's valuation and the black market. The Central Bank also raised interest rates on deposits and lending, and the National Bank of Egypt and Banque Misr issued savings certificates with a 15% interest rate, conditional on surrendering US dollars to reduce demand and recycle it within the banking sector. However, despite this devaluation and significant Gulf support to increase foreign exchange reserves, there was still a significant gap between the official and black-market exchange rates, with a difference of around 5 pounds. Therefore, the Central Bank of Egypt decided to liberalize the exchange rate on November 3, 2016, allowing banks operating in Egypt to price foreign currency through the interbank mechanism. This aimed to restore the trading of dollars within legal channels and eliminate the parallel foreign exchange market as part of a comprehensive reform package including a comprehensive set of financial and monetary reforms to boost growth rates and employment (Central Bank of Egypt, 2018). Therefore, it was necessary for the Central Bank of Egypt, in light of the decline in international foreign exchange reserves, the high inflation rate, and the decline in the volume of foreign investments, to reduce the Egyptian pound against the US dollar once again. to preserve foreign exchange reserves, attract foreign portfolio investment with a stable exchange rate during its presence in Egypt, and to eliminate the price gap. The gap between the official and unofficial markets remained significant due to the weakness of dollar resources, which hindered foreign direct investment, especially in the presence of multiple dollar exchange rates and increased transactions in the unofficial market (ElMasry, 2021).

On November 11, 2016, the International Monetary Fund and Egypt signed a $12 billion loan agreement under the Extended Fund Facility (EFF). The agreement

included a shift to a flexible exchange rate system driven by market forces, fiscal consolidation, reducing budget expenditures, increasing value-added tax rates, and implementing deep structural reforms in the fiscal situation to stimulate economic growth. Consequently, a shift to a flexible exchange rate system driven by market forces was made to give banks operating in Egypt the flexibility to price the buying and selling of foreign currency in the free market (Sabry, 2017). The exchange rate of the dollar witnessed a significant increase, jumping from about 10.1 Egyptian pounds in 2016 to about 17.8 pounds in 2017, then about 16.77 in 2019, and then stabilized around 15.7 pounds in 2020 and 2021, as shown in Figure No. (9).

In 2022, following Russia's war in Ukraine, Egypt faced significant financial pressures. The cost of importing commodities such as wheat and oil increased, while tourism, a major source of foreign currency, was hit hard due to a decline in arrivals from two of its largest markets, Ukraine and Russia. This led foreign investors to withdraw more than $20 billion in hot money from the economy, causing instability in Egypt's black market for foreign exchange. Speculation and demand for the dollar increased, while supply remained insufficient (Brantner & Al-Najjar, 2023). In response, Egypt turned to the International Monetary Fund again to bridge the external financing gap, leading the government to float the Egyptian pound in March 2022, pushing the dollar exchange rate to around 19.16 pounds. The government then floated the pound again in October 2022, raising the dollar exchange rate to around 24.7 pounds. In January 2023, the government floated the pound once more, driving the dollar exchange rate to around 30 pounds (International Monetary Fund, 2022).

Figure No. (9). clearly shows the upward trend of the Egyptian pound's exchange rate against the US dollar starting from 2011 until 2023. This is due to the events that the country witnessed after the 2011 and 2013 revolutions, the agreements with the International Monetary Fund, and the subsequent liberalization of the exchange rate of the pound. As shown in Figure No. (9)., in 2011, the exchange rate of the dollar against the pound was about 5.9, reaching about 30 pounds per U.S. dollar in 2023. It can be said that Egypt followed a managed floating exchange rate system until 2016, but after signing the loan agreement with the

Fund in November 2016, Egypt adopted A market-determined exchange rate system.

And This period witnessed a significant increase in net inflows of FDI to Egypt, as these flows increased from about $-0.48 billion in 2011 to about $9.8 billion in 2023, As illustrated in Figure No. (9)

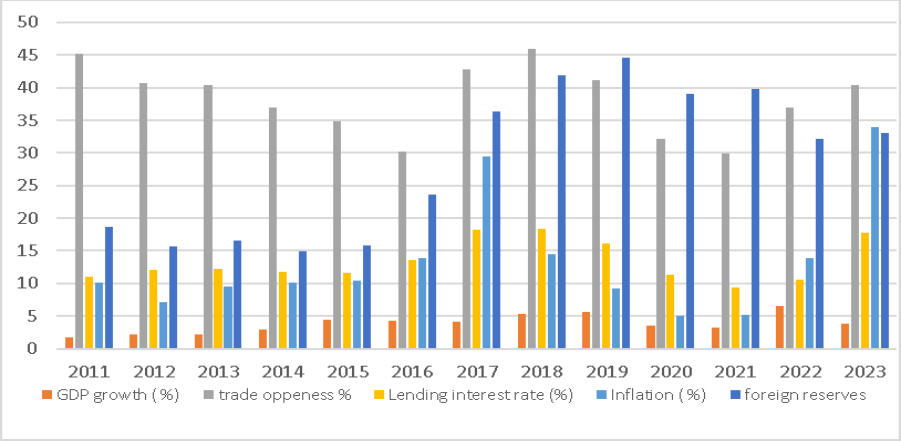

Figure 10: the evolution of GDP growth, trade openness, lending interest rate, inflation rate and foreign exchange reserves during the period 2011-2023

Source of data: (worldbank, 2024)

During this period, the growth rate increased from about 1.7% in 2011 to about 3.7%, in 2023, Egypt's trade openness also decreased from about 45.2% in 2011 to about 40%, in 2023 the lending interest rate increasing from 11% in 2011 to about 17.7%, in 2023, The inflation rate increased during from about 10% in 2011 to about 33.8% in 2023. and Egypt's foreign exchange increased to reach around to $33 billion in 2023, As illustrated in Figure No. (10)

4. DATA AND METHODOLOGY

4.1 Data

The goal of this research is to explore the impact of the exchange rate, GDP growth rate, the inflation rate, the interest rate, the degree of trade openness, the size of foreign exchange reserves on FDi net inflow in Egypt. This research uses annual time series data from 1974 to 2023. The data was gathered from the World Bank databases. To ensure compatibility with econometric techniques, all

variables used in the model were transformed into natural logarithms. Table No. (1) shows the variables abbreviation and description.

Table 1: Model variable definition

Abbreviation of Variable	Description	Source of data
FDi	FDi net inflow	World bank database
GDP	GDP growth (annual %)	
ER	Official exchange rate	
TO	Trade openness -to-GDP (%)	
IR	Lending interest rate (%)	
Inf	Inflation rate (annual %)	
Fr	foreign reserves	

Table 2: Descriptive statistics of model variables during the period 1974-2023

	LN_TO	LN_IR	LN_INF	LN_GDP	LN_FR	LN_FDI	LN_ER
Mean	3.8664	2.626	2.322	1.57925	2.2382	0.43504	1.135
Median	3.8491	2.605	2.42172	1.59349	2.7031	0.1958	1.222
Maximum	4.3103	3.012	3.52297	2.58624	3.7970	2.44912	3.421
Minimum	3.3964	2.079	0.81967	0.11814	-0.566	-2.7969	-0.93
Std. Dev.	0.2376	0.211	0.63905	0.45135	1.2771	1.35567	1.208
Skewness	0.0162	-0.296	-0.5893	-0.5087	-0.629	-0.1233	-0.18
Kurtosis	2.2123	2.865	2.8105	4.26287	1.9825	2.18279	1.993
Jarque-Bera	1.217	0.72	2.79049	5.15011	5.1314	1.42695	2.258
Probability	0.5442	0.698	0.24777	0.07615	0.0768	0.48994	0.323
Sum	181.72	123.4	109.134	74.2248	105.19	20.4469	53.36
Sum Sq. Dev.	2.5978	2.05	18.7856	9.37105	75.031	84.5405	67.12
Observations	47	47	47	47	47	47	47

Source: Author's calculations using EViews (12).

Table No. (2) shows the descriptive statistics of the model variables, and the values of the averages for all variables were positive, and their standard deviations were relatively low. The results also indicate reasonable consistency, with negligible differences between the mean and median for each variable. The Jarque-Bera test also shows that the data series for all variables take the form of a normal distribution

Table 3: Correlation coefficient matrix between model variables

	LN_TO	LN_IR	LN_INF	LN_GDP	LN_FR	LN_FDI	LN_ER
LN_FDI	-0.26	-0.02	0.07	-0.15	0.73	1	0.74

Source: Author's calculations using EViews (12).

Table No. (3) shows the correlation coefficients between the model variables, and these coefficients indicate the following:

- The Correlation between LN_TO and LN_FDI =-0.26, which is a weak inverse correlation.
- The Correlation between LN_IR and LN_FDI =-0. 02, which is a very inverse correlation and.
- The Correlation between LN_INF and LN_FDI =0. 07, which is a very direct correlation.
- The Correlation between LN_GDP and LN_FDI =-0.15, which is a weak inverse correlation.
- The Correlation between LN_FR and LN_FDI =0.73, which is a strong direct correlation.
- The Correlation between LN_ER and LN_FDI =0.74, which is a strong direct correlation.

4.2 Methodology

The research study explores the dynamic relationship that exists between the exchange rate, GDP growth rate, the inflation rate, the interest rate, the degree of trade openness, the size of foreign exchange reserves, and foreign direct investment in Egypt. econometric methods allow long-term relationships accompanied by short-term associations to be assessed while simultaneously linking exchange rate, GDP growth rate, the inflation rate, the interest rate, the degree of trade openness, the size of foreign exchange reserves, and FDi net inflow.

Since many of macro variables are not stationary, this leads to spurious regression if we use conventional models. For this we use the idea of cointegration, which means that although the individual variables are not stationary by themselves, they follow the same long-run relationship and thus the residuals become stationary. For this reason, we will use cointegration methodology in our

research. The cointegration test requires that all variables are at the level of first difference I(1). The ARDL bounds test procedure can also be used whether the independent variables are I(0), I(1), or cointegrated (Degong , Ullah , & Ullah , 2023).

The ARDL model is a dynamic model because it includes lags for both the dependent and independent variables so that we can measure both short- and long-term relationships between the variables under concern. The relationship between FDI and its determinants is indicated in the following long-run equation (Abdelgany, 2020).

FDi= f(GDP, ER, TO, IR, Inf, Fr) (1)

In regression form,

$$FDi = B_{\circ} + ß_1\,GDP + ß_2\,ER + ß_3\,TO + ß_4\,IR + ß_5\,Inf + ß_6\,Fr + U \quad (2)$$

Where ß1 , ß2, ß3, ß4, ß5, ß6 all indicate coefficients, and U is the residual.

5. FINDINGS AND ANALYSIS

5.1 Unit Root Tests

To apply the ARDL bounds test, we need to follow several procedures. First, we need to test the stationarity of the variables. Since the ARDL bound methodology assumes that the variables are integrated of degree I(1), I(0), or jointly integrated and do not suffer from seasonal unit roots and fluctuating roots and collapse if the variables are integrated of degree I(2). We can find that this condition is satisfied in our case as shown in the following tables (4) and (5).

Table 4: Results of ADF Unit Root Test

At Level							
	Augmented Dickey-Fuller Test						
	LN_TO	LN_IR	LN_INF	LN_GDP	LN_FR	LN_FDI	LN_ER
With Intercept							
t-Statistic	-2.749	-2.111	-2.36415	-5.04765	-2.1931	-6.343	-0.30
Prob	0.0734	0.2412	0.1570	0.0001	0.2114	0.0000	0.916
	no	no	no	***	no	***	no
Trend and Intercept							
t-Statistic	-3.3395	-2.476	-2.2434	-5.9865	-2.5078	-7.698	-3.13
Prob	0.0722	0.3375	0.4557	0.0000	0.3232	0.0000	0.109
	no	no	no	***	no	***	no
Without Trend and Intercept (None)							
t-Statistic	-0.3696	0.8352	-0.19862	-0.82543	0.26258	-5.819	1.251

Prob	0.5462	0.8880	0.6096	0.3532	0.7581	0.0000	0.944
	no	no	no	no	no	***	no
At First Difference							
With Intercept							
t-Statistic	-5.6682	-5.481	-7.32375	-10.96506	-4.6726	-6.965	-4.40
Prob	0.0000	0.0000	0.0000	0.0000	0.0004	0.0000	0.000
	***	***	***	***	***	***	***
Trend and Intercept							
t-Statistic	-5.6010	-5.184	-7.29324	-10.82725	-4.8517	-6.828	-4.35
Prob	0.0002	0.0006	0.0000	0.0000	0.0015	0.0000	0.006
	***	***	***	***	***	***	***
Without Trend and Intercept (None)							
t-Statistic	-5.7217	-5.428	-7.3846	-11.1056	-4.3025	-6.971	-3.62
Prob	0.0000	0.0000	0.0000	0.0000	0.0001	0.0000	0.000
	***	***	***	***	***	***	***

Source: Author's calculations using EViews (12).

(***) Significant at the 5% and (no) Not Significant

Table 5: Results of PP Unit Root Test

At Level							
	Augmented Dickey-Fuller Test						
	LN_TO	**LN_IR**	**LN_INF**	**LN_GDP**	**LN_FR**	**LN_FDI**	**LN_ER**
With Intercept							
t-Statistic	-2.1176	-2.900	-2.4282	-5.2900	-1.577	-5.50	-0.17
Prob	0.2388	0.0529	0.1395	0.0001	0.4864	0.000	0.93
	no	no	no	***	no	***	no
Trend and Intercept							
t-Statistic	-2.840	-2.919	-2.311	-6.0457	-1.712	-7.22	-2.32
Prob	0.1906	0.1658	0.4200	0.0000	0.7306	0.000	0.41
	no	no	no	***	no	***	no
Without Trend and Intercept (None)							
t-Statistic	-0.363	0.7532	0.137817	-0.674580	0.53151	-4.92	1.55
Prob	0.5485	0.8735	0.7215	0.4197	0.8273	0.000	0.96
	no	no	no	no	no	***	no
At First Difference							
With Intercept							
t-Statistic	-5.561	-0.902	-7.4606	-18.35082	-4.7134	-8.95	-3.79
Prob	0.0000	0.7785	0.0000	0.0000	0.0004	0.000	0.00
	***	***	***	***	***	***	***
Trend and Intercept							
t-Statistic	-5.4830	-0.230	-7.4346	-18.254	-4.87	-8.432	-3.75
Prob	0.0002	0.9904	0.0000	0.0000	0.0014	0.000	0.02
	***	***	***	***	***	***	***
Without Trend and Intercept (None)							
t-Statistic	-5.6247	-0.816	-7.5348	-18.1093	-4.413	-8.44	-3.58
Prob	0.0000	0.3569	0.0000	0.0000	0.0000	0.000	0.00
	***	***	***	***	***	***	***

(***) Significant at the 5% and (no) Not Significant

Source: Author's calculations using EViews (12).

The unit root (UR) test is used to determine the stability of the time series data for the variables included in the model and at what level of differences this stability is achieved, and through this the integration degree of the model variables is determined. Tables No. (4) and (5) show the summary results of the unit root (UR) test, whether for the variables in their level form or after performing the first difference, through: Augmented Dickey-Fuller (ADF) test, Phillips–Perron Unit Root (PP) and using the statistical program EViews. The following is noted from the data in Tables No. (4) and (5) ,The results of the unit root (UR) test show the instability of the variables in the model at level and at Trend and Intercept except LN_GDP and LN_FDI, according to the (ADF) and (PP) tests, all variables are stable after performing their first differences, at the level of Significance 5%, which means that the time series of the model variables are integrated of the first order I (1), according to the (ADF) test and (PP) tests. Accordingly, the cointegration test will be conducted between the model variables where all the model variables share the same degree of integration I (1), through the ARDL method.

To conduct cointegration tests and estimate both long-run and short-run parameters, it is necessary to determine the optimal lag length for the variables included in the model. The AIC criteria, as shown in Figure No. (11):, indicate that the optimal lag length are (4, 2, 4, 4, 4, 3, 4).

5.2 Optimal Lag length

In Figure No. (11): we show the different ARDL models according to the AIC Criteria, as follows:

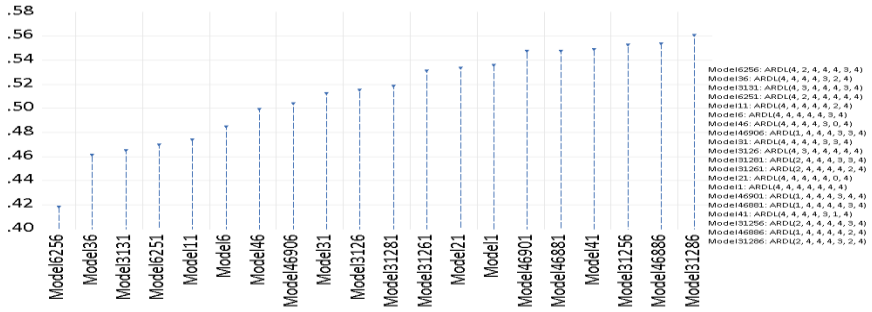

Figure 11: Akaike Information Criteria (top 20 models)
Source: Author's calculations using EViews (12).

This analysis resulted in multiple ARDL models. The results showed that the optimal lag periods, according to the AIC criterion, are (4, 2, 4, 4, 4, 3, 4), indicating four lags for LN_FDI, two lags for LN_ER, four lags for LN_FR, four lags for LN_GDP, four lags for LN_INF, three lags for LN_IR, and four lags for LN_TO.

5.3 Co-integration

We can determine the long-run relationship between variables through cointegration. It combines short-run dynamics with long-run equilibrium. Cointegration test looks at how time series, which may not be stationary separately, are related, as equilibrium forces mechanisms will prevent any deviation too far and participate in a stationary linear sequence (Konya, 2004).

Therefore, this research studies the long-run relationship using the Autoregressive Distributed Lagging (ARDL) cointegration technique and the specific cointegration test.

The null hypothesis in this research is presented as follows:

H_0: $\beta 1 = \beta 2 = \beta 3 = \beta 4 = \beta 5 = \beta 6 = 0$

While the alternative hypothesis:

H_1: $\beta 1 \neq \beta 2 \neq \beta 3 \neq \beta 4 \neq \beta 5 \neq \beta 6 \neq 0$

This will be done through bound tests to determine the presence of a long-run relationship between the model's variables. These tests rely on the F-statistic to assess the joint significance of the long-run coefficients. If the calculated F-statistic exceeds the critical value, the null hypothesis of no long-run relationship is rejected, and the alternative hypothesis of a long-run relationship is accepted, regardless of whether the variables are integrated of order degree zero (I(0)) or one (I(1)). However, if the calculated F-statistic is less than the critical value, the null hypothesis is not rejected. The results of this test are considered more accurate than traditional tests.

Table 6: Bound Tests Results

F-Bounds Test		Null Hypothesis: No levels relationship		
Test Statistic	Value	Signif.	I(0)	I(1)
			Asymptotic: n=1000	
F-statistic	16.58428	10%	2.53	3.59
k	6	5%	2.87	4
		2.5%	3.19	4.38
		1%	3.6	4.9
Actual Sample Size	39		Finite Sample: n=40	
		10%	2.831	4.04
		5%	3.327	4.7
		1%	4.527	6.263
			Finite Sample: n=35	
		10%	2.879	4.114
		5%	3.426	4.79
		1%	4.704	6.537

Source: Author's calculations using EViews (12).

Table No. (6) shows that the calculated F-statistic is greater than the upper bound of its critical value at all levels of significance. Therefore, the null hypothesis (Ho) stating that there is no long-run relationship between the variables in the model is rejected, and the alternative hypothesis (H1) is accepted, indicating the presence of a long-run relationship among the model's variables. Consequently, the next steps in the ARDL analysis will be undertaken.

5. 4 The long run relationships

After ensuring the existence of cointegration among the model's variables in the previous step, the long-run relationships are estimated using the ARDL model. The general form of the long-run equation for the model is as follow in equation No. (3):

$$Ln\ FDI_t = B_o + \sum_{i=0}^{P} B_{1\,i}\ FDI_{t-1} + \sum_{i=1}^{n} B_{2i}\ GDP_{t-i} + \sum_{i=1}^{h} B_{3i}\ ER_{t-i} + \sum_{i=1}^{q} B_{4\,i}\ TO_{t-i} + \sum_{i=1}^{o} B_{5\,i}\ IR_{t-i} + \sum_{i=1}^{k} B_{6\,i}\ INF_{t-i} + \sum_{i=1}^{j} B_{7i}\ FR_{t-i} + U_t \quad (3)$$

Where t refers to years and β's are long run coefficients, and n, p, h,q,o,k,j represent the optimal number of time lags determined by the AIC test and FDI is the dependent variable and the remaining variables are the independent variables and Ut is the error term.

Table 7: The long Run Coefficients

Variable	Variable Name	Coefficient	Std. Error	t-Statistic	Prob.
LN_ER	Official exchange rate	-1.811871	0.10834	-16.72386	0.002
LN_FR	foreign reserves	0.066376	0.081505	0.814378	0.439
LN_GDP	GDP growth rate	0.940485	0.155679	6.041167	0.0003
LN_INF	Inflation rate	-0.022785	0.112229	-0.203021	0.8442
LN_IR	Lending interest rate	1.352	0.319778	4.227932	0.0029
LN_TO	Trade openness	0.908186	0.156582	5.800066	0.0004

Source: Author's calculations using EViews (12).

From the previous table, it is obvious that:

The variable of: Official exchange rate has a negative and statistically significant impact on foreign direct investment as:

- 1% increase in exchange rate leads to a -1.8% decrease in net foreign direct investment flows) This means that the devaluation of the Egyptian pound increases the net inflows of foreign direct investment into Egypt)

This result is consistent with the economic theory: when a local currency depreciates, domestic assets, labor, and resources become cheaper in terms of foreign currencies. This reduces the cost of acquiring assets, establishing businesses, or expanding operations in the local market. Additionally, it makes domestic goods and services more competitive in the global market, thereby boosting exports. Consequently, the country becomes more attractive for foreign direct investment. However, in the case of Egypt, a significant portion of this foreign investment flows into government bonds and treasury bills to capitalize on high-interest rates (hot money), rather than being channeled into productive sectors of the economy.

- The variable of: GDP growth rate, Lending interest rate and Trade openness have appositive and statistically significant impact on net foreign direct investment flows as:

- 1% increase in GDP growth rate leads to a 0.94% increase in net foreign direct investment flows

The increase in the rate of GDP growth in Egypt indicates that the economy is expanding, which means high demand for goods and services, improving infrastructure, and a favorable business environment. This attracts foreign investment to Egypt.

- 1% increase in Lending interest rate leads to a 1.3% increase in net foreign direct investment flows
- The increase in the Lending interest rate in Egypt attracts foreign investment flows into government bonds and treasury bills to capitalize on high-interest rates (hot money)
- 1% increase in Trade openness leads to a 0.90% increase in net foreign direct investment flows

The increase in trade openness leads to an increase in FDI flows to Egypt because it creates a more favorable environment for international companies to operate, trade and profit, reducing barriers such as tariffs, quotas and organizational restrictions, which makes it easier for foreign companies to access the local market in Egypt, facilitating Egypt's integration into global trade networks, reducing the cost of importing inputs and exporting finished goods and increasing the flow of foreign investments to Egypt.

The variables of: Inflation rate has a negative and non-statistically impact on foreign direct investment and foreign reserves has a positive and non-statistically impact on foreign direct investment

5. 5 The Short run dynamics

The short-term parameters are estimated through the Error Correction Model (ECM), by taking the error term from the long-term estimated regression equation and including it in the short-term equation, taking a lag period for it, in addition to the first difference for all variables in the model, taking into account the lag periods prior to each variable being less than the long-term by a period, and therefore the lag periods for the variables range between zero or only one period, as is clear from Equation No. (4), which represents the general formula for the ECM equation as follows:

The short-term parameters are estimated using the Error Correction Model (ECM). This is done by taking the error term from the estimated long-run regression equation and including it in the short-run equation with a lag. Additionally, the first difference of all variables in the model is included, considering previous lags for each variable that are shorter than the long-run lag. Therefore, the lags for the variables range from zero to only one period, as shown in equation No. (4), which represents the general form of the ECM equation as follows:

$$\Delta FDI_t = B_\circ + \sum_{i=1}^{P} ß_1 \Delta FDI_{t-1} + \sum_{i=1}^{n} B_2 \Delta GDP_{t-i} + \sum_{i=1}^{h} B_3 \Delta ER_{t-i} + \sum_{i=1}^{q} B_4 \Delta TO_{t-i} + \sum_{i=1}^{o} B_5 \Delta IR_{t-i} + \sum_{i=1}^{k} B_6 \Delta INF_{t-i} + \sum_{i=1}^{j} B_7 \Delta FR_{t-i} + \varphi ECT_{t-1} + U_t \quad (4)$$

Where Δ represents the first difference of the variables, β's refers to short run coefficients in the short run, φ represents the speed of adjustment in the short run to reach a stable equilibrium state in the long run, (ECT) represents the correction factor or the speed of adjustment (Speed of Adjustment) of the FDI as a result of the change in the factors affecting it, and thus shows the time period required for the dependent variable to achieve equilibrium with the independent variables in the long run. Table No. (8) presents the results of the short-run estimates.

Table 8: Short-Run Results: Error Correction Model

Variable	Coefficient	Std. Error	t-Statistic	Prob.
C	-36.512	2.587	-14.111	0.000
D(LN_FDI(-1))	1.181	0.113	10.441	0.000
D(LN_FDI(-2))	0.699	0.066	10.568	0.000
D(LN_FDI(-3))	0.338	0.063	5.3439	0.000
D(LN_ER)	-3.266	0.264	-12.341	0.000
D(LN_ER(-1))	2.286	0.307	7.440	0.000
D(LN_ER(-2))	0.746	0.249	2.985	0.017
D(LN_FR(-1))	1.866	0.235	7.923	0.000
D(LN_FR(-2))	1.908	0.198	9.620	0.000
D(LN_FR(-3))	1.087	0.186	5.824	0.000
D(LN_GDP)	0.339	0.079	4.260	0.002
D(LN_GDP(-1))	-1.124	0.142	-7.887	0.000
D(LN_INF(-2))	0.330	0.075	4.362	0.002
D(LN_INF(-3))	0.350	0.081	4.292	0.002
D(LN_IR)	3.942	0.456	8.633	0.000

Variable	Coefficient	Std. Error	t-Statistic	Prob.
D(LN_IR(-1))	-3.200	0.523	-6.112	0.000
D(LN_IR(-2))	-3.964	0.612	-6.475	0.000
D(LN_IR(-3))	-1.916	0.485	-3.947	0.004
D(LN_TO(-1))	-2.130	0.294	-7.22	0.000
CointEq (-1)	-0.887	0.202	-14.253	0.000
Adjusted R^2	0.95			

Source: Author's calculations using EViews (12).

From the table No. (8), it is obvious that:

The short-term outputs of Table No. (8). are consistent with the long-term outputs in Table No. (7), except for the following:

- foreign reserves in previous years D(LN_FR(-1)), D(LN_FR(-2)) and D(LN_FR(-3)) has a positive and statistically significant impact on foreign direct investment

If previous years have witnessed exchange rate stability, this enhances foreign investor confidence, as it reduces the risks associated with converting profits into their home currencies. Conversely, significant exchange rate fluctuations in previous years may lead to foreign investor hesitancy due to concerns about losses in the value of their investments or profits.

the table No. (8) also shows that:

- Foreign direct investment is affected by Foreign direct investment in previous years: D(LN_FDI (-1)) ,D(LN_FDI(-2))and D(LN_FDI(-3))

Foreign investment in previous years plays a pivotal role in shaping the future of foreign investment in the country. The success of previous investments enhances confidence, improves infrastructure, and attracts new investors, while the failure of past investments can create concerns that negatively impact future investment flows.

The negative and statistically significant coefficient reported for the error correction term CointEq (-1) = -0.88, which measures the speed of adjustments towards equilibrium

The explanatory power of the model was adjusted R2 square = 0.95, i.e., the explanatory variables in the model illustrate about 95% of the changes that occur to foreign direct investment which is high explanatory ability.

5.6 Diagnostic tests

5.6.1 Breusch-Godfrey Serial Correlation LM

Table 9: Serial Correlation LM test

	The value	Prob
F-statistic	0.484663	0.6329
Obs*R-squared	5.563383	0.0619

Source: Author's calculations using EViews (12).

As shown in No. (9), the F-statistic and the Chi-Square (2) statistic are both insignificant at the 5% significance level. Consequently, we cannot reject the null hypothesis of no autocorrelation in the residuals

5.6.2 Normality Test

The Jarque-Bera (JB) test is employed to assess this normality, as illustrated in Figure No. (12).

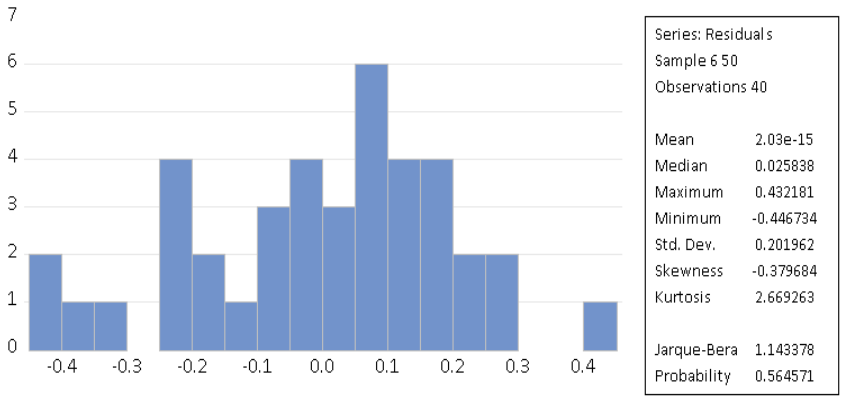

Figure 12: Test for normal distribution of residuals

Source: Author's calculations using EViews (12).

It is observed that the parameter value for this test is not significant at the 5% level, which implies that we cannot reject the null hypothesis that the distribution is normal.

5.6.3 HETEROSKEDASTICITY

Table 10:Heteroskedasticity Test: Breusch-Pagan-Godfrey

	The value	Prob
F-statistic	0.818087	0.6799
Chi- Square (2)	29.41257	0.4960
Scaled explained SS	0.918748	1.0000

Source: Author's calculations using EViews (12).

It is observed from Table No. (10) that both the Chi-Square and F-statistic values are insignificant even at the 5% significance level, which means we cannot reject the null hypothesis. Consequently, the model does not suffer from heteroscedasticity.

5.6.4 STRUCTURAL STABILITY TEST

This is done through the CUSUM test, which examines the cumulative sum of residuals, and the CUSUMSQ test, which examines the cumulative sum of squared residuals. As shown in Figure No. (13), both the cumulative sum of residuals and the cumulative sum of squared residuals move within the lower and upper bounds at the level of significance of 5%., indicating that the model is structurally stable.

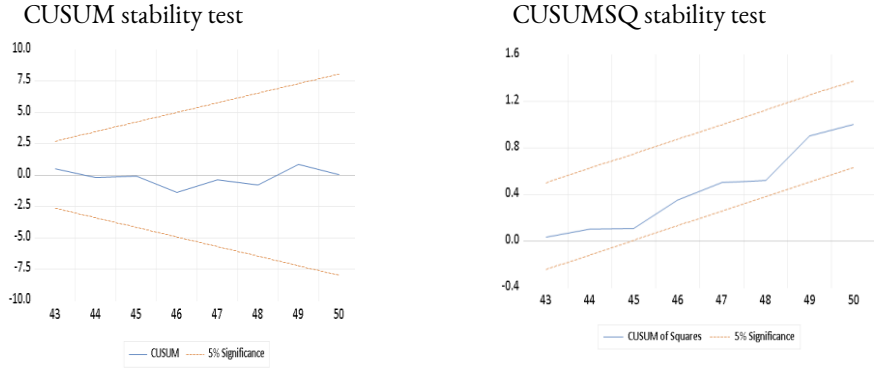

Figure 13: Structural stability tests of the model

Source: Author's calculations using EViews (12).

The results of the previous tests demonstrate the adequacy of the model used and the high quality of its fit

6. STUDY RESULTS AND RECOMMENDATION

6.1 RESULTS

The study concluded that there is a significant long-term cointegration between exchange rate movements and net foreign direct investment inflows in Egypt (Negative impact), which means that an increase in exchange rate decreases FDI net inflows to the host country as evidenced by the application of the Autoregressive Distributed Lag (ARDL) model. The findings revealed the following:

- The Oil & Gas sector remains the largest FDI recipient, receiving about 61 % of total FDI inflows. The second largest sector is the service sector, receiving about 20 % of total FDI inflows, while the agriculture sector received an average of only 0.05% of total FDI, while the industry sector received around 7%. This indicates a bias in FDI towards rentier sectors at the expense of real economy sectors, reflecting a structural imbalance in the sectoral distribution of FDI. It also suggests that the primary objective of FDI in Egypt is to exploit the country's natural resources rather than working on manufacturing these resources within the country. This is evident from the concentration of foreign inflows in the oil and gas industry and services, which does not contribute to the development of the manufacturing and agricultural sectors and reduces the expected positive effects on economic growth.
- There is a negative and significant impact of the exchange rate change on net foreign direct investment flows. 1% increase in exchange rate leads to a -1.8% decrease in net foreign direct investment flows) This means that the devaluation of the Egyptian pound increases the net inflows of foreign direct investment into Egypt). This result is consistent with the research hypothesis
- There is a positive and insignificant impact of foreign reserves on net foreign direct investment flows

- The GDP growth rate has a positive and significant impact on net foreign direct investment flows. 1% increase in GDP growth rate leads to a 0.94% increase in net foreign direct investment flows
- The trade openness, has a positive and significant impact on net foreign direct investment flows. 1% increase in Trade openness leads to a 0.90% increase in net foreign direct investment flows
- The lending interest rate has a positive and significant impact on net foreign direct investment flows. 1% increase in Lending interest rate leads to a 1.3% increase in net foreign direct investment flows
- There is a negative and insignificant impact of inflation on net foreign direct investment flows
- There is a negative and insignificant impact of inflation rate on net foreign direct investment flows
- The study further highlighted that the exchange rate movements, as an independent variable, has a significant impact at the 5% significance level on attracting net foreign direct investment flows in the long run. Specifically, a depreciation of Egyptian pound relative to the US dollar tends to attract more net flows of foreign direct investment flows.

6.2 Recommendation

To significantly increase net inflows of foreign direct investment (FDI) into Egypt and maximize its benefits, several recommendations can be implemented:

- Create a stable legislative and institutional environment: This involves fostering sustained high economic growth, low inflation rates, a stable foreign exchange market, speeding up issuance of licenses, and reduced bureaucracy.
- Correcting structural imbalances in the economy can be achieved by deepening industrialization through transitioning to a higher stage of manufacturing. This involves shifting from consumer goods industries to capital goods industries (producing machinery and intermediate goods), thereby building an independent industrial base for the national industry, concurrently with acquiring and developing local technological capabilities

- Correcting structural imbalances in the economy can be achieved by Encouraging foreign direct investment in priority sectors such as agriculture and industry, this will enhance the added value in the Egyptian economy, reduce unemployment rates, and improve the efficiency of the workforce.
- Strengthen the Egyptian pound: By addressing balance of payments imbalances and reducing the trade deficit through a targeted foreign trade strategy that improves the quality and competitiveness of Egyptian products.
- Maintain exchange rate stability: The Central Bank should adhere to its declared exchange rate regime to boost FDI across all economic sectors.
- Provide tax incentives to manufacturing, services, and agriculture sectors to attract more FDI.
- Offer tax exemptions to high-tech FDI: This will encourage the localization of advanced technology industries in Egypt.
- Adopt a manufacturing-for-export approach, Egypt should also seek to attract investors who focus on exporting to maximize benefits from local, Arab, and African markets.
- The government should encourage higher levels of openness by reducing tariffs and quotas on imports and thus encouraging foreign direct investment.
- It is worth noting that to encourage higher levels of foreign direct investment, it is necessary to work on increasing economic growth, accompanied by other factors such as trade openness.
- When dealing with the exchange rate, the government should take into account the impact of the change in the exchange rate on other economic variables such as inflation, economic growth, interest rates.
- Finally, FDI plays a vital role in supporting economic growth, provided that this FDI is directed towards productive sectors of the economy and increases exports. Therefore, it is advisable to conduct more researches to identify the sectors to which FDI is directed in Egypt in order to measure the return from this FDI and explore ways to encourage the direction of FDI towards sectors that create new added value in economy and increase exports.

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أثر تحركات سعر الصرف على صافي تدفقات الاستثمار الأجنبي المباشر خلال الفترة 1974-2023: دراسة تطبيقية على مصر

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ملخص البحث باللغة العربية

يعتبر الاستثمار الأجنبي المباشر أحد أهم آليات تحفيز النمو الاقتصادي فضلا عن تسهيل نقل التكنولوجيا المتقدمة إلى الدولة المضيفة. وتكمن أهمية سعر الصرف في أنه يمثل الحلقة الأولي التي تربط بين المستثمر والدولة المضيفة، كما أن تقلب سعر الصرف يعد عاملاً حاسماً يؤثر على تدفق الاستثمار الأجنبي المباشر إلى الدولة المضيفة. واستهدفت مصر من تحرير سعر الصرف هو جذب تدفقات رأس المال الاجنبي مع السماح للاقتصاد بامتصاص الصدمات الخارجية وزيادة الصادرات.

استهدف البحث إلى التوصل إلى تأثير تحركات سعر الصرف على صافي تدفقات الاستثمار الأجنبي المباشر في مصر خلال الفترة (1974-2023). استند البحث إلى فرضية مفادها أن هناك علاقة ذات دلالة إحصائية بين تحركات سعر الصرف في الاقتصاد المصري وصافي تدفقات الاستثمار الأجنبي المباشر. وقد اعتمد الباحث على المنهج الوصفي التحليلي، واعتمد النموذج القياسي على أسلوب التكامل المشترك ونموذج الانحدار الذاتي للفجوة الموزعة (ARDL) لتقدير العلاقات طويلة الأجل، ونموذج تصحيح الخطأ (ECM) لتقدير العلاقات قصيرة الأجل.

وتشير النتائج طويلة الأجل إلى وجود علاقة تكامل مشترك بين متغيرات النموذج، وأن صافي تدفقات الاستثمار الأجنبي المباشر تتأثر سلبًا بتحركات سعر الصرف خلال فترة الدراسة، أي ان تخفيض سعر صرف العملة يجذب الاستثمار الأجنبي الى مصر. كما أن هناك تأثير معنوي إيجابي للمتغيرات التالية؛ معدل نمو الناتج المحلي الإجمالي، والانفتاح التجاري، وسعر الفائدة على الإقراض من حيث التأثير على الاستثمار الأجنبي المباشر. كما أن معدل التضخم له تأثير سلبي وغير معنوي على الاستثمار الأجنبي المباشر، كما أن الاحتياطيات الأجنبية لها تأثير إيجابي وغير معنوي على الاستثمار الأجنبي المباشر. فضلا عن اتفاق النتائج قصيرة الأجل مع النتائج طويلة الأجل، مع بعض الاختلافات الطفيفة. بالإضافة إلى ذلك، يتمتع النموذج بقوة تفسيرية عالية.

الكلمات الدالة: تحركات أسعار الصرف، صافي تدفقات الاستثمار الأجنبي المباشر، اسلوب التكامل المشترك، نموذج ARDL، ونموذج تصحيح الخطأ (ECM)

Suggested Citation according to APA Style

Elmoghiar, M. S. (2025). The Effect of an Exchange Rate Movements on Net Inflows of Foreign Direct Investment during the Period 1974-2023: An Empirical Study on Egypt. *Journal of Alexandria University for Administrative Sciences, 62*(2), 97-141.