

## **Analysis of the Relationship between Budget Deficit and Foreign Direct Investment in Egypt (1980 -2020)**

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### **Abstract**

Researchers and policy makers in the last decades mentioned the importance of balanced budget and the role of the foreign direct investment (FDI) for the performance of the domestic economy. Additionally, they mentioned that FDI can also solve some economic problems such as; lack of domestic investment, decrease the fiscal deficit balance, and unemployment. However, the majority of the previous literature have focused on analyzing this relationship in one directional with the majority analyzing the impact of the budget deficit on the FDI while, fewer studies analyzed the impact of FDI on the budget deficit. By surveying a sample of these studies, it has been observed that the relationship between budget deficit and FDI is with non- monotone nature where the impact might be negative or positive. By considering the case of Egypt, it suffered from debt crises and budget deficits because of the pressure of internal or external shocks, and the negative effect of political, economic, and social instability conditions.

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Moreover, it enjoys competitive advantages in attracting foreign investment as this is owing to the reforms that adopted by Egypt through a large scale of national strategy. Additionally, it has implemented some regulatory reforms, it seems that all these economic reforms that started since the implementation of the open-door policy in 1970s until the recent reforms that started in 2016, it still being followed up to improve and help Egypt's investment and business climate. Therefore, the main concern of this research is to test if there is a positive impact of the relationship between the FDI and the budget deficit in Egypt during the period 1980 to 2020. The choice of this duration is owing to the evident of various internal and external shocks affecting the dynamic nature of the relationship between FDI and budget deficit in Egypt.

So, ARDL bound test approach is used to examine the nature of relationship between budget deficit and FDI. The results of model convinced that there is a short and long run relationship between FDI and budget deficit in Egypt where the FDI has a positive impact on the budget deficit.

**Keywords:** Budget Deficit, Foreign Direct Investment, The Autoregressive Distributed Lag (ARDL)

## تحليل العلاقة بين عجز الموازنه والاستثمار الاجنبى المباشر فى مصر (1980-2020)

### الملخص

قد اشار الباحثون وصناع السياسيات فى العقود الاخيرة الى اهمية توازن الموازنة ودور الاستثمار الاجنبى المباشر فى أداء الاقتصاد المحلى. كما انهم اضافوا لذلك ان الاستثمار الاجنبى المباشر يمكنه ايضا ان يحل بعض المشكلات الاقتصادية مثل نقص الاستثمار المحلى وتقليل العجز المالى والبطالة. ومع ذلك، فقد ركزت غالبية الادبيات السابقة على تحليل هذه العلاقة فى اتجاه واحد، حيث قامت الاغلبية بتحليل تأثير عجز الموازنة على الاستثمار الاجنبى المباشر، بينما قام عدد اقل من الدراسات بتحليل تأثير الاستثمار الاجنبى المباشر على عجز الموازنه. ومن خلال اخذ عينه من هذه الدراسات لوحظ ان العلاقة بين عجز الموازنه والاستثمار الاجنبى المباشر ذات طبيعه غير محدده فقد يكون لها تأثير سلبى او ايجابى. وبالنظر الى حاله مصر فإنها عانت من ازمات الديون وعجز الموازنة بسبب ما تعرضت له من ضغط الصدمات الداخليه والخارجيه، والتاثير السلبى لظروف عدم الاستقرار السياسى والاقتصادى والاجتماعى. علاوة على ذلك، فهى تتمتع بمزايا تنافسيه فى جذب الاستثمار الاجنبى، وذلك بفضل الاصلاحات التى تبنتها مصر من خلال نطاق واسع من الاستراتيجيه الوطنيه. بالاضافه لذلك، قامت بتنفيذ بعض الاصلاحات التنظيميه ويبدو ان كل هذه الاصلاحات الاقتصاديه التى بدأت منذ تطبيق سياسيه الانفتاح فى السبعينيات وحتى الاصلاحات الاخيره التى بدأت فى عام 2016، لاتزال قيد المتابعه لتحسين ومساعدته الاستثمار ومناخ الاعمال فى مصر. ولذلك فإن الاهتمام الرئيسى لهذا البحث هو اختبار ما اذا كان هناك تاثير ايجابى للعلاقة بين الاستثمار الاجنبى المباشر وعجز الموازنه فى مصر خلال الفتره من 1980 الى 2020.

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ويرجع السبب في اختيار هذه الفترة الزمنية الى الصدمات الداخلية والخارجية المختلفة التي اثرت على طبيعته الديناميكية للعلاقة بين الاستثمار الاجنبي المباشر وعجز الموازنه في مصر. لذلك تم استخدام اسلوب اختبار الانحدار الذاتى الموزع للتكامل المشترك (ARDL) لفحص طبيعته العلاقة بين عجز الموازنه والاستثمار الاجنبي المباشر. وقد توصلت النتائج الى وجود علاقه قصيره وطويله المدى بين الاستثمار الاجنبي المباشر وعجز الموازنه في مصر حيث ان للاستثمار الاجنبي المباشر تاثير ايجابي على عجز الموازنه.

**الكلمات المفتاحية:** عجز الموازنة، الاستثمار الاجنبي المباشر، لانحدار الذاتى الموزع للتكامل المشترك (ARDL)

## **Introduction:**

Budget status in Egypt during 1980 to 2020 has been fluctuating sharply. These fluctuations can be regarded to various factors including external shocks and internal shocks. Egypt suffered from several external shocks such as; the increases in the oil price in 1980s, Gulf war in August 1990, the Asian crisis that began in August 1997, and the decline in the petroleum and its products which began at the end of 1997 (Selim, 2008). Additionally, the shocks that affected the global economic conditions were the collapse of the World Trade Center towers in the USA in 2001, the Iraq war in 2003, the global financial crisis in 2009, and COVID-19 in 2019 (Selim, 2008; Gaber, 2021). Whereas, the external shocks were the Luxor terrorist attack in 1997, the revolution of January 25 in 2011, the events of 30 June in 2013, and the terrorist acts from 2013 to 2015 (Gaber, 2021; Boshra, 2020).

Additionally, The Egyptian economy is considered to be an open economy and one of the most attractive economic environments in the region (El- Ghandour, 2015; Ndiayel& XU, 2016). The historical background of foreign investment in Egypt started specifically in 1914, as French, British and Belgian held more than 90% of paid up capital of joint stock companies. Furthermore, in 1920s, industrialization was driven by tariff protection and public credit providing an enabling environment for the domestic private sector (Geneva, 1999). In 1958, the open door was closed and the direction of the Egyptian market economy shifted to the public sector as all the domestic and foreign joint stock companies were nationalized over the period 1960 to 1964 (Geneva, 1999).

However, in 1973, President Sadat re-opened the door again through the return of a free market economy announcement. The Effect of the Economic Reform and Structural Adjusted Program (ESRAP) in 1991, proved its success as the flow of

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FDI increased in the 1990s. Additionally, the current level of net inflows appeared to be more stable than earlier, the net flow of FDI reached to its peak in some periods and reached to the trough in another. This is owing to the unstable social, political and economic conditions specially after the first revolution in 2011. (Geneva, 1999)

By tracing the status in Egypt in this regard, it has been found that the trend of the budget deficit and the FDI in Egypt witnessed periods reflecting the same direction of the relationship between them such as; the first half of eighties, 1993-1995, 2000-2006, and 2015- 2020. While, there are periods reflecting the opposite direction of the relationship between them such as; 2007-2009, 2011-2013, and 2016-2017. Accordingly, this may raise a question of “What is the nature of relationship between the FDI and the budget deficit in Egypt?”. Therefore, this paper uses the autoregressive distributed lag (ARDL) co-integration approach to check the long–run relationship and the short run dynamic interactions relationship between the budget deficit and the FDI.

### **1. Literature Review**

This section reviews the theoretical studies as, there is a debate around the nature of relationship between FDI and government budget. As, the first group refereed to the FDI may have positive or negative impact on the budget deficit through increasing the government revenues through some channels such as (VAT, international tax, corporate tax, Knowledge transfer and technology and exploitation of natural resources) or shrink the tax base and imposing pressure on the government spending to protect the domestic economy, as it became vulnerable after the increase of FDI inflow (Le and Suruga, 2005).

## 1.1 Empirical literature of the positive impact of the FDI on the budget deficit

The earlier literature typically found positive impact of FDI on the budget deficit (increase government revenue).

Gropp and Kostial (2000) analyzed the correlation between FDI, taxation, and revenues of corporate tax in 19 OECD countries over the period 1987-1997, using the panel data analysis, they found that FDI inflows affected the corporate tax revenue positively.

Mahmood and Chaudhary (2013) studied the impact of FDI on the tax revenue in Pakistan from 1972 to 2010, using ADF, ARDL and Phillips-Perron test and Ng-Perron test. The results showed that FDI has a positive and significant impact on the tax revenue in Pakistan.

Okey (2013) explored mainly the impacts of FDI as well as its sectorial allocation on tax revenue of 8 countries in west Africa over the period 1989-2009, he found that FDI had a positive impact on the revenues.

Bunescu and Comaniciu (2014) used correlation analysis and studied the economic and noneconomic factors which affect tax revenues in 27 EU countries from 1995-2011. They revealed that FDI inflows had a weak positive effect on the tax revenues.

Aslam (2015) examined the long run relationship between FDI inflows and revenues in Sri Lanka from 1990-2013 and discovered that FDI inflows significantly positively contributed to the revenues.

Bal and Fazl (2016) investigated the impact of FDI inflows on the tax payments of the firms with different technology levels in Turkey from 2004-2012. They found that FDI inflow increased the revenues from firms especially in the firms with high technology level.

Bayar and Ozturk (2018) investigated the impact of FDI inflows on tax revenue in OECD countries with a panel co

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integration and causality analysis from 1995-2014 period. They found that there was one-way causality from foreign direct investment inflows to total revenues.

Abdrmane Camara (2019) estimated the impact of FDI on the government revenue for 92 developing countries from 1990-2015. The estimation results showed that in the long term FDI have a positive impact on the government revenue in the developing countries except for resource exporting countries the effect of FDI on the revenue is negative.

THABANG MOSES (2020) examined the nexus between foreign direct investment (FDI) inflows and budget deficit in a panel of five Southern African Development Community (SADC) countries (Malawi, South Africa, Tanzania, Namibia, and Zambia). The study employed the Panel Auto Regressive Distributed Lag (PARDL) model in examining the relationship between budget deficit and FDI. The panel unit root tests results showed different orders of integration (at levels and first-order) giving way to the use of PARDL. Co-integration test results confirmed a long-run relationship in the budget deficit FDI series. In the long run, there is a positive impact of FDI and budget deficit. Also it recommended that government should attract more foreign direct investment so as to minimize budget deficit and this could speed up the development of SADC countries.

### **1.2 Empirical literature of the negative impact of the FDI on the budget deficit.**

Tabasam (2014) investigated the interaction among FDI and tax revenue in Pakistan from 1975-2012. By using time series analysis, he concluded that FDI inflow had a negative impact on the revenues.

Gaalya (2015) investigated the interaction among FDI and tax revenue in Uganda during the period 1994-2012 with regression



analysis and reached that FDI inflow had a negative impact on the revenues

Jeza, Hassen and Ramakrishna (2016) analyzed impact of FDI on tax revenue in Ethiopia from 1974-2014. They found that tax incentives to attract FDI will lead to revenue decline in Ethiopia.

## **2. The interaction between trends of the Budget Deficit and the FDI in Egypt from 1980-2020**

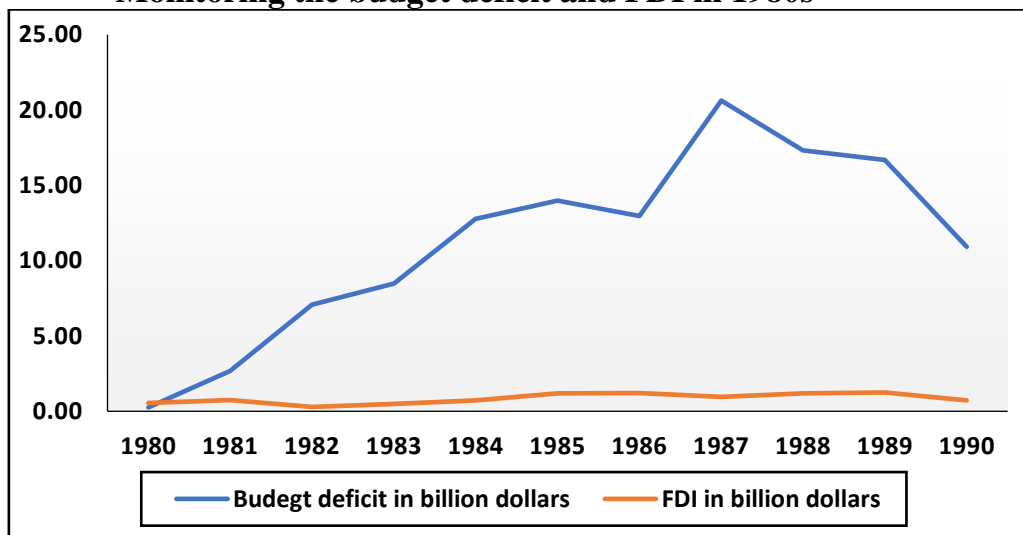
This section will review the main different transitions between budget deficit and FDI. There are three main sub-period of monitoring budget deficit and foreign direct investment classified into the following:

- A. Monitoring the budget deficit and FDI in 1980s
- B. The Economic Reform and Structural Adjustment Program in 1990s,
- C. Generations of Economic Reform program in 2000s.

### **A. Monitoring the budget deficit and FDI in 1980s**

Figure 1

Monitoring the budget deficit and FDI in 1980s



Source: drawn by researcher using data from CAPMAS, Central Bank and World Bank

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During 1980s, the behavior of budget deficit and FDI was fluctuated, as The overall deficit was owing to some main reasons: (El Essawi, 2007).

- 1) The strong expansionary fiscal and monetary policy that was adopted by the Egyptian government to modify the losses from war 1973.
- 2) The investment in the infrastructure; public utility, transportations, communication, and electricity.
- 3) the Egyptian government faced extreme pressure in 1987, as the Egyptian government was demanded to pay \$ 5.5 billion as a debt installment. This installment was divided into \$ 2.5 billion as a principal and \$2.6 billion as an interest according to the World Bank.
- 4) Egypt suffered from an economic teaser which was caused by the drop-in oil prices by 50%. This problem caused deficit by \$20.6 billion in 1987, because of the sharp decline in the oil revenues, the remittances, and the fees of the Suez Canal (Amin, 2012).
- 5) The high rate that was recorded by two main pillars, as the wages cost recorded 18.43% of total expenditures in 1989 relative to 15.09% in 1982. While, the interest service debt increased from 4.33% of government expenditures in 1980 to 10.05% in 1989.

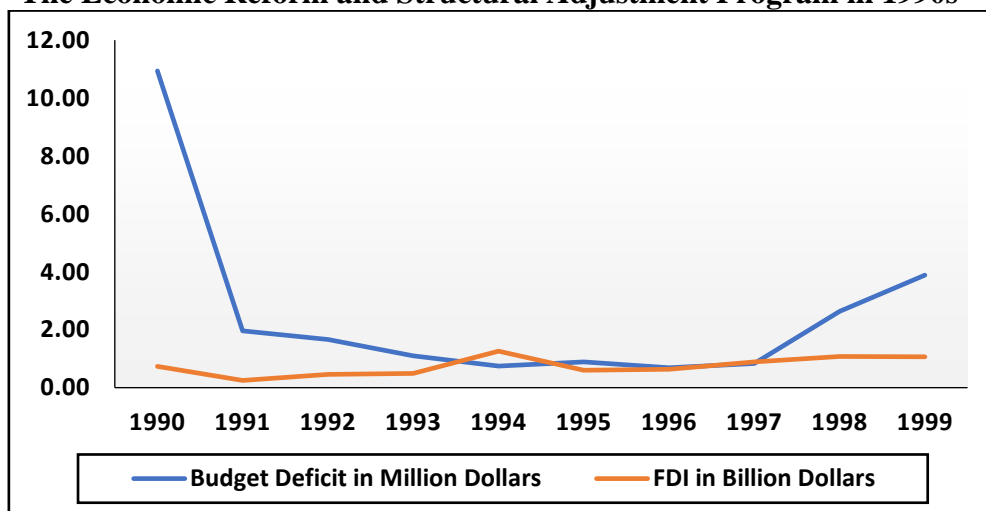
While, the trend of foreign direct investment in Egypt is not following a specific pattern, as it is sometimes increasing and sometimes decreasing sharply. Accordingly, the eighties witnessed an increase in FDI inflows to be USD 1.25 billion in 1989, relative to USD 0.55 billion in 1980. The main reason for this increase is the open door policy that was adopted in 1974. Additionally, the killing of President Sadat and the concern of investors about the instability of the economic policy in Egypt (Rehab and et.al 2022). Whereas, between 1986 and 1989, the

FDI tends to increase and the budget deficit decreased because of many laws being issued such as; law no, 230. This law added some activities and incentives to attract more foreign investors and supported the law no, 159 in 1981, which affirmed emphasizes securing projects, and not seizing fund on their accounts (Rehab and et.al, 2022). However, FDI began to decline when the Gulf War arose between 1990 and 1991 (Alaa and et al, 2021).

## **B. The Economic Reform and Structural Adjustment Program in 1990s**

Figure 2

The Economic Reform and Structural Adjustment Program in 1990s



Source: drawn by researcher using data from CAPMAS, Central Bank and World Bank

Figure 2 shows new stage in the Egyptian economy over the period 1990s. The end of the Gulf War is considered a lifeboat for Egypt as: (Albolbol and et al, 2004)

- a) The Gulf countries and the United States released Egypt from debts amounting to \$13.6 billion.
- b) The Paris Club is exempted Egypt from 50% of other debts, and helped the Egyptian government to reschedule the other debts.

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c) In 1991, Egypt implemented an economic reform program related to the recommendations of the IMF agreement.

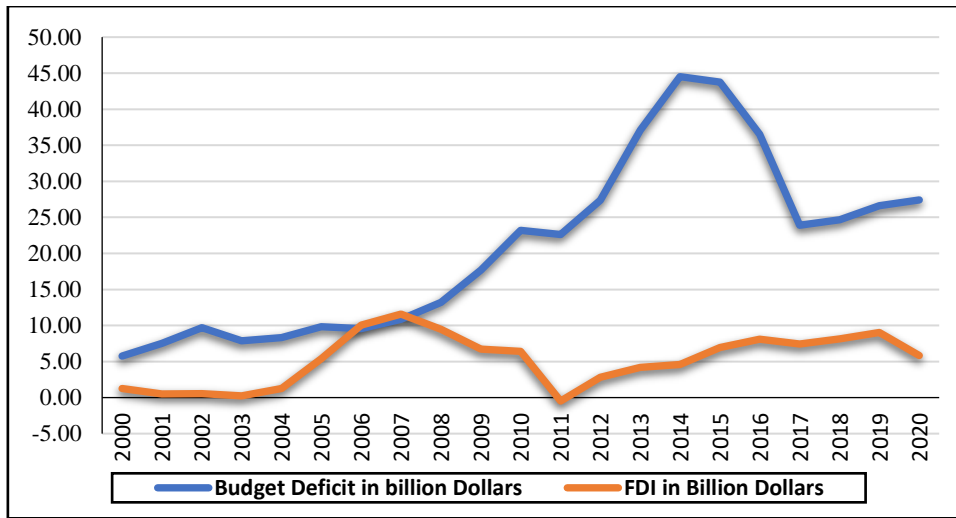
Therefore, due to the contractionary policy that was followed by the Egyptian government, the budget deficit showed a declining trend till 1996 (Handoussa, 2005). Whereas, the deficit increased again to be \$3.8 billion in 1999, relative to \$0.83 billion in 1997. This deficit because of the negative effects of the internal and the external shocks such as; the Luxor massacre in Egypt and the financial crisis in East Asia in 1997). (Ferjani, 2000)

However, the FDI increased to 1.26 billion dollars and the budget deficit decreased to the lowest value to be \$0.75 billion in 1994. The reason behind that was the collapse of the Egyptian pound against the USD dollar, this collapse led to an increase in the inflows, deposits, and the official foreign currency reserves in Egypt (Amira and et.al, 2021). FDI tended to increase again till 1999. This increase because of the Egyptian improvements in the investment law to provide additional incentives, customs exemptions, and privileges to the foreign and domestic investment in 1997.

**C. Generations of Economic Reform program from 2000 to 2020**

This period witnessed more fluctuation in both variable. Between 2000 and 2003, FDI tended to decrease while the budget deficit increased, this is due to the adverse effect of external shocks such as; September 11 in 2001, and the Iraq War in 2003 (Alissa, 2007).

**Figure 3  
Generations of Economic Reform program from 2000 to 2020**



Source: drawn by researcher using data from CAPMAS, Central Bank and World Bank

From 2000 to 2010, The world witnessed instability in the political conditions such as: the attack of September 11,2001, Iraq war in 2003, and the global financial crises in 2008/2009(Ferjani, 2000). These conditions led to a slowdown in the Egyptian economy and increasing the budget deficit to be \$23.2 billion in 2010, relative to \$7.5 billion in 2001. Despite, all of the previous shocks the Egyptian government is adopted an expansionary fiscal policy to motivate domestic consumption and increase the public investment. Through this expansionary policy the government executed four main mega projects in the infrastructure such as (Toshka, Al-Salam canal in Sinai, the Gulf of Suez and East of Port Said) (Eldepey, 2022).

It is worth mentioning a brief about the importance of those projects: (Norman and Rei Odawara, 2010)

- a) Al-Salam canal: this project is aimed at building a pumping stations and power transformation facilities to secure the water level in the main irrigation canal on the 82 Km extension linking the Damietta effluent in the eastern side of the Nile delta in Egypt with the Suze Canal.

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- b) Toshka project: this is an ambitious project to create a second Nile Valley, the aim of Toshka and the Southern Egypt development project is to develop and extend agricultural production and create new jobs.
- c) The Gulf of Suez: this project is to treat water from Ismailiya canal and supply industry in the Gulf Suez area and a new residential community outside Cairo. Also, it is said to be the largest water processing facility in the Middle East.
- d) East port said industrial zone offers a unique investment opportunity through its strategic location and investor incentives offered. Furthermore, the industrial zone is considered the right fit for investors planning to enter the markets in Africa and the MENA region or to expand their businesses in those markets.

While, Egyptian economy witnessed a decline in the net FDI by 1 billion dollars because of the negative impact of the events of September 11, 2001, and the Iraq war in 2003 (Hany, 2018). However, the FDI recorded \$11.58 billion in 2007, which is considered the highest value in 2000s. This increase is owing to the implementation of several comprehensive reforms such as; the enhancing investment climate and reducing the cost of time that required to start the activity. In 2010, The FDI declined again to \$ 6.31 billion because of the negative effect of the global financial crisis in 2008/2009 (Hany, 2018).

In 2011, Egypt witnessed political instability that derive negative economic and social consequences. Specifically, in January 25 in 2011, the break of political revolution caused in stability in both the political and economic conditions through increasing the unemployment rate, poverty, and increasing the pressure on the budget deficit to be \$22.6 billion (Abdelkhlik and Qutb, 2020).

This deficit is owing to 2 main reasons: (Abdelkhlik and Qutb, 2020)

- 1) Increasing the government expenditures through increasing the minimum wage to EGP1200 per month, changing the contracts of the temporary employees to make them permanent, and some foreign investors stopped going to invest.
- 2) Decreasing in the public revenues after revolution of January 25, as the oil sector suffered from a big hit also, the government supported the energy sector in 2013.

Because of the reduction in the public revenues, the government applied tax reform program in 2014 to increase the revenues taking the following procedures: (Ashour, 2022)

- Broadening of the tax base.
- Impose Property tax.
- Impose 10% tax on capital gains and dividends.
- Additional 5% tax on incomes exceeding LE 1 million of physical persons and corporate bodies.
- Increase taxes on Alcohol by 200% and Cigarettes by 50%.

Additionally, Egypt started new numbers of national mega projects such as, (the New Suez Canal, establishing new cities, Energy development, and infrastructure development). These projects will contribute in new chapter in the economic progress of Egypt by providing job opportunities, attracting foreign investors, and enhancing the competitiveness of the Egyptian economy. (Ministry of planning and Economic Development, 2021)

Moreover, the economic reform program in 2016, has contributed to achieving positive outcomes as the following: (OECD, 2021)

- 1) There was an increase in the economic growth rate, the local and foreign investment, and the employment rates.

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- 2) The budget deficit decreased to be \$23.9billion in 2017.
- 3) It has contributed to strengthening the ability of the Egyptian economy to confront the negative repercussions of COVID-19.

While the flow of FDI in Egypt declined to negative \$0 .48 billion in 2011, this is owing to the political instability conditions after January 25 revolution. Nevertheless, the inflow soared to \$ 2.8 billion in 2012, because of the Qatar political support. Moreover, FDI increased to \$ 4.6 billion in 2014, because of the corrective revolution in June 2013(OECD, 2020). Whereas, Egypt moved toward building a well-structured economic reform to stabilize the economy at the begging of 2016.

These reforms included seven main directions of structural reforms as following: (OECD, 2020)

- Develop the business environment
- Develop the role of the private sector
- Labor market flexibility
- Increasing the efficiency of vocational training
- Develop human capital
- Achieve financial comprehension
- Increasing the efficiency of public institutions and governance.

In 2017, FDI decreased due to the persistence of interest rates at a high level and the decline in the volume of demand in the Egyptian market. In addition to the weak promotion of the efforts made by the state during the recent period, and being affected by developments in emerging markets. (Ministry of finance, 2020) While, the flow of FDI moved to the peak and increased to \$9billion in 2019, which is considered the highest level of flows since 2010. There are several reasons behind that as the following: (Anwar, 2021)



- the inflow of FDI increased by 40.6% and this is represented around 20% of the total volume of FDI in African Countries.
- The multinational companies reinvested around 41% of their profits in Egypt.
- Egypt ranked the 15<sup>th</sup> globally in terms of FDI inflows as it acquired 11.9% of the total FDI to the Middle East and Africa.
- Egypt ranked 2<sup>nd</sup> in the Middle East and Africa region as it launched several of new projects by 60%.

Related to the new generation of economic and financial reform that was adopted by Egypt in 2016, it achieves balance, sustainable inclusive growth (Khan and Miller, 2016). Additionally, this economic reform causes the praise of some international institutions for encouraging the investment in Egypt as the following:

- The Rand Merchant Bank report:” Where to invest in Africa 2020”, despite the negative repercussions of the Covid-19, Egypt came as the best country to invest in 2020 in Africa for the third consecutive year.
- Related to the World Bank’s Global prospects report 2021, “The Egyptian economy has not been severely harmed”.
- The OECD “investment Policy Reviews of Egypt 2020” report, “Egypt is implementing ambitious reforms to stabilize its economy, attract local & foreign investment, and spur stimulating growth that made it possible for the state to be the top investment destination in Africa” (GAFI, 2021).
- Moody’s “affirmed that Egypt is the only country in the region that maintained its pre- pandemic growth rates, thanks to the full-fledged government reforms over the past four years”. It also confirmed that “Egypt is outperforming

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its regional counterparts in terms of turning investment into GDP growth”.

- The British Standard Chartered bank expects that” Egypt will achieve the fastest growth in the region by 2021 and that Egypt will return to the pre-pandemic growth trends by 2022 outperforming most of the economies in the region” (GAFI, 2021).

### 3. Empirical Test

The main aim of this research is to see the impact of the FDI on the Budget deficit in case of Egypt from (1980-2020).

The below table summarize the five selected variables, their corresponding source of data and their units of measure:

**Table 1**  
**list of selected variables**

Code	Variable	Unit	Source
BD	Budget Deficit	Billion US dollars	CAPMAS Central bank
GDP	Gross Domestic product	Billion US dollars	World bank
INF	Inflation	percentage	World bank
FDI	Foreign Direct Investment	Billion us dollars	CAPMAS Central bank
EXR	Exchange rate	US dollars	Central bank

Source: drawn by researcher

### 3.1 Methodology

This paper has undertaken Autoregressive Regressive Distributed lag (ARDL) approach by pesaran (2001) to test long run relationship between the dependent variable and independent variables in the following model:

Model (1):  $BD = f(FDI, EXR, GDP, \text{ and } INF)$

The analysis has started with the unit root tests in each series. Then ARDL model are implemented to investigate the long run relationship between the identified series by comparing F-

statistics of the unrestricted error correction model with the corresponding critical values bounds; and once the series are co-integrated in the long run, the coefficients of this relationship are estimated by ARDL methods.

### **3.2 Data Analysis**

#### **3.2.1 Descriptive Statistics**

Table (2) shows descriptive statistics of variables used for empirical analysis in ARDL model approach.

The statistics include measures of concentration (mean and median), dispersion (standard deviation), and normality (Skewness, Kurtosis and Jarque-Bera JB statistics). The total number of observation is 41

**Table 2**  
**Descriptive Statistic**

	<b>BD</b>	<b>EXR</b>	<b>FDI</b>	<b>GDP</b>	<b>INF</b>
Mean	14.05363	5.081707	3.073756	1.28E+11	11.00091
Median	10.83723	3.470000	1.190000	8.48E+10	11.24762
Maximum	44.51850	17.78000	11.58000	3.84E+11	29.51848
Minimum	0.260000	0.700000	-0.480000	2.17E+10	-2.198235
Std. Dev.	12.11268	4.612232	3.422041	1.09E+11	6.357330
Skewness	0.922607	1.582174	1.001752	0.926056	0.580488
Kurtosis	3.085742	4.990998	2.564288	2.403830	3.782013
Jarque-Bera	5.829122	23.87767	7.181614	6.467306	3.347324
Probability	0.054228	0.000007	0.027576	0.039413	0.187559
Sum	576.1987	208.3500	126.0240	5.26E+12	451.0372
Sum Sq. Dev.	5868.681	850.9074	468.4147	4.72E+23	1616.626
Observations	41	41	41	41	41

**Source: made by the researcher using E-views10**

Descriptive statistics of sample data shows that the average value of growth rate of budget deficit is 14.1%, growth rate of FDI has the average value of 3.07%, Exchange rate has the average value of 5.08%, GDP growth rate has the average value of 1.28%, and inflation rate has the average value of 11%.

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**3.2.2 Unit Root Test**

All series are tested for the presence of unit roots at both levels and first difference in two different cases:

- 1) with intercept
- 2) with intercept and trend.

**Table 3  
Unit root test**

Variables	level		First difference	
	Intercept	Trend & intercept	Intercept	Trend & intercept
BD	-1.6478 (0.4492)	-2.2907 (0.4288)	-3.7131 (0.0078)	-3.6635 (0.0375)
EXR	0.3892 (0.9800)	-2.2891 (0.4297)	-4.5770 (.0007)	-4.6373 (0.0033)
FDI	-1.7165 (0.4155)	-4.1370 (0.0125)	-5.0666 (0.0002)	-4.9744 (0.0013)
GDP	3.9705 (1.000)	1.6291 (1.000)	-3.6657 (0.0087)	-4.6678 (0.0153)
INF	-4.704 (0.0005)	-4.6443 (0.0032)	-10.1310 (0.000)	-4.4351 (0.0061)

**Source: made by the researcher using E-views10**

According to the data in the previous table budget deficit, exchange rate and gross domestic product have a unit root at level in two different cases with intercept & trend and intercept, but these variables at the first difference are stationary in both two different cases (intercept & trend and intercept). While, the foreign direct investment has a unit root at level in the case of the intercept, but it also stationary at level in case of the intercept and trend. But at the first difference, FDI has stationarity in both two different cases (intercept & trend and intercept). Finally, inflation rate is stationary at level in both two different cases (intercept & trend and intercept).

### 3.2.3 ARDL Model

ARDL model is implemented, where Budget deficit (BD) is considered to be the dependent variable and the independent variables are foreign direct investment (FDI), Gross domestic product(GDP), inflation rate (INF), and Exchange rate(EXR).

#### a) The optimal number of lags

The ARDL model was estimated from a recursive search of optimal numbers of lags through the Akaike information criterion (AIC) and from the diagnostics statistics. As, the Akaike information criterion (AIC) suggests the best lag length for model is 2 lags or (1, 1, 0, 1, 0). which means that (BD, EXR and GDP) will have 1 lags while FDI and INF have no lags respectively.

#### b) Coefficients and interpretations

From the E-views' output representation, the estimated equation can be written as:

$$\mathbf{BD} = 0.664039\mathbf{BD}(-1) - 6.048561\mathbf{EXR} + 5.158221 \mathbf{EXR}(-1) + 0.286042 \mathbf{FDI} - 1.98\text{E-}10 \mathbf{GDP} + 2.88\text{E-}10 \mathbf{GDP}(-1) + 0.203615 \mathbf{INF} - 0.480229.$$

In the short run, previous value of budget deficit has a significant effect on its current value, where the last year value has a positive effect. Also, current value of foreign direct investment has a positive and significant effect at level 10% on the budget deficit. The other variables have a significant effect on the budget deficit at level 5%. whereas, current exchange rate and the current gross domestic product affect negatively on the budget deficit while the value of exchange rate and gross domestic product at the previous year affect positively on the current budget deficit. The inflation rate also has a positive impact on the budget deficit.

According to the results of The regression show that the calculated R2 is 0.966 which means that about 96.6% of total variations in BD are caused by the explanatory variables (EXR,

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FDI, GDP & INF), While the remaining 3.4% of variation are the error term. Also, the probability of F-statistics means that the overall model is significant.

**3.2.4 Test of the long run relationships**

The second step is to apply bound F-test to see if there is long-run relationship between the variables, on the other hand there is a co-integration or not.

**Table 4  
F-bound test**

F- Bound test	Null Hypothesis: No levels relationship			
Test Statistic	Value	Signif.	I(0)	I(1)
F-statistic	6.875863	10%	2.2	3.09
k	4	5%	2.56	3.49
		2.5%	2.88	3.87
		1%	3.29	4.37

**Source: made by the researcher using E-views10**

The decision is based on the results at table (7). as it shows that F-Statistics equals (6.875863) which is above the upper critical value I (1) of (4.37 at 1%, 3.87 at 2.5%, 3.49 at5%, and 3.09 at 10%) of significance. So, reject the null hypothesis (H0: no Co-integrations), and accept the H1: there is a co-integration and long run relationship between the variables

**3.2.5 Estimated the long run coefficients**

The third stage of an ARDL model to certain of the co-integration test is to estimate the long-run coefficient model. Table 9, table 10 below present the estimates of regression using ARDL approach.

**Table 5**  
**ARDL Co-integration and long run**

Long run coefficient				
Variable	Coefficient	Std. Error	t-Statistic	Prob.
EXR	-2.650126	0.587581	-4.510229	0.0001
FDI	0.851415	0.494209	1.722784	0.0946
GDP	2.69E-10	3.82E-11	7.025713	0
INF	0.606068	0.211354	2.867545	0.0073
C	-1.429418	2.761011	-0.517715	0.6082
<b>EC = BD - (-2.6501*EXR + 0.8514*FDI + 0.0000*GDP + 0.6061*INF -1.4294 )</b>				
Co-integration form				
Variable	Coefficient	Std. Error	t-Statistic	Prob.
D(EXR)	-6.048561	0.783452	-7.720398	0
D(GDP)	-1.98E-10	4.13E-11	-4.782378	0
CointEq(-1)*	-0.335961	0.048643	-6.906613	0

**Source: made by the researcher using E-views10**

The CointEq (-1) or error correction term(ECT)or (speed of adjustment) is significant and negative which affirms the existence of the long run relationship between budget deficit and other variables (exchange rate, foreign direct investment, gross domestic product and inflation) also, ECT is negative at -0.3359 means that 33.59% of error in the short run will be corrected.

The estimated coefficients of the long run relationship are significant for all variables (EXR, GDP and INF) at level 5% but, FDI is significant at level 10%. Considering the impact of macro-variables which are (foreign direct investment, inflation rate and gross domestic product) have a positive effect on the budget deficit and their coefficients are (0. 851, 0.606, and 2.69) respectively, while exchange rate has a negative effect on the budget deficit and its coefficient is -2.65.

### 3.2.6 Diagnostic Statistics

This part provides some diagnostic tests after the estimation to be certain from this model is free from Heteroscedasticity, multi-collinearity, serial correlation and the residual is normally

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distributed. Related to the below results in table 10 &11 it shows that model (1) and model (2) are free from both serial correlation and Heteroskasicity.

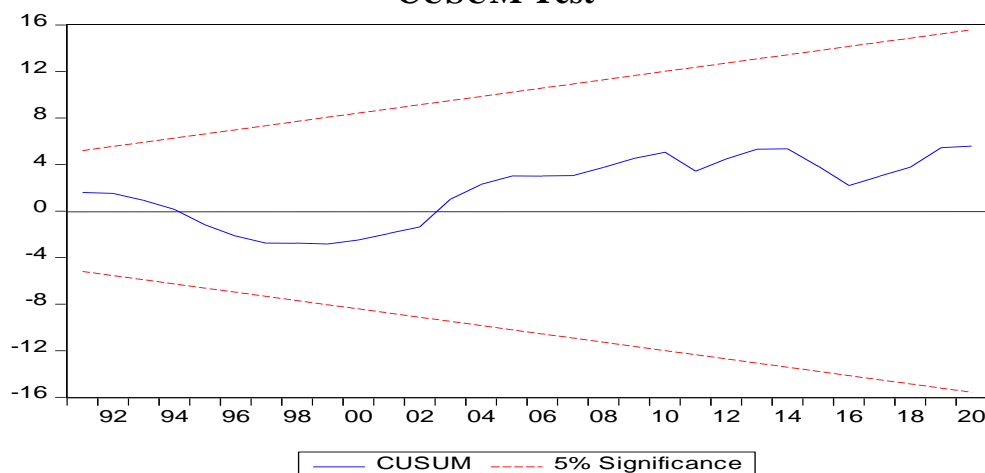
**Table 6**  
**Serial correlation LM Test and Heteroskedasticity Test**

Breusch-Godfrey Serial Correlation LM Test:			
F-statistic	0.25232	Prob. F(2,30)	0.7786
Obs*R-squared	0.661722	Prob. Chi-Square(2)	0.7183
Heteroskedasticity Test: Breusch-Pagan-Godfrey			
F-statistic	0.824576	Prob. F(7,32)	0.5744
Obs*R-squared	6.112493	Prob. Chi-Square(7)	0.5267
Scaled explained SS	4.787798	Prob. Chi-Square(7)	0.6858

**Source: made by the researcher using E-views10**

According to Heteroskedasticity Test: Breusch-Pagan-Godfrey the probability value of F-stat is above the critical values which means accept the null hypotheses H0: (No Heteroskasicity) and reject H1: there is Heteroskasicity.

**Figure 4**  
**CUSUM Test**



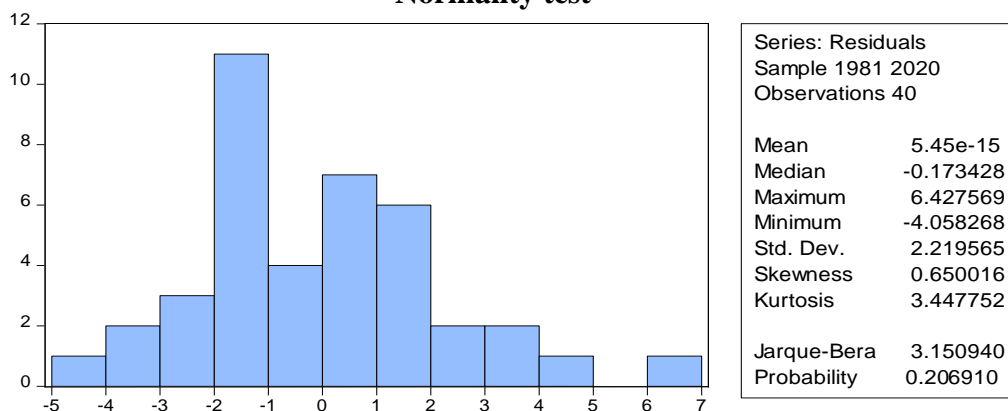


Source: made by the researcher using E-views10

The Above graphs show that CUSUM test are lying within the critical bounds so, our model (1) is structurally stable. The data and variables of all models are stable because the plots of CUSUM (Cumulative sum of recursive residuals) are not crossing critical boundary lines. The CUSUM chart at 5% significant showing that the blue line is not crossing the red line on both sides. So, there is no problem of recursive residuals in mean terms, which means no need to add variables.

While, according to the normality test in figure 3.3 the probability is above the critical value at level 5% and 10% so, accept the null hypothesis ( $H_0$ : residuals are normally distributed).

**Figure 5**  
Normality test



Source: made by the researcher using E-views10

### 3.2.7 Test of Hypothesis

$H_0$ : FDI has no impact on budget deficit in Egypt

$H_1$ : FDI has an impact on budget deficit in Egypt

The results of the short run and long run of ARDL on budget deficit in tables 4.5 and 4.7 indicates that FDI has positive effect on budget deficit both in the short run and long run. If FDI increase by 1%, The deficit will decrease by 0.085% in the long run, on the other hand budget revenues will increase by

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0.085%. Hence, H<sub>0</sub> is rejected and H<sub>1</sub> is accepted both in short run and in the long run. This result is agreement with the earlier results of Gropp and Kostial (2000), Okey (2013), Mahmood and Chaudhary (2013), and THABANG MOSES (2020). While it against the findings of Tabasam (2014), Gaalya (2015) and Jeza, Hassen and Ramakrishna (2016).

### **Conclusion**

According to the importance of the budget deficit and FDI, this research analyzed the main causes of increasing or decreasing them in Egypt during period of time from 1980 to 2020. During this period, it found that Egypt faced more economic, political, and social instability with many other external shocks. While, Egypt has provided many efforts and support to eliminate or reduce the negative effects of all the previous consequences through issuing new laws, applying more than economic reform program and searching for alternatives to decrease the deficit. Accordingly, Egypt succeeded in obtaining praise from many international institutions to encourage investment in Egypt.

Also, this paper investigates the effect of foreign direct investment(FDI) on budget deficit in Egypt by using time serious data from the period 1980 to 2020. ARDL bound test approach is used to check the relationship between dependent variables which is the budget deficit and the other independent variables (FDI, exchange rate, gross domestic product and inflation rate). ADF test shows all variables is stationary at 1st difference. So, ARDL bound testing approach is used to check the relationship between the variables. The results show that there is a positive and significant impact of the FDI on the budget deficit

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## Appendices

### Appendix1

#### E-views results for ARDL

Dependent Variable: BD				
Method: ARDL				
Date: 10/05/23 Time: 19:49				
Sample (adjusted): 1981 2020				
Included observations: 40 after adjustments				
Maximum dependent lags: 2 (Automatic selection)				
Model selection method: Akaike info criterion (AIC)				
Dynamic regressors (2 lags, automatic): EXR FDI GDP INF				
Fixed regressors: C				
Number of models evaluated: 162				
Selected Model: ARDL(1, 1, 0, 1, 0)				
Note: final equation sample is larger than selection sample				
Variable	Coefficient	Std. Error	t-Statistic	Prob.*
BD(-1)	0.664039	0.079265	8.377437	0.0000
EXR	-6.048561	1.019128	-5.935038	0.0000
EXR(-1)	5.158221	0.974638	5.292451	0.0000
FDI	0.286042	0.166875	1.714115	0.0962
GDP	-1.98E-10	5.63E-11	-3.511335	0.0014
GDP(-1)	2.88E-10	6.63E-11	4.340087	0.0001
INF	0.203615	0.079435	2.563287	0.0153
C	-0.480229	0.943710	-0.508874	0.6143
R-squared	0.966136	Mean dependent var		14.39847
Adjusted R-squared	0.958728	S.D. dependent var		12.06145
S.E. of regression	2.450333	Akaike info criterion		4.807182
Sum squared resid	192.1323	Schwarz criterion		5.144957
Log likelihood	-88.14363	Hannan-Quinn criter.		4.929311
F-statistic	130.4227	Durbin-Watson stat		1.990731
Prob(F-statistic)	0.000000			

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

**Source: made by the researcher using E-views10**