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The Effect of Fiscal and Monetary Policy on Public Debt in Egypt

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THE EFFECT OF FISCAL AND MONETARY POLICY ON PUBLIC DEBT IN EGYPT

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ABSTRACT

The thesis aims to examine the effect of monetary policies and fiscal policies on public debt in Egypt during the period from 2006 until 2021. Egypt is witnessing aggravated levels of debt, with limited fiscal and monetary space. Therefore, the objective of the paper is to analyze the effect of discount rates, inflation rates, subsidies, taxes and economic growth on debt-to-GDP in Egypt using a VAR model with an extended test of Impulse Response Function. The results suggest that a positive shock in government expenditures initially decreases public debt but leads to a fluctuating increase in the debt-to-GDP ratio in the long run. Tax increases initially reduce the debt to GDP ratio. A positive shock in inflation rates increases the debt to GDP ratio initially but shows a negative effect in the longer term. Additionally, a positive shock in discount rates leads to a higher debt to GDP ratio in the long run due to higher cost of debt service. The findings conclude that the interactions between fiscal and monetary policies are quite complex and interrelated, and require policy makers to consider their effect on the long and short run. The thesis also highlights the significant risk for Egypt to fall in a debt-inflation trap.

1. Chapter I: Introduction

Public debt is one of key indicators to the performance of an economy, whether developing or developed ones (Musa el al., 2023). Public debt, which is the total obligations or liabilities the government own to local or foreign debtors, is affected by different macroeconomic variables. It highlights main government decisions, and thus, political and economic direction of the government. It also has an impact on several other macroeconomic variables. Changes in any of those variables highly affect macroeconomic stability in the country (Ocampo, 2005; Obstfeld et al., 1997; Bernanke, 2004).

Major world events have not been in favor with countries' ability to contain accumulated debt. For the past decade, the whole world has been witnessing a series of external shocks/crises that affected their economic stability starting with the outbreak of the COVID-19 crisis in 2020 followed by the Russian-Ukrainian war in 2022. Those events led to a surge in worldwide commodity prices, and inflation rates (Maurya et al., 2023; Nasir et al., 2022). Many countries adopted more tightened policies to contain those inflationary prices. Governments are puzzled whether to adopt an expansionary policy to minimize the losses incurred from the pandemic, or adopt a contractionary policy to contain the inflationary pressure induced from the war, or to have a balance between targeting inflation and sustaining fiscal stimulus (CBE, 2023). Fiscal and monetary policies play a crucial role in encountering debt accumulation, achieving growth, and stabilizing prices (Croce, 2002; Al-Shawarby and El Mossallamy, 2019).

During the 1960s, the world focused on adopting fiscal policies as a main driver for economic growth (Bordo and Levy, 2020). Years later, the notion of relying solely on fiscal policy started to collapse, with a direction towards relying on monetary policy. Until the financial crisis of 2007 - 2008, governments started to rethink of coordination between fiscal policy and monetary policy (Bordo and Levy, 2020). The effectiveness of the fiscal and monetary policy has been questioned throughout the years especially during shocks.

Egypt relies heavily on external resources to meet its deficits. For the past years, it has witnessed unprecedented high levels of public debt due to a surge in its expenditures along with lower national income (Alatrash and Nurmukhametov, 2021; Fahmy and Hashem, 2019). It had just been recovering from the two uprisings in 2011 and 2013 through adopting a comprehensive reform

program in 2014 (Al-Shawarby and El Mossallamy M., 2019). Later in 2016, the Government of Egypt (GOE) received a loan from the International Monetary Fund (IMF) conditional upon the liberalization of the exchange rate regime and the devaluation of the Egyptian pound (IMF, 2016). This devaluation has negatively affected the Egyptian society, and has been one of the major factors that affected the cost of borrowing, and external debt (Fahmy and Hashem, 2019). The pressure on the government budget worsened in 2020 as the GOE had to encounter the Covid-19 crisis by securing USD 6.4 billion stimulus package (Kassab, 2022).

1.1. Problem Statement

The accumulation of debt aggravated in Egypt accompanied with a continuous devaluation of the Egyptian pound (IMF, 2023). As an emerging market, Egypt has inflationary challenges and capital outflows (CBE, 2023). The GOE has had a limited fiscal space and has provided unconventional monetary policy reflected in a second devaluation for a flexible exchange rate in October 2022; which led to an appreciation of all currencies against the Egyptian pound (CBE, 2023). Unfortunately, External debt as an example, amplified to US$ 165.3 billion at the end of March 2023, which is significantly higher than external debt recorded in June 2022 that is US$ 9.6 billion (CBE, 2023).

GOE's borrowing decisions, along with its fiscal and monetary policies, can have a direct impact on the public debt situation which has already been experiencing high levels. This poses a significant challenge in the country's economic capacity to tolerate accumulated debt. Hence, the fiscal and monetary tools by which governments can limit debt accumulation remains a controversial question especially in Egypt; since it has been witnessing rising levels of debt despite different economic doctrines.

1.2. Main Objectives and Research Question

Amidst the threatening economic situation that Egypt is witnessing, along with the limited policy tools the government is left with, trying to survive an era of political and economic instability; it is very important to examine the reasons behind the debt situation in Egypt. Owing to the importance of fiscal and monetary policies in shaping government decisions, investigating the relationship between public debt and its response to changes in major fiscal and monetary policy

indicators is crucial; as this would provide useful implications for policy makers regarding lowering debt accumulation and the sustainability of public debt.

Thus, the main objective of this research is to analyze the effect of monetary and fiscal policies on Egypt's public debt-to-GDP ratio during the period from 2006 to 2021. Therefore, this research aims at doing the following:

- Examine the effect of monetary policy, namely discount rates, and inflation rates, on public debt-to-GDP ratio in an attempt to understand how different monetary policy tools affect government decisions concerning borrowing and debt accumulation.
- Examine the effect of fiscal policy in terms of government spending (subsidies), and government revenues (taxes) on debt accumulation.
- Examine the effect of Gross Domestic Product (GDP) on debt accumulation.
- Examine the dynamic interactions between monetary and fiscal policies and their effect on debt accumulation using dynamic econometric model Vector Auto Regression (VAR) Model.

Hence, the main research question of the paper is: To what extent is Egypt's public debt affected by fiscal and monetary policies?

Sub-questions:

- What is the direction and magnitude of the effect fiscal policy tools on Egypt's public debt?
- What is the direction and magnitude of the effect monetary policy tools on Egypt's public debt?
- Does Egypt's economic growth affect Egypt's public debt accumulation?
- To what extent is the VAR model explaining the relationship between the interaction of governmental policies and Egypt's public debt?

1.3. Contribution of this Research

This paper aims to extend the time frame upon which few papers discussed the effect of macroeconomic variables, namely fiscal and monetary policy indicators, on public debt in Egypt. The most recent literature that analyzed the same set of variables covered the period from 2005

until 2015 (Fahmy and Hashem, 2019). Extending the period encompasses a dramatic change in the Egyptian economy facing multiple of economic fluctuations. To the best of our knowledge, there has been a few studies that tackle the recent economic situation encompassing the Egyptian pound floatation and COVID-19 in Egypt using the fiscal and monetary indicators such as taxes, subsidies, inflation, interest rates, and exchange rates (Fahmy and Hashem, 2019). Therefore, the thesis covers recent economic fluctuations in Egypt due to unexpected domestic and global events.

Second, the paper applies the VAR model to assess the impact of government expenditures such as subsidies, government revenues such as taxes, discount rate, inflation rate, and economic growth on gross public debt in Egypt. VAR models are suitable for the research question as it is an econometric model that incorporates the dynamic relationship between a set of stationary variables that are jointly related, and it is the most suitable for the variables of the thesis (Jacobs et al, 2020). To the best our knowledge, there has been few studies that used this econometric model to test the effect of fiscal and monetary policies on gross public debt in Egypt as gross public debt gathers both the external debt and the gross domestic debt (Fahmy and Hashem, 2019). Moreover, the interaction between monetary and fiscal policy have not been widely discussed from an empirical perspective (Kassab, 2022). Also, the interaction between monetary and fiscal policy differs from one country to the other, and may differ within the same country in different time periods (Kassab, 2022). Seeing that the VAR model is used to represent the dynamics between a set of interdependent variables; which is the case of interest as monetary policy and fiscal policy variables affect each other, and in return affect debt accumulation as per the literature (Fahmy and Hashem, 2019). Hence, the paper contributes to the literature by explaining this dynamic relationship using the VAR model in Egypt.

As for the variables, most of the literature discuss the effect of debt on economic growth in different countries, however, it has been noticed that the relationship in the opposite direction is not focused on to a great extent. Meaning that, the effect of GDP level on public debt has not been extensively investigated as the vice versa. Hence, this paper opts to provide insightful interpretations to the effect of an increase in the GDP level on public debt. In addition, this topic comes to a great relevance for policy makers as per the next sub-section; therefore, the paper aims to contribute to literature by providing policy recommendations to a vital branch of the

government, which is the public debt. This is important for Egypt since it has been witnessing rising levels of debt despite different economic doctrines as previously highlighted.

1.4. Policy Relevance

It has long been of concern for policy makers to determine the effects of public debt on macroeconomic variables like economic growth. The answer to this question is very relevant to policy. An increase in the expenditures spent by the government and in the public investment of the country, along with a decrease in taxes, these factors can affect the level of public debt (De Soyres et al, 2022). Therefore, it essential to understand the reasons behind the increase in public debt. This will help governments assess public debt sustainability, and debt service (De Soyres et al, 2022). Owing to the debt's effect on economic growth, policy makers will understand the relationship between public debt and real GDP and formulate pro-growth economic policies; the ability to control for debt accumulation will either affect the growth of the economy or the regression of it. In specific, public debt has serious economic implications on the economy, especially on the medium and long run growth (Baldacci, 2012). In addition, debt can negatively affect capital accumulation (Baldacci, 2012).

Nevertheless, this paper aims to analyze the amount of debt relying on the ratio of debt to the national income. This provides a more realistic estimate to how much the government is actually able to repay its debt based on the output of the economy. This study is particularly relevant to policy makers as it opts to provide means on how to reduce the ratio of debt to GDP, either by adjusting the budget deficit, or by increasing economic growth. Governments ought to turn deficits into surpluses without hurting growth. If policy makers formulate policies that aims to reduce deficits, but in return, they create further recession, Alesina and Tabellini (2005) describe this to be a counterproductive policy.

In Tunisia, Belghuith and Omrane (2017) concluded that inflation and investment reduce public debt, while there are other macroeconomic variables that increase public debt such as real interest rate and trade openness. The study suggested policies for the government to decrease primary deficit through fiscal adjustment in order to curb debt accumulation. The results of the paper were very policy relevant to the economic situation in Tunisia, as the government had to rely on external borrowing after the revolution, which was explained by the lack of domestic resources to finance

debt. Moreover, other macroeconomic indicators threatened the health of the economy like high level of unemployment, and rise in inflation rate.

Kwon et al (2009) is another study that highlighted the importance of analyzing public debt to provide useful policy implications. For example, there are a number of policies for countries to deal with high debt. When inflation is expected to rise, nominal interest rates will rise, this will increase public debt if not encountered by a primary surplus. Debt will elevate inflation more, and the country is trapped in a cycle of debt because the government expects more inflation.

The main notion of this research is policy relevance; as it investigates the relationship between some macroeconomic variables and public debt. Such analysis is useful to understand the main factors affecting the debt situation in the country. Analyzing the effect of fiscal and monetary policies on public debt is important for policy makers due to their significant impact on economic activity and macroeconomic stability (Croce, 2002; Al-Shawarby and El Mossallamy, 2019). Fiscal policies on one side, affected the aggregate demand through government revenues and expenditures (Stupak, 2019). Monetary policy, on the other side, influences interest rates and money supply (Stupak, 2019). Any change in one of those policies will have an effect on the other, and understanding the interaction between both variables is important a change in one of them will affect the other. Reflecting the relationship between fiscal and monetary policies on public debt helps policymakers take informed decision and effective policies regarding debt service and debt accumulation (De Soyres et al, 2022).

1.5. Thesis Outline

The thesis is divided into seven chapters. Chapter 1 discusses the motivation behind this thesis, the main problem statement and the research objectives, the contribution of the thesis and how its relevant to policy. Chapter 2 tackles the existing literature on the topic of the study and elaborates on the main research question of the thesis. Chapter 3 provides a historical and contextual background on the Egyptian economy; why Egypt in specific is relevant to the question of interest. Chapter 4 provides a conceptual and theoretical framework shedding light on key economic theories that explain the relationship between fiscal policy, monetary policy and public debt. Chapter 5 is related to the selection of variables, the methodology adopted and the economic

model. Chapter 6 discusses the main results of the model and interpretations. Chapter 7 concludes and chapter 8 provides policy recommendations and the key takeaways from the thesis.

2. Chapter II: Literature Review

The main variables of interest, which will thoroughly be discussed in the methodology section, are debt to GDP ratio as a dependent variable, and the explanatory variables are subsidies and taxes as reflectors of fiscal policy, inflation rates and discount rates as reflectors of monetary policy, and economic growth. Hence, this chapter tackles the aforementioned variables by focusing on the relationship between monetary policy, fiscal policy and the interaction between them on public debt according to several research papers. It starts by first, tackling the relationship between debt and economic growth. Second, reviewing the effect of fiscal policy on public debt focusing on taxes and subsidies as reflectors of government revenues and government expenditures respectively. Third, reviewing the effect of monetary policy on public debt, in particular, using inflation and interest rates as main indicators for the monetary policy regime conducted. Fourth, reviewing the effect of monetary and fiscal policy mix on public debt. Fifth, the literature existing on the effect of fiscal and monetary policy on public debt in Egypt. Lastly, the literature gap, and how the thesis aims to fill it in.

2.1. Debt and Economic Growth

Most countries get trapped in a vicious cycle called debt. The theoretical literature approves the negative relationship between economic growth and public debt. It is also considered as a burden for the next generations (Checherita-Westphal and Rother, 2011). This paper examines the relationship between public debt illustrated in the debt-to-GDP ratio, and economic growth through per capita GDP growth rate in 12 European countries for the period of 1970-2011. These countries are Netherlands, Spain, France, Germany, Finland, Greece, Ireland, Austria, Belgium, Portugal, Luxembourg and Italy. The results of the analysis confirm the negative relationship between economic growth and public debt-to-GDP ratio. Similarly, De Soyres et al (2022) focuses on analyzing the relationship between public debt and real GDP but with a different timeframe and dataset. De Soyres et al (2022) analyze this relationship for 178 countries over 1995-2020. The results of the study were that the relationship between real GDP and public debt is generally

negative when the debt is unexpected, and this occurs for specific countries that already have existing debt level or have been witnessing rising debt level in the previous 5 years.

In contrast to Checherita-Westphal and Rother (2011), there is likely a positive relationship between real GDP and public debt when countries have low-income level. Casares (2015) examines the relationship and concludes that countries that have low levels of external debt, higher growth can be achieved when they face an increase in external debt to GDP ratio. Nevertheless, when there are high levels of public debt, an increase in the external debt to GDP ratio negatively affects economic growth. In addition, Morganti (2022) extended the relationship between the economic growth and public debt to include the volatility of growth rates. The paper explained that high debt has a negative impact on economic growth and the volatility of GDP growth rates after analyzing a sample of 114 countries.

Not only the levels of both variables are analyzed, but also the rates by which debt and growth change are analyzed. Checherita-Westphal and Rother (2011) states that the yearly changes in the levels of debt are inversely related to the annual growth rate. It also emphasizes that one reason for a positive relationship between economic growth and government debt would occur if the funding service for productive investments were deficits.

There are reasons behind debt accumulations, Casares (2015) demonstrated that the relationship between external public debt and economic growth is illustrated in an inverted U-shaped for two reasons. The first is that the increase in external debt is associated with a lower non-tradeable good. The second is that when the external public debt increases, the country has a higher risk premium and interest payments whether for private or public debt. Moreover, Checherita-Westphal and Rother (2011) highlight that debt accumulation occurs due to higher public consumption and transfers, or the government absorption of exogenous shocks.

Ekouala (2021) analyzed the role of socio-political factors in public debt accumulation by using panel data that covers the period from 1980 until 2021 in the CEMAC countries focusing on Ordinary Least Squares (OLS) model and Generalized Least Squares (GLS) model. The study found out that corruption, electoral openness, political system and fraud have a statistical significance on public debt. Focusing only on external debt, Sağdiç and Yildiz (2020) by examining the reasons behind external debt in Georgia, Azerbaijan, Kyrgyzstan, Turkmenistan,

Kazakhstan, Tajikistan and Uzbekistan, they stated that the reasons behind external debt can be numerous, such as continous budget deficits, domestic savings and capital accumulation are insufficient, spending on unanticipated events such as natural disasters, increasing demand on imports paving the way for external dependence especially for inputs. Also, the paper explained that countries that suffer from high external debt have undeveloped financial markets and institutions. Also, deficits in the balance of payments lead to an increase in external debt.

Johnson (2001) tackled the reasons behind domestic debt from a theoretical rather than an empirical perspective stating that the three main reasons behind domestic debt. The first reason is when the government's revenue is unable to meet its expenditure, the government resorts to borrowing domestically. The second is that when the government's implementation of monetary policy affects the money supply in the economy through selling of treasury bills in open market operations. The third reason is that when the government wants to develop the financial sector, the government tries to gain the investor's confidence through offering short-term treasury bills, and after that, issues long-term instruments.

Dixit and Lambertini (2000) discuss the relationship between fiscal and monetary policy and concludes that discretionary fiscal policy can hinder the effectiveness of monetary policies. On the contrary, discretionary monetary policy do not hinder the effectiveness fiscal policy. Alba et al (2004) discuss that high debt ratios do not automatically result in macroeconomic crises. The outcome is influenced by factors such as the debt's term structure, prevailing interest rates, the perception among market participants of government policies aligning with declining debt ratios in the long term. Fahmy and Hashem (2019) utilized an SVAR model to examine the impact of macroeconomic shocks, namely fiscal and monetary tools, on the sensitivity of public debt. This paper highlighted the relationship between the fiscal policy, monetary policy, and public debt. It concluded that government expenditures affect public debt the most. Not only does fiscal and monetary policy tools are analyzed, but also macroeconomic variables such as real GDP.

2.2. The Effect of Fiscal Policy on Public Debt

Blanchard (2017) defines fiscal policy as what the government chooses to spend, and what to collect to finance its spending. He explains that fiscal policy imposes many economic implications, as it be either contractionary or expansionary. Alesina and Tabellini (2005) relied on the World

Bank Indicators dataset to explain counter-cyclical fiscal policies and pro-cyclical fiscal policies. The paper states that in economic downturns, developed countries employ counter-cyclical fiscal policies in an attempt to boost public spending and reduce taxes. However, developing countries resort to pro-cyclical fiscal policies by reducing their public expenditures and raising their taxes to obtain more revenues, which is known as contractionary policy.

In Kaminski et al (2004), the reason behind adopting pro-cyclical fiscal policies is thoroughly discussed by examining 40 low-income countries, 25 middle low-income countries, 18 middle-high-income countries, and 21 OECD countries. Countries in economic downturns become unable to borrow, or they can borrow but become highly indebt with interest rates in the future. To minimize the impact of the economic regression along with avoiding running deficits, governments cut their expenditures resulting in a pro-cyclical fiscal policies. In contrast, during booms, governments become more able to borrow and have the ability to do so, consequently, increase their public spending.

As stated by the IMF, expansionary policies, which were counter-cyclical fiscal policies after the financial crisis, have helped these advanced economies to shorten the period of economic recession (IMF, 2009; IMF, 2010). Blanchard (2017) illustrates that a fiscal imbalance due to inappropriate fiscal decisions may leave the government with low fiscal space, and that some regimes use the fiscal policy to reduce the budget deficit by cutting down the expenditures or increasing taxation.

This sub-section reflects on two variables of interest in the research objectives. Fiscal policy effect on public debt is divided into first, the effect of taxes on public debt. Second, the effect of subsidies on public debt.

2.2.1. The Effect of Taxes on Public Debt

Taxation is one of the key tools in fiscal policy and it plays a critical role in funding government activities and services (Tanzi and Zee, 2001), and decisions concerning taxation policies are linked with the accumulation of public debt (Camous and Gimber, 2018). Similarly, Galí, et al (2007) and Baldacci et al. (2012) highlight the importance of tax policies and spending measures by

governments especially in times of financial instability as it can have effects on economic efficiency and add to debt-consolidation.

Mahmood and Rauf (2008) investigates the interaction of fiscal and monetary management and how it affected the debt stock and debt servicing. The paper explains that tax sources are used to fund expenditure needs, and fiscal deficit that results in government debt results when the tax and non-tax sources are not enough to meet government expenditures. The results of the paper indicate that rising debt was induced by the weaknesses by the fiscal sector of the economy, and the indicator used for debt level in the paper was debt-to GDP ratio. Also, Alesina and Tabellini (2005) discuss means by which the government can reduce the same indicator which is the ratio of debt to GDP by recommending the first way is to adjust the size of the budget deficit according to the desired level, for instance, reduce government expenditures, or increase government revenues. The second recommendation is to expand the output of the economy.

Not all taxes can be useful for financing the country's debt. Menguy (2020) investigates the relationship between tax competition, the efficiency of available fiscal resources, which are the different types of taxation, and public debt levels in countries within a monetary union. The paper highlights that the most effective method to general taxes is through labor taxes. However, empirical findings prove that there is an inverse relationship between consumption taxation rates and public debt. Also, capital taxes will not decrease public debt as efficiently as other sources due to capital mobility. This was proven by empirical findings that showed a positive relationship between implicit tax rate and the level of public debt for Eurozone member countries by analyzing 234 observations between the period from 1999 until 2016. Tax competition was also investigated by other research papers. For instance, Zodrow (2006) explores the capital income taxation in small open economies. He provided the same results as Menguy (2020) as they create distortions rather than solving the debt problem.

Yared (2019) explains the argument of tax-smoothing; which occurs when the government opts for a stable tax rate over time and lessening the impact of taxation on individuals and the private sector; as sudden changes or fluctuations in tax rates can distort consumer spending which affects economic stability. In times of having economic downturns, the government can run budget deficits, which means increasing expenditures rather than collecting taxes. On the vice-verse, in

times of economic booms, the government can start to collect more taxes than spending to repay the previous budget deficits. Alesina et al (2018) discussed the same dilemma, however Alesina et al (2018) do not discuss tax-smoothing, but rather questions and answers the most optimal path to reduce debt to sustainable level. For instance, some economists advocate for lower spending as it is the best way to restore fiscal stability. Meanwhile, others oppose this point of view as cutting spending may likely hurt economic growth.

2.2.2. The Effect of Subsidies on Public Debt

Subsidies are a tool for government spending and a determinant for the notion of fiscal policy (Clements et al, 1998). Schwartz and Clements (1999) investigates the problems that arises when trying to define and quantify the amount of government subsidies as a fiscal strategy. It analyzes the subsidy expenditures from 1975 until 1990 for 60 countries. The data is extracted from the United Nation's system of National Accounts and concluded that government subsidies may not always be reflected in the government's fiscal account. The paper highlights subsidies as a main tool for fiscal policy and they can exist as a tax subsidy that affect government operating deficits; because they act as a reduced tax revenue. As subsidies formulate a component of government expenditure, Baldacci et al (2012), the paper depicted the effect of increasing government expenditure, or what is known as expenditure based fiscal adjustments, helps the economy to recover from a financial crisis.

Like (Clements et al, 1998)'s findings, Schwartz et al (1995) highlight the effect of subsidies on government expenditure and highlights its effect on domestic resource allocation and income distribution. Not only do subsidies affect domestic level of the country, but it also affects the international trade as it distorts competition between companies if one company obtained a subsidy that another company did not get. However, advocates for the New Economic Policy argue that if subsidies are decreased, and this decrease is used to fund public investment, the fiscal deficit will not change.

Government expenditures can have an effect on macroeconomic variables such as GDP and inflation. Alastrash and Nurmukhametov (2021) analyze the effect of fiscal stimulus on real GDP in Egypt during the period of March 2001 until March 2021; which is a period that comes across different debt regimes. The paper concluded that monitoring debt ratios is required before injecting in the economy any fiscal stimuli. As for inflation, Ghosh and Ghosh (2003) show that if

government lowered subsidies and the difference in the government's budget is used to finance public investments, then fiscal deficit and inflation may rise, which shows that monetary policy is interrelated with fiscal policy and public debt.

2.3. The Effect of Monetary Policy on Public Debt

Monetary policy is another governmental tool through which governments address inflation rates, interest rates, and exchange rates to achieve certain strategic and economic objectives. Monetary policy tools can affect public debt as explained by Kwon et al (2009). The paper investigates the relationship between public debt and inflation in heavily indebted developing countries using VAR model concluding that when public debt increases in countries with large existing public debt, inflation increases. This imposes a challenge in highly indebted developing countries face when they conduct monetary policy as there are several constrains such as interest and exchange rate volatilities. Sometimes monetary policy would limit growth in money supply, which raises public debt. Also in emerging market and developing economies, Kwon et al (2009) explain that contractionary monetary policy that aims to curb inflation will lead to an increase in the government-borrowing, but this will narrow the scope for government spending and increase vulnerability of debt (IMF, 2022).

This sub-section reflects on two variables of interest in the research objectives. It sheds light on literature discussing monetary policy tools and their effect on public debt: First, the effect of inflation on public debt. Second, the effect of interest rates on public debt.

2.3.1. The Effect of Inflation on Public Debt

Inflation is a monetary phenomenon as it based on the relative supply of money (Kwon et al, 2009). Nguyen (2015) discussed the relationship between public debt and inflation in 60 developing countries in different continents like Asia, Latin America and Africa. It covered a reasonable time frame from 1990 until 2014. It discovered that public debt and inflation have a two-way relationship. Public debt positively affects inflation, while inflation negatively affects public debt. With a less sample size, Akitoby et al. (2014) investigates the effect of inflation rates on public debt-to-GDP ratio in G7 countries. Some countries had high inflation rates, and other had low inflation rates. The results of this paper aligns with Nguyen (2015) in the sense that inflation negatively affects public debt. This means that higher inflation rates could help reduce

debt levels in countries of G7, which are known to be advanced economies. However, higher inflation rates solely will not reduce public debt-to-GDP ratio; as it may be accompanied by distortion in resource allocation, or lower economic growth.

Chaudhary et al (1995) argue that debt financing through an increase in money supply generates inflation. Another analysis by Hilscher et al. (2014) conclude that higher inflation will be able to do little to debt and will not lead to lower debt value by evaluating data from 2012 in USA. The reason behind this is that market participants do not expect inflation rates to be high in the short run. Following the analysis of expectations, Grigoli and Sandri (2023) use analysis survey data across more than 40 countries. The paper reached a preliminary finding that inflation expectations increase when there are high debt levels in the country.

2.3.2. The Effect of Interest Rates on Public Debt

There is a fundamental relationship between interest rates and debt whether external or domestic. Higher interest rates result in the transmission of financing the debt from taxpayers to bondholders, and this distorts the domestic financial system (Chadha et al, 2014). Moreover, in case of external debt, higher interest rate leads the government to redirect its resources to abroad to fulfill obligations to foreign creditors, which in turn leads to a depreciation of the exchange rate and lowering domestic spending. This in return increases external debt for emerging economies (Borensztein, 1989; Augustine, 2019).

Another relationship between risk premiums and government debt is illustrated in Gros (2013). In times of crisis in countries with high-risk premium, Gros (2013) explains that sometimes banks choose to invest in high-yielding domestic government debt as it can balance their refinancing costs that could be higher. Also, when the risk premium is high, governments call out banks to support for the debt. The paper also presents an empirical experience that suggests that foreign funds that are directly related to foreign debt, are not smoothly directly related to interest rates. From a theoretical framework, Aiyagari et al. (2002) discuss how individuals take their consumption decisions. Governments try to maximize welfare of individuals over time by planning how and what the individuals should consume. Concerning interest rate and government debt, the paper claims that accruing claims on the private sector is an optimal long run policy; as government will be able to pay for its expenditures through interest rates revenues, and not through borrowing.

This is different than Gros (2013) as it focuses more on domestic funds, rather than funds from abroad to finance the debt.

According to Kumhof and Yakadina (2017), bondholding associated costs increase in a quadratic manner as the amount of them increase. When this occurs, higher interest rates should intervene to finance a higher government debt. The paper has shown that it is possible to predict the steady state of the government debt-to-GDP ratios, and the level of real interest rates, and the elasticity of real interest rates for advance and emerging economies.

2.4. Monetary and Fiscal Policy Mix on Debt Service

The optimal debt monetary or fiscal policy lies in the proposition of the Ricardian Equivalence (Barro, 1980; Robert, 1974). The proposition explains that the level of government debt today affects future generations. For instance, if the government conducts expansionary policy today by cutting taxes and borrowing, this means that the private sector and the citizens should expect an increase in the taxes in the future in order for the government to be able to service the debt. In return, the private sector and consumers should be rational enough to understand that the government's expansionary policy today means that they should save to finance a higher tax in the future. This will result in having no effect on the government debt, the consumption level or the investment decisions because of a government's decision to borrow; because the current private sector and citizen's behavior will offset the government's future decisions (Yared, 2019). Despite the supporting opinions to Ricardian equivalence, Bernheim (1987) claims that deficits make the rational agent indifferent between paying the money today or paying the same amount plus its interest tomorrow. Thus, government deficits push people to consume more.

Kumhof and Yakadina (2017) explains the interaction between one tool of fiscal policy and another in monetary policy. It states that the economy is vulnerable to shocks that makes the government commit to future policies. When debt rises substantially because of the shock, tax cuts become costly on the government as it can be affected by the debt limit on real interest rates, and the government budget. Therefore, the government has to raise future taxation which might cause distortions in the market. Also, in Aiyagari et al. (2002) paper, taxes and interest rates can sometimes be used by the government in a mutually exclusive way. When the government is able

to finance its spending or its debt through interest rate revenues, which is a monetary tool, it will not rely on imposing taxation as a fiscal tool.

As for the empirical evidence on the interaction between fiscal and monetary policies, Davig and Leeper (2009) used a dynamic stochastic general equilibrium (DSGE) model on USA dataset, and concluded that the relation between fiscal and monetary policy fluctuate in an active and passive way. Bianchi and Illut (2017) also used a DSGE model on US quarterly data, to investigate a similar relationship. It concluded that inflation is driven by monetary actions that were also driven by fiscal policies.

Mountford and Uhlig (2009) and Fialho and Portugal (2005) used a VAR model, the latter concluded that monetary policy is more dominant in Brazil, while the former concluded that monetary policy is more dominant in USA. Other papers such as Van Aarie (2003) used a Structual VAR model to examine how policies interact in Europe. In some countries, fiscal and monetary policies complemented each others, however, in other countries, they were substitutes.

2.5. The Effect of Fiscal and Monetary Policy on Public Debt in Egypt

It is important to understand the reason behind public debt before assessing the main factors affecting it. Abdelkhalek (2000) examines the reasons behind domestic debt in Egypt using “debt dynamic” equation, and relying on primary balance to GDP ratio. Egypt was caught in collective repercussions of fixed exchange rate along with liberalized cross-border capital movement, and constricted monetary stance. This mixture of policies led to an influx of significant capital during 1990s; which led the Central Bank of Egypt (CBE) to interfere through issuing domestic debt to absorb the excess liquidity. In the early 1990s, domestic debt surpassed the fiscal requirements which later on accumulated domestic debt.

Fiscal policy plays a major role in establishing a sound economic system and macroeconomic stability (Ali and Mohamed, 2022). The paper estimated the impact of fiscal consolidation on economic growth in Egypt. The results of the paper showed the fiscal consolidation positively impacts economic growth and this aligns with the results of expansionary policies regarding fiscal consolidation such as decreasing the debt-to-GDP ratio and the budget deficit. It also concluded that expenditure cuts have more expansionary effects than increasing taxes.

From a monetary policy side, Shokr et al. (2019) studied the effect of monetary policy and foreign shocks on GDP, inflation rates, and exchange rate using non-recursive SVAR model in Egypt. Although the paper does not tackle the effect on public debt, the paper concluded that monetary policy shocks significantly affect GDP, inflation and exchange rate in Egypt, which in return affects the public debt. Stabilizing those three indicators would help the CBE reach price stability and economic growth.

From an empirical perspective, Al-Shawarby and El Mossallamy (2019) tackles both the fiscal and monetary policy interactions and their effect on economic stabilization by applying the New Keynesian small open economy dynamic stochastic general equilibrium (DSGE). The paper concluded that inflation, GDP and debt stock are key determinants for economic stability. Also, the CBE focuses on anti-inflationary policy more than focusing on targeting output. It also does not strongly respond to nominal exchange rate variations. Using similar variables to Al-Shawarby and El Mossallamy (2019), Fahmy and Hashem (2019) examine the vulnerability of public debt to different structural shocks in Egypt. The paper concluded that there is a negative relationship between inflation rate and public debt, and also between the government revenues and public debt. However, there is a positive relationship between real effective exchange rate and debt, and also between interest rate and public debt.

Fiscal dominance in Egypt appears in the findings of studies conducted by Hassan et al. (2014), Elhendawy (2019), and El-Khishin and Kassab (2021). Using a Structural VAR (SVAR) model, Hassan et al. (2014) observed that fiscal dominance weakened following the enactment of CBE law No. 88 in 2003, granting the Central Bank of Egypt (CBE) a higher level of independence. This study was conducted on the period from 1975 to 2011. Similarly, El-Khishin and Kassab (2021) employed the SVAR methodology to explore the interaction between fiscal and monetary policies in times of uncertainty. However, they covered the period from 2006/2007 to 2018/2019. Both studies have aligning results that confirms fiscal dominance in Egypt. Nevertheless, an increasing level of independence for the central bank is noticed.

2.6. Research Gap

The literature regarding the effect of monetary and fiscal policies on government debt is continuously evolving. However, there are certain areas that have not been sufficiently examined

in the literature, and require further investigation. In this context, this paper aims to identify and address the gaps in the existing literature to provide a deeper understanding of the economic circumstances in Egypt.

The first gap to be identified is the effect of economic growth on government's debt. The existing literature extensively discuss the effect of government's debt on economic growth. We encountered minimal number of studies that discuss the relationship otherwise. Hence, this study opts to investigate the effect of real GDP in Egypt on debt-to-GDP ratio.

There is vast literature that discusses the effect of certain tools of fiscal and monetary policies on government debt, whether focusing on one monetary policy tool, or fiscal policy tool. However, there has not been extensive studies combining both the fiscal and the monetary policy and analyzing its effect on government's debt, and in specific, for Egypt. There has been several papers that discuss the relationship in either fiscal policy or monetary policy on government debt in Egypt, but the study is either not covering the recent period of study, or the paper does not use the VAR model to analyze the dynamic relationship between the two variables. Moreover, few papers discuss the relationship from an empirical perspective on Egypt (Al-Shawarby and El Mossallamy, 2019; Fahmy and Hashem, 2019; Kassab, 2022).

Therefore, this paper aims to fill in the outdated period of study, and the methodological shortcomings. In addition, this paper depicts if there is any recent changes or developments in the relationship between economic growth and other fiscal and monetary policies, and between public debt and other macroeconomic indicators. The reason behind that is that 2020 was a period of global pause due to COVID-19 pandemic; which required government intervention on a fiscal and monetary scale. Also, the thesis attempts to include the Russian-Ukrainian war in the descriptive results of the dataset to include the economic impact of Egypt.

3. Chapter III: Contextual Background – Egypt

This chapter discusses the political economy in Egypt highlighting major historical fluctuations that Egypt passed through in terms of economic frameworks. It highlights different and contrasting legislative directions according to each presidential era, and how each era contributed to debt accumulation despite adopting a different notion. This chapter then tackles the supporting statistical evidence in the stylized facts sub-section explaining the past two decades in numbers

3.1. Political Economy in Egypt

Egypt's political economy is explained by three main principles during the past years, despite the last four different economic doctrines. The first principle is that the political power in the country enforces the economic policies to achieve the already set objectives. The second principle is that the elite, aligning with the political power, own a high share in investments that generate revenues and create jobs to achieve these economic and strategic objectives. Citizens do not necessarily approve the government's decisions, nor agree with it, but they accept it hoping to improve their livelihood assets, which is the third principle (Colombo, 2023).

This section first discusses from 1952 until 1970 that highlights major characteristics of Nasser's era, it then discusses the preceding presidential period that was ruled by President Anwar El Sadat and subsequently Mubarak's era. After that, it elaborates on current economic doctrine with economic reforms Egypt agreed with the IMF on, then concluding with the current status.

From 1952 until 1970

The Egyptian economic history passed by multiple fluctuations, and Egypt was a vulnerable country against any international event. Before the revolution of 1952, Egypt's economy was mostly agricultural; as the economy largely depended the production and exporting of cotton (Richards, 1980). A very small number of rich citizens, called the elites, owned a large area of the agricultural land exhibiting an unequal distribution of resources (Richards, 1980). The private sector controlled the main productive sectors such the agriculture, trade, and electricity. In specific, foreigners controlled the banking system, the insurance companies and public transportation. The government focused only on investing in the infrastructure (El-Ghonemy, 2004; Ikram, 2006).

After the 1952 revolution, there was a gradual direction towards more government involvement in the economy as there had been problems regarding the financing of the Aswan High Dam and the Suez War of 1956 (El-Ghonemy, 2004; Ikram, 2006). It was until the early 60's, the Egyptian government along with the public sector controlled all sectors in the economy such as the industrial sectors, and the financial sectors (African Development Bank ADB, 2009). The period from 1956 until 1970 was characterized by the government intervention and the Arab trend towards Socialism along with the introduction of the new Constitution of 1956 and the movement towards

"Egyptianizing" the essential bodies of the economy (Kerbœuf, 2012; Megahed and Ghannam, 2022).

The "Egyptianization" was later turned into Nationalization. This Nasser's Era had multiple features that shifted the economic system from a liberal capitalist system to more distribution of wealth with an aim to become a socialist, co-operative and democratic society (Megahed and Ghannam, 2022). The investment was tightly planned, and the pricing was controlled and determined, similarly to foreign trade (Megahed and Ghannam, 2022) For instance, banking and non-banking financial sectors were required to become joint stock companies that are domestically owned within 5 years (El-Ghonemy M., 2004; Ikram K., 2006). In 1960 in specific, Bank Misr and the National Bank became publicly owned; which was a major indication to the government's ideology (Moheildin and Nasr, 2003).

Although the Nasser's era aimed to improve the economic and social status in Egypt, there had still been several economic downfalls (Torrey, 1965). The foreign exchange was low and insufficient to align with the government's policy goals as Egypt continuously ran a balance of payment deficit that was accumulated by World War II (Torrey, 1965). The debt situation became worse after the war in 1967 and the government started to deal with difficulties in the budget deficit (Stork, 1982). Moreover, the economic system that involved government intervention was inefficient as it distorted price. It also had contradicting goals; one goal was to promote economic growth and increase the level of investment savings, however, the government opted to increase the level of consumption by increasing wages and guaranteed employment (El-Ghonemy M., 2004; Ikram K., 2006).

From 1970s until 1980s

In the 1970s, during Anwar Sadat's presidency, the economy had already been under economic stress because of the war (Stork, 1982). Hence, Sadat decided to follow a different economic system that relies on open door policies and economic growth in attempt to follow the aim of modernizing the Egyptian society by the year 2000 (Hamed, 1981). However, for 15 years after the announcement of the new ideology, few steps were taken towards the new approach as the public sector still dominated the main sectors of the economy (Ikram K., 2006). It was claimed that open door policies was intended to gain the inflows of foreign funds, which later on paved the

way for Law 43 of 1974 enactment. The law encouraged foreign investments through concessions on imports, taxation, and guarantees against nationalization to the extent that there was total tax exemption on individual and trading profits (El Nazer, 1979).

Despite the inflow of financial resources, deficits, debt, and inflation continued to increase as the country's problem was more of a structural problem. Food and other important commodities prices rose significantly and affected the trade account and the government budget (Stork, 1982). In the 1980s, the government tried to sustain the level of growth rates through expansionary economic policies, which worsened debt problem due to several reasons. First, petroleum export prices dropped and its revenues collapsed which caused deterioration to the Egyptian trade (Stork, 1982). The government continued to rely on external borrowing to finance investments, and perhaps, this reliance of heavy external borrowing since 1975 created a debt crisis in the country (Stork, 1982). In 1987, the total debt reached more than 40 billion dollars; which is almost 112% of GDP (Ikram K., 2006). Accompanied by a decrease in non-oil exports, it became very hard for Egypt to respond to its debt service obligations, and financing the debt was from new borrowing until it Egypt became stuck in a debt trap (Adly, 2011; Koussa, 2023). This led Egypt to have less presence in international capital markets (Ikram K., 2006).

As a consequent, the Paris Club Deal was conducted in 1987 to resolve Egypt's debt crisis. Paris Club is an informal group of public creditors and was initiated in 1956. Creditors try to provide solutions to debt problems in debtor countries. These solutions aim to create debt relief either by rescheduling, postponement, concessional rescheduling or a decrease in the debt service obligation.[1] The agreement concerning the debt trap in Egypt only postponed it, but it didn't actually solve it as a total of 11.3 billion dollars were rescheduled including all interest payments, and amortization payments (Ikram K., 2006).

As previously stated, conducting fiscal expansionary policy along with declining revenues were the main reason behind the rising budget deficit. Although the government tried to curb expenditures, especially through cutting down explicit subsidies, this was not effective as this type of subsidies only constituted 5% of GDP, unlike implicit subsidies that constitute 15% of GDP at that time. As for the monetary policy, interest rates were low, and this was a low incentive for

[1] Club De Paris, retrieved from URL: https://clubdeparis.org/

investors to self-finance (Ikram K., 2006). As described by Ayubi (1992), Egypt is one of the countries that are regionally and internationally influenced, and have low domestic adaptability. It follows domestic adjustment relatively in a rigid sense, but asks for financial assistance from Western governments in return.

Last but not least, adjusting policies during this period of the 1980s was disorganized. The government kept on promising more than it could deliver, and less than what the country needs and less than the IMF's recommendations. Moreover, there was no ministerial committee that was actually accountable to the policies and decisions taken due to inter-ministerial committees. (Hinnebusch, 1981). Not only did these committees had overlapping jurisdictions, but they didn't have unified vision. The situation got worse due to the 1990 Gulf crisis along with the shortfall in resources (Posusney, 1991). Furthermore, inflation rate increased with an annual rate of 14.7%, the balance of payments had suffered from a deficit, and the ratio of debt service compared to the foreign exchange earnings reached 55%. (Ikram K., 2006)

ERSAP 1991

As the economic status in Egypt continued to deteriorate, the World Bank (WB) and the IMF suggested that Egypt's economic problem could be addressed through stabilizing the economy and structural reforms that encompass four main factors (Ibrahim and Lofgren, 1995). First, the private sector should be empowered enough to compete with the public sector. Second, in order for Egypt to get out of this economic problem successfully, the transition has to be made slowly and gradually. Third, privatizing the financial and banking sector was important as the WB and the IMF recommended, however, the government decided to only privatize Joint Venture (JV) banks. Fourth and lastly, the devaluation dilemma; the government had not really devaluated the Egyptian pound for fears of inflation, or regressing future growth. All of this left Egypt with only one resort which is Egypt's Economic Reform and Structural Adjustment Programme of 1991 (ERSAP) (Ikram K., 2006).

The ERSAP indicated that the IMF will stabilize the economy by securing a stand-by-credit arrangement (SBA) that is worth 400 million dollars in attempt to adjust the economy (ADB, 1999). While the WB handles the structural reform in the economy by securing a 300 million dollars loan (ADB, 1999). Hence, the main objectives of the reform programme is to correct for

external and internal balance. Externally, through unifying the exchange rate and encourage valuing imports by the Egyptian currency (ADB, 1999). Internally, it aimed to decrease government expenditures to decrease the budget deficit, and the demand for imports (Korayem, 1997; ADB, 1999).

According to the ERSAP adjustment plan, and in order to adjust the fiscal imbalance, the government had to conduct several policies that include alteration in fiscal and monetary policies. As for the fiscal policy, the government develops policies from both the revenue side, and the supply side. From the revenue side, the government increases taxation such as global income tax, sales tax, and excise tax (Ibrahim and Lofgren, 1995; ADB, 1999). Also, through increasing the prices of energy production. From the expenditure side, the government should reduce expenditures such as reducing wages, public investments, and subsidies. (Korayem, 1997; ADB, 1999)

As for the monetary policy, the government should reduce inflation through relying on treasury bills market instead of borrowing from the CBE (Korayem, 1997). Also, the government should put ceilings on credits for banks in an attempt to restrict money creation (Mabrouk and Hassan, 2012). Banks should also decide their interest rates in an attempt to pave the way for a market-based monetary policy regime. This is done along side curbing the preferential credit given to banks by governments. At the same time, the IMF suggested an exchange rate reform and trade liberalization (Al-Mashat and Billmeier, 2007; Korayem, 1997)

For the purpose of fulfilling the structural part of the ERSAP, there were pricing reforms in the industrial sector and the agricultural sector (ADB, 1999). Both sectors' reforms removed the pricing of their products and they were subject to liberalization. In addition, there was a gradual decrease in subsidizing food and energy products and on the agriculture inputs. Aside from the pricing reforms, there were also public sector reforms, which included institutional, legal, and financial reforms (ADB, 1999). The ERSAP's results were successful as it reduced inflation, provided a stable currency, and produced a sound economic system with a sound banking system and balance of payments (Ibrahim and Lofgren, 1995). There were also improvements in privatization, trade and investments (Korayem, 1997).

The 2000s

During 2001-2002, the budget deficit did not improve, and was still large. This has definitely affected the economic stability Egypt started to build. In 2001, a tight monetary policy was imposed, but it did not improve the growth of private sector credit (Al-Mashat and Billmeier, 2007). Until 2004, former authorities focused on the exchange rate system, trade liberalization, and improving the monetary framework. In 2003 in specific, the government decided to float the Egyptian pound after a series of devaluations (Jbili and Kramarenko, 2003). However, public debt rose by 36% as a percentage of GDP. The reason behind this was mainly domestic debt, meanwhile, external debt decreased (Korayem, 1997).

In 2005, Egypt had a new income tax law with higher exemption threshold. As described by the General Authority for Investment and Free Zones (GAFI), the law aimed to broaden the tax base by phasing out deductions. It also lessened the top marginal tax rates on income.[2] Not only the tax law gained a share of the reform, but also tax administration. A tax-payer office was created and self-assessment payment was created. To facilitate the tax payment experience on citizens, income tax and sales tax were going to be paid through an appointment with a single tax commissioner. (Korayem, 1997)

According to past events, whenever Egypt stands on a promising stance, a global turbulence occurs and Egypt becomes affected like the Asian financial crises and the global financial crisis (Mabrouk and Hassan, 2012). In response to the global inflation after 2007-2008 financial crisis, the government carried out a fiscal consolidation policy and approved a deficit-neutral package that introduces multiple tax reforms, and the revenues obtained from those tax reforms would finance government employee's wages, and increasing the quota for ration cards (Mansour, 2011). This was accompanied by a fiscal stimulus package dedicated for projects of infrastructure and utility (Mansour, 2011). Egypt's economic performance was better than anticipated; due to the limit direct exposure globally, and low level of global financial inclusion (Korayem K., 1997).

Post 2011 Revolution

The subsequent decade was stocked with economic instability (Miller and Khan, 2016). It was characterized by slow economic growth, increase in the unemployment rates, and rise in the budget

[2] Income Tax Law No. 91 of 2005, GAFI, retrieved from URL: https://www.gafi.gov.eg/English/StartaBusiness/Laws-and-Regulations/Documents/TaxLaws.pdf

deficit that is accompanied by increase in government expenditure (Miller and Khan, 2016). Despite the historical attempts of privatization, by 2013 and 2014, public sector possessed the majority of assets, and controlled the vital sectors of production such as electricity (Abed, 2020; Rana and Khanna, 2020). Alongside, Egypt suffered from low human capital, poor infrastructure, and low access to credit (IMF, 2015).

As for the monetary policy, the Egyptian pound had witnessed major fluctuations. Due to the increase in non-oil imports, and decline in tourism and Suez Canal revenues, and the stagnation of FDI inflows, the Egyptian pound was not demanded along with low supply of foreign currency in the country (IMF, 2017). The CBE had always tried to support the Egyptian pound's stability through financing the market with foreign reserves until they significantly declined. Moreover, the CBE resorted to borrowing from the Gulf Cooperation Council (GCC). As a result, there was a new IMF-supported economic reform programme in 2016 (IMF, 2015).

IMF Second Loan 2016

In November 2016, the IMF agreed to give Egypt a three-year extended loan equivalent to 12 billion USD under the Extended Fund Facility (EFF). The objectives of loan is to promote economic and inclusive growth, increase employment and competitiveness in the markets, decrease budget deficit and public debt, all while provide social protections to those most affected by the conditions imposed (IMF, 2016). If Egypt succeeded to abide by the conditions, this would help it achieve macroeconomic stability (IMF, 2016). Those conditions rested on four main pillars. The first pillar is concerned with policy adjustment, as Egypt was required to conduct contractionary policies from both the fiscal and monetary aspects (IMF, 2016). Also, the Egyptian pound will counter a new floating exchange rate regime. Those fiscal and contractionary policies will hold inflation rate steady along with sustaining public debt (IMF, 2016). The second pillar is concerned with structural reforms to strengthen the veins of the economy in terms of public finance, business regulations, governance, and enhancing energy sectors (IMF, 2016). The third pillar is a social pillar as it advocates for more spending on social safety nets through food subsidies and cash transfers (IMF, 2016). The last pillar is concerned with closing the gap of international reserves and help gain new external financing (IMF, 2016).

Not all of the results of the IMF loan were positive; the reform discovered some weaknesses in the Egyptian economic system (Kaldas, 2022). Inflation surged accompanied by peaks in energy prices and value added taxes. To combat inflation, the CBE took some measures regarding its policy rates, raised its reserve requirements, gradual decrease in overnight deposit and lending rates. In addition, higher energy prices obliged the government to decrease energy subsidies. Egypt became left with multiple challenges such as relying on foreign currency financing and external debt flows; which threatened external public debt sustainability (IMF, 2017). This is along with the continuous rise in oil prices internationally and accumulating liabilities on the government's budget (IMF, 2018; IMF; 2019).

Current Status

While Egypt was on its way to address those challenges, the global pandemic COVID-19 hit the world. It had negative impact on tourism, financial sectors, retail sectors, and oil and gas. The slowdown in international trade negatively affected the Suez Canal revenues, foreign direct investment, and foreign investment portfolio. The stagnation in the global economy enlarged the financial gap and financing cost on the government.

There were measures taken by the government that were against its contractionary policy direction due to the pandemic. From a fiscal policy aspect, the government provided stimulus packages to face the pandemic, along with increasing pensions, subsidies, medical professional allowances, tax reliefs, and expanding Takaful and Karama. Similarly, the monetary policy was expansionary, as the CBE provided preferential interest rate to specific sectors in need, launched a stock-purchase programme, and reduced policy rates. It was inevitable for a country to avoid getting negatively affected by COVID-19, so Egypt requested financial assistance from the IMF that will allow the government to adjust the balance of payments and address the most vulnerable group of people.

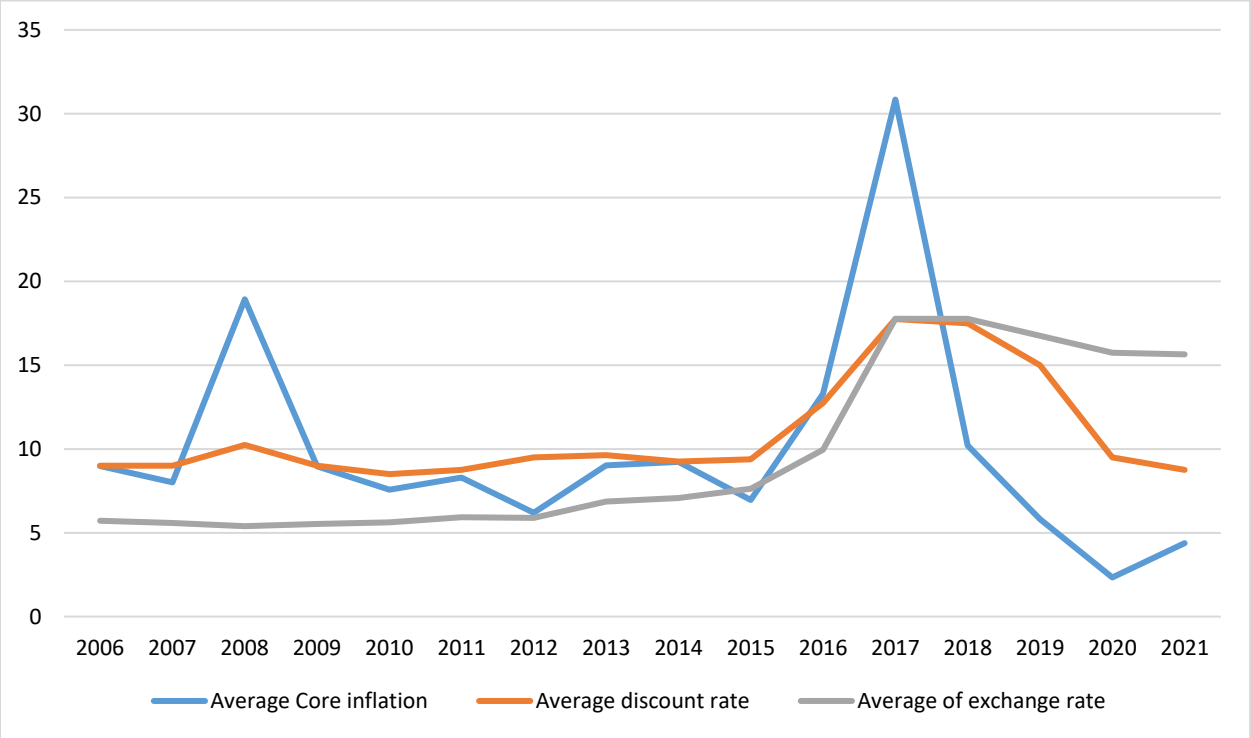
3.2. Stylized Facts

Figure (2) illustrates the trend of the average of inflation rate, exchange rate, and discount rate. The rates have been used in average as the original dataset is on quarterly basis. Hence, to obtain annual observations, an average of the year for each variable was calculated. As it is shown in figure (2), inflation rates in Egypt faced two economic transitions. It was indirectly affected during

the 2007-2008 financial crisis and reached a peak of approximately 19%, while it was directly affected in 2016 due to the Egyptian pound floatation. Despite the promising trend line that shows that inflation increased but with a decreasing rate expressing an overall decreasing inflation rate trend line from 2018 until 2020. Inflation rates in Egypt spiked due to fiscal consolidation measures and unanticipated international inflation compared to domestic inflation. This led the CBE to adopt a tighter monetary policy than planned (CBE, 2021). Discount rates have exhibited steady rate since 2006 until 2016; it was also affected by the Egyptian pound floatation. Despite this, it has returned to its rates in 2021.

As for the exchange rate, Egypt has been adopting a managed exchange rate from 2006 and until 2016 because it has decided to fully-float the Egyptian pound as a response to meet the IMF loan conditions (IMF, 2016). This is shown in the peak in exchange rate in figure (2) that remained at the same level until 2021.

Figure (2): Trends of Main Monetary Policy Tools during 2006-2021 in Egypt

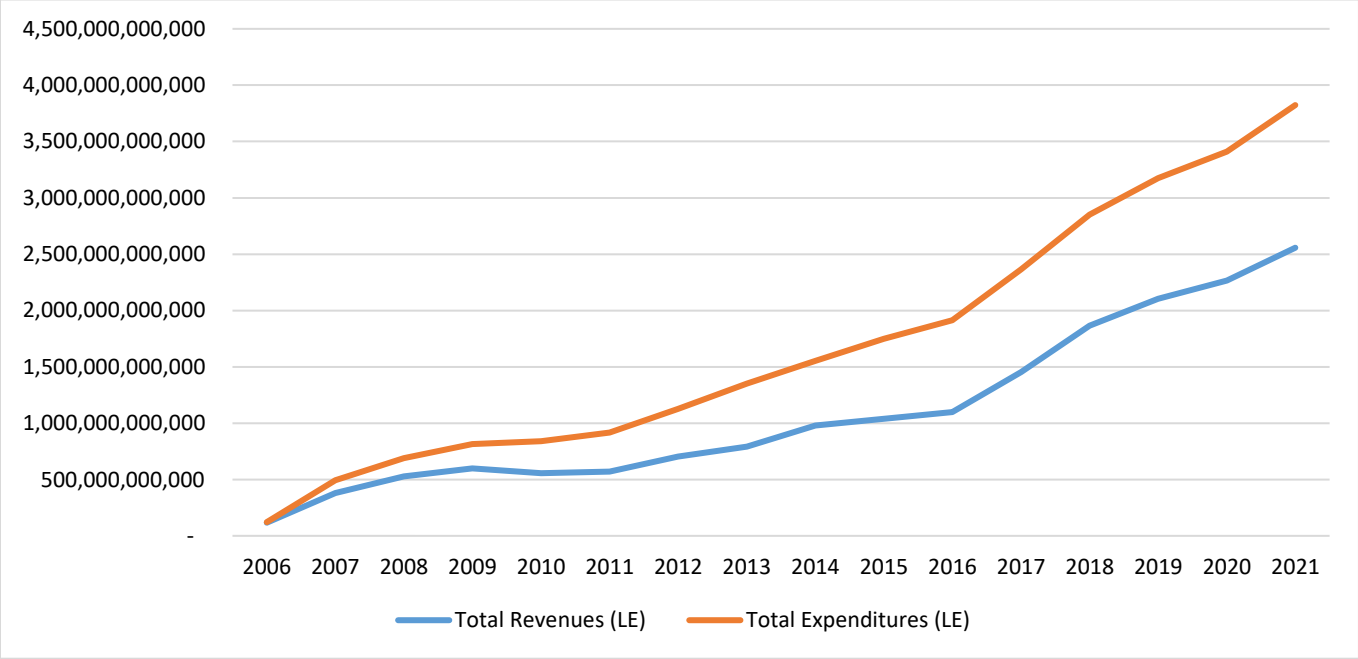


Source: Drawn by the Author using Central Bank of Egypt Statistics (CBE) 2006 – 2021

As for the fiscal stance, growing budget deficits are the main problem behind uncertain debt stance. Fiscal deficits lead to debt financing; and this liability keeps growing over time until it threatens economic stability and growth. In figure (3), total revenues and total expenditures are illustrated during 2006 until 2021. It is worth mentioning that these data are derived from the budget sector, and not the general government. Although general government's dataset is more representative, there hasn't been available data on it, so relying on it would have led to underrepresentation of the government's expenditures and revenues. Total expenditures encompass wages and compensation of employees, purchases of goods and services, interest payments to the National Investment Bank (NIB) and social insurance funds (SIFs). It also encompasses subsidies, grants, and social benefits. There are also other expenditures on defense, and purchases of non-financial assets. Total revenues on the other side encompass tax revenues that include taxes on income and profits, taxes on property, taxes on goods and services, and taxes on international trade. It also encompasses grants, property income, sales of goods and services, and financing investments.

In figure (3), during the period from 2006 until 2021, government's expenditures have always surpassed government's revenues. This explains why the government incurs prolonged cash deficits during the same period until it reached 1,266,195 billion Egyptian pounds in 2021.

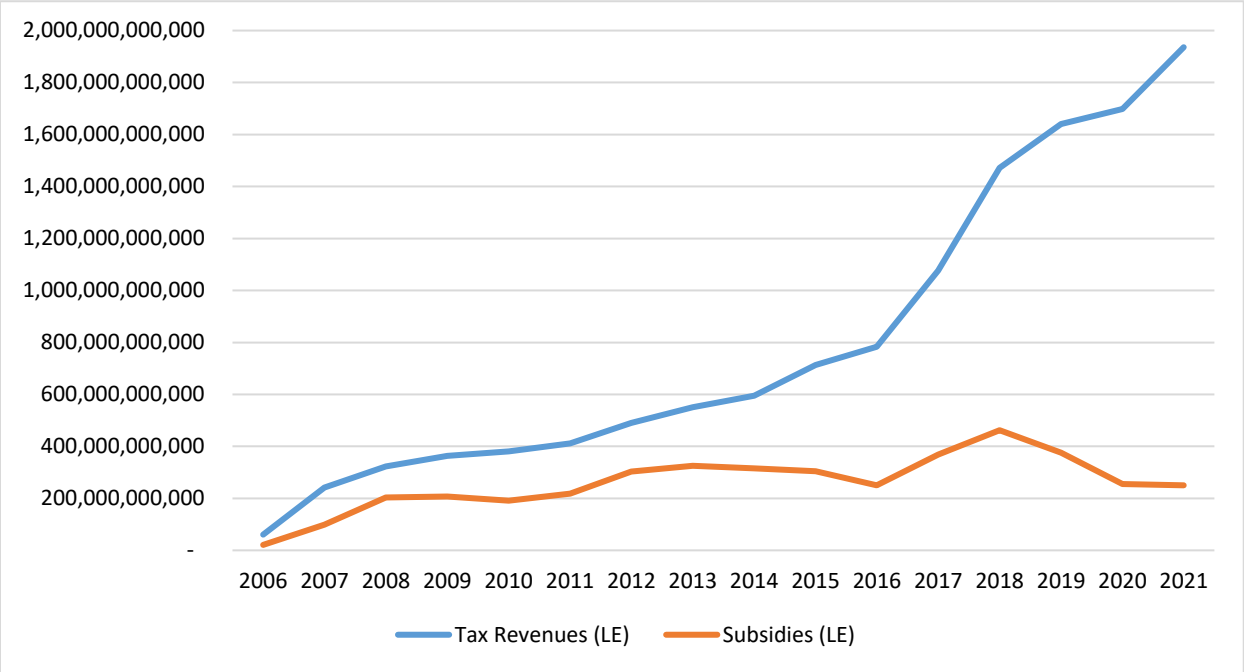
Figure (3): Total Revenues and Total Expenditures from 2006 until 2021



Source: Drawn by the Author using Central Bank of Egypt Time Series Data (CBE) 2006 – 2021

Due to the IMF loan conditions, Egypt had to adopt a contractionary policy such as increasing taxes and lowering subsidies. In figure (4), it is obvious that the amount of taxes the government received increases during 2006 until 2010, while subsidies fluctuate slightly but ends with a small decrease in 2021; which supports the notion that Egypt is adopting a contractionary policy. When subsidies increase, this shows that the government is adopting an expansionary policy as it dedicates a part of the government's budget to be spent on goods and services through consumers.

Figure (4): The Evolution of Main Fiscal Policy Tools during 2006-2021 in Egypt

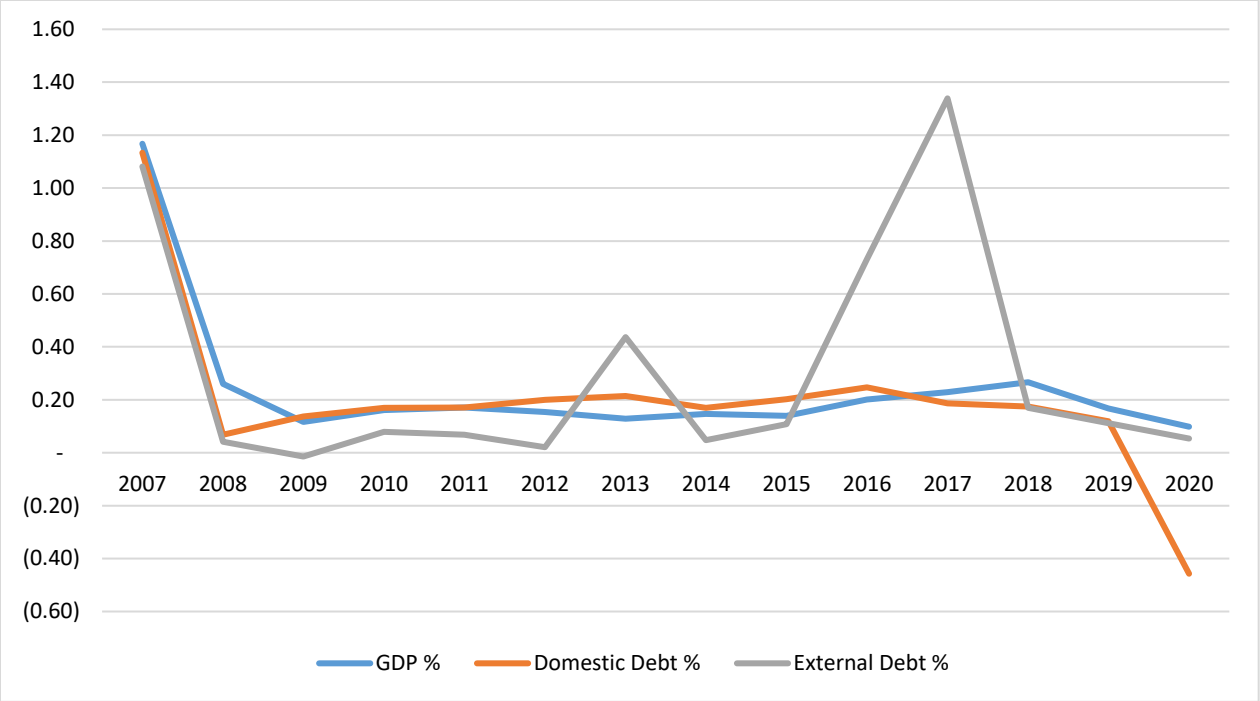


Source: Drawn by the Author using Central Bank of Egypt Time Series Data (CBE) 2006 – 2021

Figure (5) explains the result of growth rates of government's policies reflected in the GDP, the external debt, and domestic debt. The rate by which the external debt and the domestic debt is rising is faster than the rate of GDP in some years, but slower in another. Before the Egyptian revolution in 2011, Egypt's had relied on foreign currency from tourism and FDIs. After the revolution, there was a noticeable decrease in the foreign currency that caused an increase in external debt. In 2017, external debt has seen a peak in the growth rates due to the floatation in the Egyptian pound and the increase in external borrowing attributed to the IMF loan beside the depreciation of the currency against the USD. Growth rate of GDP, external debt and domestic

debt are connected; the Egyptian economy is not capable of generating output based on domestic sources; thus, this leads to higher tendencies of the GOE to borrow from international and domestic sources.

Figure (5): Growth Rates of GDP, External Debt, and Domestic Debt in Egypt during 2007 until 2020



Source: Drawn by the Author using Central Bank of Egypt Time Series Data (CBE) 2006 – 2020

4. Chapter IV: Theoretical and Conceptual Framework

This chapter focuses on providing the two frameworks upon which the variables of interest are linked. It will start by first, the theoretical framework, and second, the conceptual framework. The main variables of interest are public debt as a dependent variable. The explanatory variables are subsidies which reflect government expenditures, taxes which reflect government revenues, inflation rates, discount rates, and economic growth. These variables will be thoroughly explained in the methodology chapter.

4.1. Theoretical Framework

4.1.1. Monetary Policies and Public Debt

The effect of monetary policy on government debt, specifically, the effect of interest rates, and inflation rates on government debt, can be explained by two theories. The first theory is the Fisher effect, which explains the relationship between inflation and government debt. The second one is the debt overhang theory; which explains the relationship between interest rates and debt.

The Fisher theory was named after the economist Irving Fisher. This theory explains that there is a direct relationship between interest rates and inflation rates on debt. If interest rate is higher than anticipated, the real interest rate on debt becomes lower than anticipated. The real interest rate is the rate adjusted for inflation. Hence, the real burden of debt will be decreased as the government will be able to repay its loads with money that has less value (Fisher, 1930).

The theory that explains the relationship between interest rates, namely discount rates, and debt is debt overhang theory. When the country has an excess amount of debt that is difficult to be repaid, this deters economic growth, as the country will not be able to inject money in the economy and stimulate growth. Creditors in that situation become unable to take a decision whether to invest in the country or spend, so interest rates increase (Krugman, 1988). Another theory that explains the relationship between interest rates and debt is the interest rate sensitivity. This theory implies that the price of financing the debt becomes more costly whenever interest rates increase. This discourages investors and creditors; consequently, this hinders economic growth (Tanzi and Lutz, 1991).

Monetary contraction is the change in monetary policy that leads to an increase in interest rate and aims to decrease the rate of inflation, while monetary expansion is the change in monetary policy that leads to a decrease in interest rate so that people borrow more and spend more. The main objectives of monetary policy is controlling the levels of inflation, unemployment, and exchange rates in the country. For instance, inflation targeting is the conduct of monetary policy to achieve a given inflation rate over time (Blanchard O., 2017).

4.1.2. Fiscal Policy and Government Debt

On the other side, the effect of fiscal policy on government debt, specifically, the effect of taxes, and subsidies on government debt, can be explained by the Ricardian Equivalence theory and the

crowding out effect theory. The Ricardian Equivalence explains the relationship between taxes and government debt. According to it, if the government increase taxes in attempt to reduce the deficit, rational individuals shall anticipate future tax reduction, and will increase their spending today, and save in the future when there is less tax liabilities (Ofori-Abebrese and Pickson, 2018). The theory suggests that rational individuals adjust their behavior according to their expectations on the government behavior. This impact on debt is that reduction in taxes, may not necessarily lead to increase in government debt, because increased private savings finance the debt. Thus, both governments and rational individuals anticipate the behavior of the other and act accordingly (Barro, 1974; Barro 1989; Evans, 1985).

As for the crowding out effect, increased government spending on subsidies imply high government debt, if the subsidies are financed through borrowing. When the government borrows to provide more subsidies, this means that the private sector has less opportunity to obtain those funds through borrowing as it competes with the government. The increased demand from both borrowers leads to higher interest rates, which in return makes funding debt more costly, reduces private investments, and regresses economic growth (Barro, 1990).

4.2. Conceptual framework

Debt is divided into two categories: Domestic debt and External debt. Public debt, in specific, encompasses both domestic debt and the public portion of external debt. Public debt is derived from the government sector, encompassing both central and local administrative units, as well as service authorities (Blanchard, 2017). Moreover, economic authorities and the National Investment Bank (NIB) contribute to this debt. The NIB, a government-owned entity, primarily borrows funds from social insurance funds and channels these funds toward lending to the government, economic authorities, and, the private sector (Alba, et al., 2004).

There is a difference between domestic and external debt because they can have varying effects on a country's macroeconomic status and debt repayment (Mahmood and Rauf 2008). Domestic debt is financed through local currency using government revenues. It has an effect on current government expenditure, and government’s fiscal space and growth. On the other hand, external debt includes both public and private external debt that is repaid in foreign currency. It is the amount of debt that is held by foreigners. Any depreciation of the local currency negatively affects external debt and the country's balance of payments (Mahmood and Rauf, 2008).

The debt-to-GDP ratio is the ratio of debt to gross domestic product, which is also called the debt ratio. Debt is a stock, what the government accumulates and owes as a result of the past deficits. Meanwhile, deficit is a flow which indicates how much the government borrows in a year. The government budget deficit is the excess of government expenditures over government revenues (Blanchard O., 2017).

There are two governmental policies that have a significant effect on the economic activity in the country. They are fiscal policies, and monetary policies. Fiscal Policy is the government choice of taxes and spending. Fiscal policy can either be contractionary or expansionary. Fiscal contraction is also known as fiscal consolidation and fiscal austerity, and it is a policy aimed at reducing the budget deficit through a decrease in government spending or an increase in taxation (Blanchard O., 2017). On the contrary, fiscal expansion is when an increase in government spending or a decrease in taxation leads to an increase in the budget deficit (Blanchard O., 2017). Meanwhile, monetary policy is the government choice of money supply and interest rate, through the central bank. Similar to fiscal policy, monetary policy can also be contractionary and expansionary (Blanchard O., 2017).

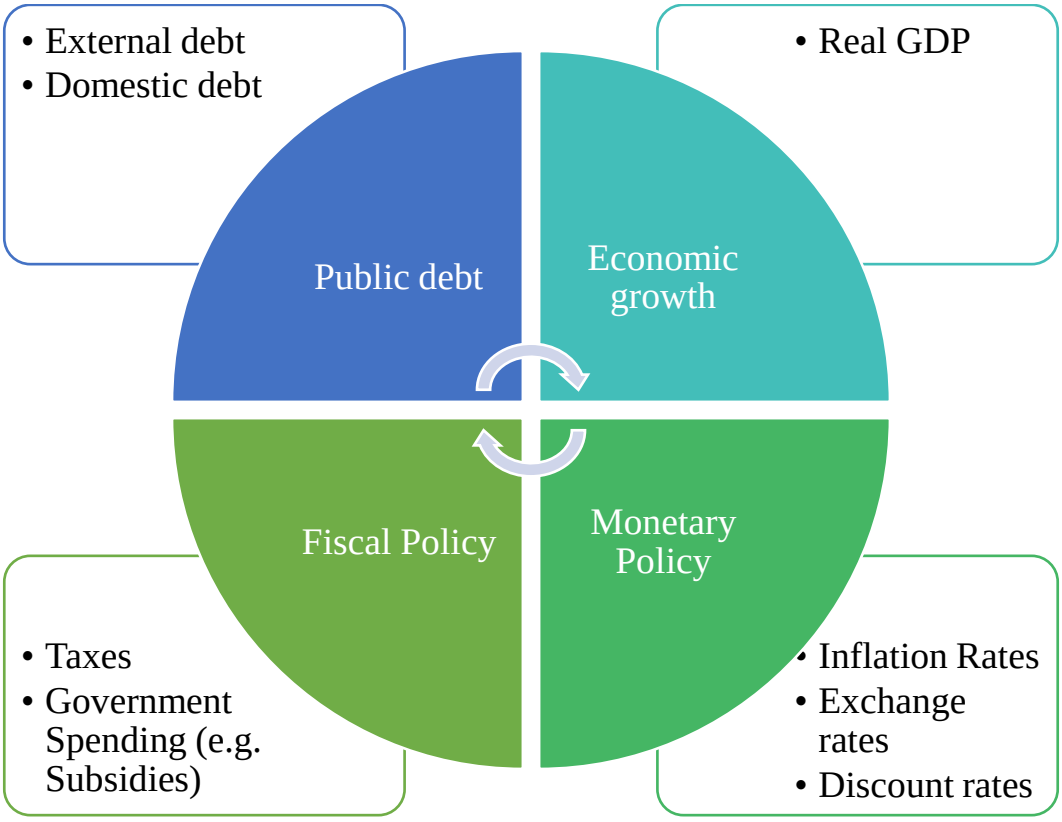
Monetary policy can be found in three main variables; which are interest rates, inflation rates, and exchange rates. Discount rates, also, are indicative for monetary policy. As indicated by the IMF and CBE, the Monetary Policy Committee in the CBE sets discount rates as it represents the rate at which central banks lend to commercial banks. Abdel Baki (2010) and Awad (2011) used discount rate to represent monetary policy in Egypt. Inflation rates reflect monetary policy tools.

For instance, when a country is adopting inflation-targeting policy, it utilizes this policy to anchor inflation expectations, and thus, encountering demand-side fluctuations and supply shocks. However, inflation rates are subject to exogenous factors that deviate the rates from the announced targets as per the CBE. As for the exchange rate policy, it closely reflects the monetary policy adopted in the country; as a flexible exchange rate gives more space for monetary policy independency. The three monetary variables are interrelated as per the IMF, as a flexible exchange rate regime complements inflation targets, and the discount rates affect the value of the currency.

The attainment of both monetary and fiscal policy requires more than one policy instrument; which means that relying on one policy to obtain a combined target of higher economic growth and non-inflationary prices is insufficient (Abdel-haleim, 2016). Figure (1) explains the

relationship between the interrelated variables of interest. The main direction of interest for the relationship between those variables is the effect of monetary and fiscal policy on government debt, having GDP as one of the main explanatory variables. Realistically and as per the literature, public debt affects monetary and fiscal policies as well as economic growth in the country. Thus, the figure illustrates the interrelatedness between each variable.

Figure (1): Main Fiscal and Monetary Tools and their Relation to Government Debt



Source: Constructed by the Author based on main findings from Blanchard O. (2017)

5. Chapter V: Methodology

This chapter focuses on the rationale behind choosing the variables, the data selected and the time frame it covers and the model conducted. It will start by data selection, then the econometric model, and the steps to conduct it, it will finalize by the limitations of the study and the ethical considerations.

5.1. Data Selection

Fiscal and monetary policies play a pivotal role in the amount of debt a country accumulates. In order to provide some empirical figures that have emerged from the relationship between both governmental tools and their effect on public debt, a time series dataset was derived from the Central Bank of Egypt (CBE) that covers the period from 2006 until 2022. By analyzing those years, it is aimed to develop a visual understanding of the multifaceted relationship between the main variables of concern.

Selection of Variables

This paper uses publicly available quarterly data for Egypt during the period of FY2006/2007Q1 to FY2021/2022Q4 to derive the model's endogenous variables. The dataset is chosen for this period for two reasons: there is lack of data availability prior to this period, and second, this was the year the CBE started to implement inflation targeting system (Al-Mashat, 2011).

All variables are derived from the monthly statistical bulletins and times-series data from the Central Bank of Egypt (CBE). Since the objective of the paper is to analyze the impact of fiscal and monetary policies on public debt, the paper applies a multivariate regression model where the public debt is regressed against key macroeconomic indicators that constitute the fiscal and the monetary policy extended from Fahmy and Hashem (2019). The following table summarizes the time series data, and their sources.

Table (1): Description of the original time series data

Variable Name	Denotation	Available data time frame	Frequency	Source	Currency/Unit
Government total revenues in logs	logrevenues	September 2006 – December 2021	Quarterly	CBE	LE/mn
Tax revenues in logs	logtax	September 2006 –	Quarterly	CBE	LE/mn

		December 2021			
Government total expenditures in logs	logexpenditure	September 2006 – December 2021	Quarterly	CBE	LE/mn
Subsidies expenditures	logsubsidies	September 2006 – December 2021	Quarterly	CBE	LE/mn
Core inflation rates	dcoreinf	September 2006 – June 2022	Monthly converted into quarterly	CBE	%
Discount Rate	ddiscount	September 2006 – June 2021	Monthly converted into quarterly	CBE	%
External debt	externaldebt	September 2006 – June 2022	Quarterly	CBE	$/mn then converted into LE using official buying exchange rate
Gross domestic debt	domesticdebt	September 2006 – June 2020	Quarterly	CBE	LE/mn

Public debt	publicdebt	September 2006 – June 2020	Quarterly	CBE	LE/mn derived from the summation of gross domestic debt and external debt
Debt-to-GDP ratio	ddebttogdp	September 2006 – June 2020	Quarterly	CBE	Percentage, derived from debt-to-GDP ratio using Real GDP, and public debt aggregates.

The dataset includes government total revenues, and government total expenditures, however, these two variables will not be used in the econometric analysis, as they will be substituted with taxes, and subsidies respectively. As for the government revenues, using taxes as a reflector for the government's revenues is significant as it encompasses on average 74% of the government's revenues as per FY 2020/2021.

Subsidies do not possess the same percentage of government expenditures as taxes' shares in government revenues. In fact, it constitutes around 6% of the government expenditures as per FY 2020/2021. Despite the low percentage, it is important to use subsidies as a reflector for government revenues as they reflect the direction of fiscal policy of the government (Ghosh and Ghosh, 2003; Cifuentes-Faura and Simionescu, 2023). It is also worth noting that the majority of government expenditures are spent on wages and interest payments. However, such areas are mandatory for the government to fulfill, unlike subsidies; which the government adjust to align with the government's objectives.

Also, core inflation rates is used as an indicator for inflation as it less volatile than headline inflation, and often used by policy makers to base their decisions (Mishkin, 2007; Ball et al, 2021). The inflation rates were published monthly by the CBE. To calculate each quarter, an average rate based on the monthly data was calculated for each quarter in a fiscal year.

As for the exchange rates, the CBE publishes it on a daily basis and in USD for the buying and selling rate. An average for each month was calculated for the period of study, and for each quarter, an average was calculated for the monthly frequency for each fiscal year. It is also worth noting that the model was run with exchange rates as an indicator for monetary policy along with discount rates, and inflation rates. However, the results of exchange rates were insignificant due to the depiction of autocorrelation.

Discount rates are used as an indicator for monetary policy as the CBE sets it as a mean to give credit to banks by treasury bills. The thesis did not use the overnight rate (ONR) despite its usage in the literature; due to the lack of data availability in the same period of study. However, increasing discount rates by the governments reduces the incentives to borrow, and thus, reduces circulating money in the economy (Sellon, 1980). Meanwhile, decreasing discount rates by the governments encourages more spending, and supports an expansionary policy (Sellon, 1980). In addition, treasury bills rate is used as a proxy interest rates (Fahmy and Hashem, 2019).

As for the debt to GDP ratio, public debt was calculated by summing aggregate domestic debt and external debt. External debt was in USD; and it was converted into EGP with buying rate for each corresponding quarter. It consists of loans from foreign bodies, bonds and deposits. In order to derive the ratio of debt to GDP, real GDP was obtained from the CBE, and public debt was divided by real GDP for each corresponding quarter. Debt to GDP ratio was the main dependent variable used in Fahmy and Hashem (2019) to examine the overall indebtness of Egypt as it is proved to be consolidate general government and economic authorities together.

5.2. Econometric Model

This chapter presents the framework used in this study to investigate the effect of fiscal and monetary policies adopted by the GOE on public debt. It will start by explaining the rationale behind using a reduced form of VAR model and its formal representation. After that, the estimation procedures of the model before interpreting the results.

To the best of our knowledge, this is the first study on the effect of fiscal and monetary interactions on government public debt using a VAR model until FY2021/2022. It is an extended study to Fahmy and Hashem (2019), and it follows the methodology conducted by Rezabek and Doucek (2018).

VAR model was developed by Christopher Sims in 1980 as a model that understands the dynamic relationship between a set of stationary variables. The VAR model is widely used to model the joint dynamics between a set of variables; which is the case of interest as monetary policy and fiscal policy variables affect each other, and in return affect debt accumulation as per the literature.

VAR models are used for multivariate time series. The structure is that each variable is a linear function of past lags of itself and past lags of the other variables; this means that each variable is affected by its past value and other variables' past values as well. The interrelatedness between the variables of interest is the crux of why the thesis depends on quantitative analysis.

5.3. VAR Model Formal Representation

The VAR model matrix representation is explained by the following:

$Y_t = a_1 + b_1 Y_{t-1} + b_2 Y_{t-1} + \ldots\ldots + b_p Y_{t-p} + u_t$

- a= (N x 1) vector of intercept
- b=(b_1,b_2,…,b_n) is a (N x N) coefficient matrix that exhibits a vector of parameters.
- Y_t=($y_{1,t}$,$y_{2,t}$,…,$y_{N,t}$)` is a (N x 1) vector of macroeconomic variables
- u_t=($u_{1,t}$,$u_{2,t}$,…,$u_{p,t}$)` interpreted as n-dimensional vector of shocks (innovations) and ut~ WN (0,Ω) (i.e., white noise); which means it is a vector of error terms with expected value of 0.

VAR model assumptions:

- Variables must be stationary
- Error terms are white noise disturbances, and usually referred to as innovations
- The coefficients of the matrix will be assessed by Ordinary Least Squares (OLS)

The paper will rely on a reduced form of VAR, and not the recursive form as it is highly dependent on the order of variables in the model, and thus, any change in the order, will lead to a

change in the result. Therefore, to avoid any computational error, the paper relies on the reduced form of VAR. This is a key difference between this paper and the model performed by Fahmy and Hashem (2019) which used the structural VAR (SVAR). This model proposes that the variables of the model are correlated with error terms, and it should be estimated using instrumental variables. And to avoid the limitations of this model, the reduced form of VAR is used as it allows easier implementation of by OLS. (Stock and Watson, 2001)

5.4. Stationarity in time series

The VAR model requires that the variables in the time series data to be stationary. Having non-stationary variables will affect the response of the variables to shocks; non-stationary variables will have a permanent effect because of the shock unlike the stationary time series that is affected temporarily (Verbeek, 2004).

To inspect the stationarity of the variables and to detect the presence of unit roots in the dataset, the Dickey-Fuller test was performed. Before testing for the stationarity, large strings variables such as the subsidies, taxes, realgdp were transformed into logs. The hypothesis of stationarity is as follows.

H_0: the variable is non-stationary

H_1: the variable is stationary

Table (2) illustrates each variable's denotation, its p-value and the interpretation. The null hypothesis means that the variable is non-stationary. Therefore, if the p-value is more than 5%, this means that we cannot reject the null hypothesis, and that the variable is non-stationary, and the vice-verse is correct.

Table (2): Summary of the Dickey-Fuller test results before adjustments

Variable	p-value	Result
publicdebttoGDP	0.2571	Non-stationary
logsubsidies	0.0000	Stationary
logtax	0.0000	Stationary
logRealGDP	0.9434	Non-stationary
avcoreinf	0.3176	Non-stationary

DiscountRate	0.7138	Non-stationary
Exchangerate	0.9119	Non-stationary

Source: Stata Output Drawn by the Author using Central Bank of Egypt's Database.

The results showed that the original time series of Real GDP, core inflation, discount rate, and exchange rate are non-stationary and integrated of order 1. This means that a first difference must be taken to ensure the stationarity of the variables. This is done through generating on Stata a new variable after taking its first difference. Upon the adjustment of the time series data, Real GDP, core inflation, discount rate, and exchange rate became stationary.

Table (3): Summary of the Dickey Fuller test results after adjustment

Variable	**p-value**	**Result**
ddebttogdp	0.0000	Stationary
logsubsidies	0.0000	Stationary
logtax	0.0000	Stationary
logRGDP	0.0000	Stationary
dcoreinf	0.0001	Stationary
ddiscount	0.0000	Stationary
dexchange	0.0001	Stationary

Source: Stata Output Drawn by the Author using Central Bank of Egypt's Database.

5.5. Determining the lag length

Selecting the optimal lag length of the variables is the main issue of the VAR model. If the lag length is too large, then there will be degrees of freedom that are unutilized, and this means that there is over-fitting for the model. On the contrary, if the lag length is too small, then this may induce autocorrelation errors. There are three main approaches through which the optimal lag length can be determined. The Akaike's information criterion (AIC), the Schwarz Bayesian Criterion (BIC), and the Hannah-Quinn Criterion (HQ). The model becomes better when the information criterion value gets lower.

After employing the three criterion, the optimal lag length is either the one that the three criterion recommended, or at least of two of them. In our case, the optimal lag length is 4 as both the AIC and the HQ criterion supported it.

Table (4): Optimal lag length using AIC, BIC, and HQ criteria

Selection-order criteria
Sample: 2007q4 - 2020q2 Number of obs = 51

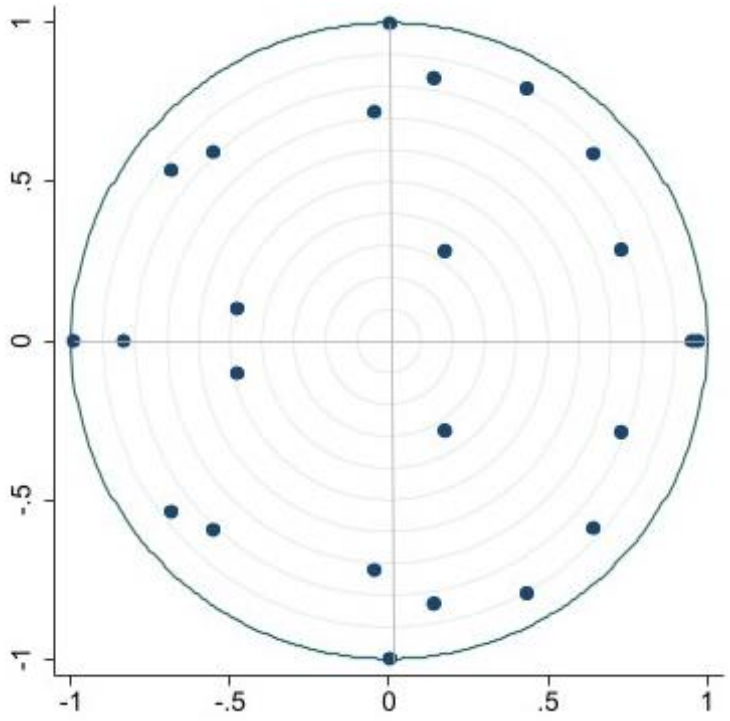
lag	LL	LR	df	p	FPE	AIC	HQIC	SBIC
0	-348.368				.043699	13.8968	13.9836	14.1241
1	-239.967	216.8	36	0.000	.002582	11.0575	11.6655	12.6485*
2	-193.821	92.293	36	0.000	.001839	10.6596	11.7887	13.6142
3	-141.326	104.99	36	0.000	.001127	10.0128	11.6629	14.331
4	-28.7122	225.23*	36	0.000	.000077*	7.00832*	9.17952*	12.6902

Endogenous: ddebttogdp d_logRGDP dcoreinf ddiscount logsubsidies logtax
Exogenous: _cons

Source: Stata Output Drawn by the Author using Central Bank of Egypt's Database.

After making sure that the variables are non-stationary, and that the VAR model was run with four number of lags, we have to ensure that the model satisfies the stability conditions. All modulus satisfied the stability conditions as the eigenvalues lie inside the unit circle and VAR satisfies stability condition as illustrated in figure (6); which explains that the impact of shocks on the variables are temporary.

Figure (6): Roots of the Comparison Matrix



Source: Stata Output Drawn by the Author using Central Bank of Egypt's Database.

Another procedure is needed to ensure the validity of the model to make sure it does not have autocorrelations using Lagrange multiplier test (see appendix 2). The null hypothesis in the test assumes that there is no autocorrelation at lag order. Seeing that the p-value is more than 5%, and the chi-square estimate is larger than 48.6 with 36 degrees of freedom, then we cannot reject the null hypothesis, and there is no autocorrelation at lag order of residuals.

The VAR model is estimated by OLS for each two variables separately, which incurs that the null hypothesis of the model is there is no relationship between economic growth, taxes, subsidies, inflation rates, discount rates as explanatory variables, and the debt-to-GDP as dependent variable.

5.6. Limitations

Some limitations of the thesis arise due to the unavailability of the quarterly data from the CBE that cover a longer time span, which may affect the significance of the model and the objective of the research. One way to mitigate this is by increasing the number of observations by obtaining a larger time frame.

Another limitation may arise owing to the nature of time series data limitations. Using time series may incorporate unseen variables that are not defined in the model which may affect external validity. However, checking for non-stationarity and autocorrelation attempted to overcome this limitation. In addition, collecting the data from the CBE unifies this dataset for all research and across all datasets; which supports representative reliability. This means that using this same dataset will produce consistent results over groups (Neuman & Lawrence W., 2006).

5.7. Ethical Considerations

The dataset is a publicly available dataset that combines aggregate macroeconomic data from the CBE. Thus, it does not require informed consent or anonymity.

6. Chapter VI: Econometric Results

The VAR output is a system of equations that is estimated by OLS (see appendix 1). Although VAR model have coefficients that are difficult to interpret as VAR model is characterized with its dynamic nature, some useful insights can be drawn from the results, and later on, supplementary tests related to VAR like impulse response analysis will explain more.

6.1. VAR Model Results

The VAR model contains more than one equation as it treats each endogenous variable separately and regresses it against other variables. According to Chi-square tests, the six variables used in the model are statistically significant, with R-squared above 75% at least; which means that at least 75% of the variability in the debt to GDP ratio is explained by the model.

We will be focusing on only the equation in which the VAR model depicts the relationship between the debt-to-GDP as a dependent variable, and other variables as exogenous variables. The hypothesis in each equation whether the explanatory variable does not affect the debt to GDP ratio at 5% significant level. From all the coefficients with their lagged values for the six variables, there were few coefficients that were significant. The first lag of real GDP is statistically significant at 5%, and it shows a positive relationship between economic growth and debt-to-GDP in the short run; this means that there is a statistically significant relationship between economic growth and debt-to-GDP ratio, keeping other factors constant. Also, the second lag of inflation rates is statistically significant at 5%; which means we reject null hypothesis and there is a positive relationship in the medium run between inflation rates and debt-to-GDP ratio, keeping other

factors constant. None of the lagged variables of discount rate showed a statistical significance. As for the government expenditures, the second lagged coefficient of subsidies showed a statistical significance at 5%; with positive relationship between government expenditures and public debt. This supports the notion that the more the government spends, the more it incurs deficits if there are no sufficient revenues to compensate for the expenditures in the medium run. On the contrary, government revenues exhibited in taxes show a statistical negative relationship at 5%; which means we reject the null hypothesis and there is a statistically significant negative relationship between taxes and debt-to-GDP, keeping other factors constant. Meaning that, when government revenues increase, it becomes more able to fund its deficit and lower debt accumulations.

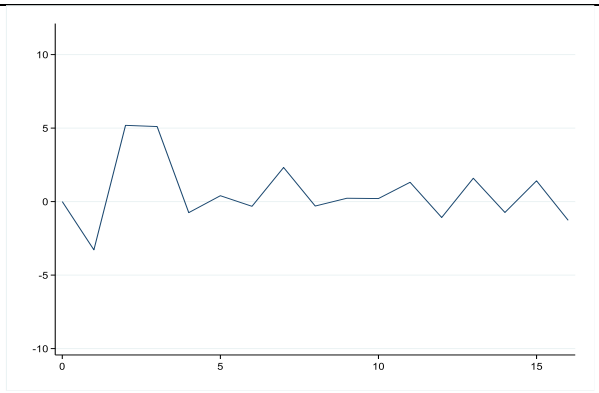
The insignificance of the individual coefficients is not surprising as the VAR model contains cross equation feedbacks (Sims, 1980) and the existence of elasticities between endogenous variables. Due to the insignificance, it is helpful to perform additional tests such as impulse response analysis.

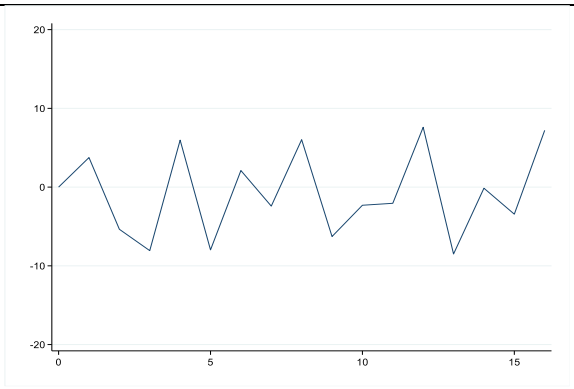
6.2. Impulse Response Analysis

This test shows the impact of shocks that occur to macroeconomic variables represented in the fiscal and monetary policy and their effect on public debt. It is usually represented by a positive shock which is the effect of an increase in an explanatory variable on the dependent variable. As the main interest of this thesis is to analyze the effect of a shock in different fiscal policies such as taxes and subsidies, and the effect of a shock in monetary policies such as discount rate and inflation rate, on public debt. The following figure (6) shows the effect of a positive shock from each variable on public debt referred to as debt-to-GDP.

Figure (6): Impulse Response Function

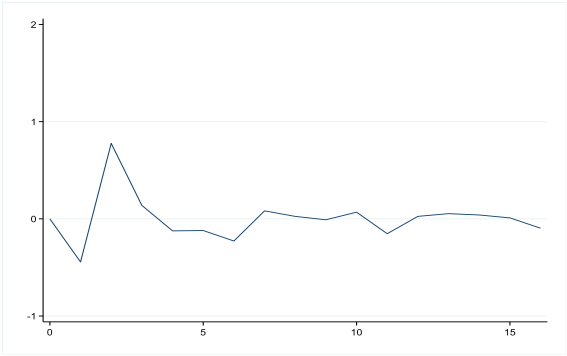
Response of debttogdp to a +ve shock in logsubsidies	Response of debttogdp to a +ve shock in logtaxes

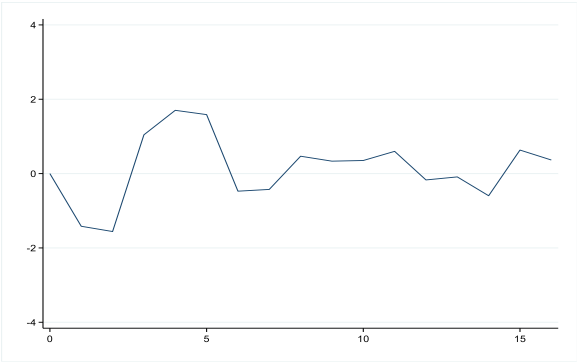




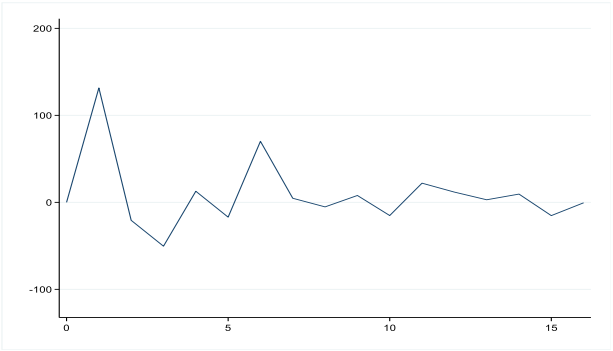
Response of debttogdp to a +ve shock in inflation

Response of debttogdp to a +ve shock in discount rates





Response of debttogdp to a +ve shock in GDP



Source: Stata Output Drawn by the Author using Central Bank of Egypt's Database

Subsidies

Subsidies, to start with, is one indicator for the government expenditure and fiscal regime in the country. It is clear that a positive shock in government subsidies is met by an instant decrease in public debt, but a fluctuating increase in debt-to-gdp ratio on the long run. The instant decrease could be explained by advocates of counter-cyclical policies; in times of recession, it is better to

spend more on the economy to reduce fiscal deficit and consequently debt. However, on the long run, this can have an adverse effect on debt (Alesina and Tabellini, 2005; IMF, 2009; IMF, 2010). One reason behind this is when a government increase its expenditures as a part of an expansionary policy; this might lead to higher debt, as expenditures can be higher than revenues creating a fiscal deficit (Schwartz and Clements, 1999).

Taxes

As for taxes, as an indicator for government revenues, the first response is a decrease in the debt to GDP ratio; this is also explained by counter-cyclical policies. When the government increase taxes in times of recession, government revenues increase, and consequently, the fiscal deficit is expected to decrease and the debt as well (Alesina and Tabellini, 2005; IMF, 2009; IMF, 2010).

Inflation Rates

From the monetary side perspective, a positive shock in inflation rates increases the debt to GDP ratio within the first three quarters, which supports the VAR results. After that, it shows a negative effect; an increase in inflation negatively affects debt to GDP ratio. One explanation behind the positive relationship if GOE decided to finance debt through an increase in the money supply; this would lead to an increase in inflation rates. Moreover, the positive relationship means the GOE will have to pay for expenditures in more expensive sense, and this would impose financial demands on the GOE (Fahmy and Hashem, 2019; Tanzi, 1991). The negative relationship on the long run occurs to the loss in real value of the currency in the long run when there is inflation. Thus, countries which suffer from very high inflation rates, are able to debt because their currency worth less (Fukunaga et al, 2020). However, higher inflation rates alone will not help reduce the public debt as it should be accompanied by sustained economic growth and efficient use of resources (Fukunaga et al, 2020).

Discount Rates

Meanwhile, a positive shock in discount rates leads to higher debt to GDP ratio because discount rates exhibit an increase in the cost of debt service. As the cost of debt financing increases, the government debt increases, especially in the long run as per the literature (Borensztein, 1989; Augustine, 2019; Barro, 1990).

Economic Growth

Last but not least, a positive shock in real GDP has caused an increase in the debt. This is consistent with the upward trend of GDP and debt exhibited in the descriptive statistics. This aligns with the GOE generating revenue from borrowing sources and not from domestic sources (Fahmy and Hashem, 2019), which is also known as hot money (Salem, 2022). Therefore, higher economic growth in the Egyptian economy is usually accompanied by higher debt rates.

6.3. Discussion

The results of the impulse response shocks support the literature in several ways. First, when a positive increase occurs to the subsidies, this is reflected in higher debt-to- GDP ratio. Although the effect of increasing government expenditure can help the economy recover from a financial crisis (Baldacci et al, 2012), monitory debt ratios before injecting government expenditures in the economy is necessary as it may cause adverse effects (Alastrash and Nurmukhametov, 2021). The findings of the effect of a positive shock in subsidies on public debt in Egypt show some recovery in the short run, but in the long run, it causes adverse effects. Taxes' increase do not reflects concrete effect on the debt-to-GDP ratio, unlike the literature clear stance on the negative effect of taxes on public debt (Alesina and Tabellini, 2005; Menguy, 2020). Reflecting this on Egypt's statistics (see section 3.2), it is clear that lowering subsidies and increasing taxes has contributed to lowering expenditures, and increasing revenues, but the debt situation has not improved.

As for the monetary tools, both of them show a positive relationship with the debt-to-GDP ratio in the long run, but a negative relationship in the short run. As for inflation rates, the long run result does not fully align with the literature as Nguyen (2015) and Akitoby et al. (2014) both conclude that higher inflation rates could reduce public debt with no specification of timing. As for discount rates, an increase in discount rate is positively related with debt-to-GDP ratio. This corresponds with Borensztein, (1989) and Augustine (2019) as both papers explain that higher interest rates lower domestic spending and lead to depreciation of the Egyptian pound; which in return increases external debt in emerging economies.

As the effect of economic growth on public debt have not been widely discussed, Fahmy and Hashem (2019) assess the direction of this relationship in Egypt. It is seen that the results of an increase in economic growth leads to an increase in public debt. This is similar to Fahmy and

Hashem's finding. As previously stated, this is due to the reliance of the GOE on foreign revenues to enhance economic growth and not on real value added from domestic resources. Hence, whenever the economic growth is improved, it is accompanied by higher public debt.

7. Chapter VII: Conclusion

The continuous rise in accumulation of debt accompanied with a continuous devaluation of the Egyptian pound and inflationary challenges in Egypt (IMF, 2023; CBE, 2023), have left the GOE with critical monetary and fiscal decisions in a time of global turbulence. In addition, Egypt's political economy during the past four presidential eras have had different economic policies, yet the accumulation of debt has kept on increasing. Hence, analyzing the effect of GOE's fiscal and monetary policies on the level of debt has become essential for policy makers to be able to formulate sound and effective policies to rescue the GOE from falling in a debt trap.

Therefore, the thesis examines the effect of monetary policies and fiscal policies on public debt in Egypt during the period from 2006 until 2021. Monetary and fiscal policy tools have been used as explanatory variables, with the debt-to-GDP ratio as a dependent variable. Fiscal policy tools are illustrated in subsidies and taxes as indicators for government expenditures and revenues respectively. Monetary policy tools are illustrated in inflation rates and discount rates. Discount rates were used as proxy for interest rates (Korayem, 1997). Exchange rates was dropped from the model due to its autocorrelation effect.

The paper relied on quantitative methodology using a VAR model with an extended test of Impulse Response Function to be able to stand on measurable understanding for the relationship between the aforementioned explanatory variables and independent variable. Generally, the findings suggest that a positive effect of economic growth, subsidies, inflation rates and discount rates on public debt. However, the results suggest a negative effect of taxes on public debt.

The results may differ in the long run from the short run. In specific, a positive shock in government expenditures initially decreases public debt but leads to a fluctuating increase in the debt-to-GDP ratio in the long run. Tax increases initially reduce the debt to GDP ratio, but it continues to fluctuate, possibly due to other macroeconomic factors. A positive shock in inflation rates increases the debt to GDP ratio initially but shows a negative effect in the longer term. Additionally, a positive shock in discount rates leads to a higher debt to GDP ratio in the long run

due to higher cost of debt service. As per the conceptual framework and the findings, the interactions between fiscal and monetary policies are quite complex and interrelated, and require policy makers to consider their effect on the long and short run.

It is apparent from the results of the data that the fiscal and monetary policies conducted by the GOE has not reduced public debt. Although the perception of Egypt's creditworthiness was improved due to the 2016 IMF programme and it allowed the GOE to get rid of domestic debt to foreign lenders, the approach by which the GOE implemented this did not help the macroeconomic situation in Egypt. The reason behind this is relying on short-term debt, or what is known as hot money, to get access to vital inflows of dollars that further increased external debt rather than causing real value added or real output in the Egyptian economy. In addition, the shifts in international markets caused huge risks to Egypt's financial crisis, as there were a lot of capital flight along with the pressure of foreign lenders bailing the domestic debt. All of this led to Egypt recently to resort to the IMF for the third time in its history.

Further research is necessary to compare consolidated government expenditures and consolidated government revenues that reflect fiscal and monetary policy from an aggregate perspective and their effect on debt to GDP ratio. Lastly, exchange rates' effect on public debt in Egypt is necessary to be investigated in future research. The limitations of the thesis reside in the unavailability of a larger time frame, and hence more observations and higher significance. Also, the usage of time-series data may include unseen effects in the model which may affect the results of it. Lastly, the dataset is a publicly available dataset that does not require informed consent or anonymity.

8. Chapter VIII: Policy Recommendations

It is not impossible to change the direction of the economy that is facing economic challenges, to a direction that is more liberalized and growing. In order to implement this, it is necessary to have policies that are adequate with the economic situation in the country. The appropriate and prudent usage of policies can play a crucial role in stabilizing and adjusting the economy.

The findings draw some useful policy implications regarding debt finance and enhancing economic growth, diverged into three main aspects: Monetary policies, fiscal policies, and institutional policies.

Monetary Policies

The CBE should carefully consider the implications of discount rates on government debt and formulate policies that balance economic stimulation with long-term debt sustainability. In general, lowering interest rates may be a productive solution for a sustained growth rate.

As for controlling inflation, it is recommended that the CBE continue inflation targeting at 7% by 2024 and 5% by 2026 to minimize and limit the negative impact of inflation rates on debt to GDP ratio. In addition, preventing macroeconomic volatility while maintaining price stability. The CBE should also fully devaluate the Egyptian pound. This means that the CBE should shift its monetary policy framework from targeting the exchange rate into targeting the inflation rate. The devaluation of the Egyptian pound lowers Egypt's liability on exchange rate effects. Hence, it will allow the GOE to control foreign reserves pressure and eliminate the parallel black market. It will also reduce borrowing from external sources of finance, which consequently, will reduce debt to GDP ratio.

Moreover, the GOE ought to encourage private sector participation in the economy, and to avoid crowding out the private sector in major industries. This means that fiscal stimulus packages that the government spends should be directly projected to private investments (Khan and Miller, 2016). This will help foreign investors gain trust in the Egyptian economy paving the way for foreign currency inflows in the domestic financial market in an attempt to lower external debt, and thus, lower the debt to GDP ratio.

Fiscal Policies

The GOE should rely on tax revenues from progressive sources. In one way, the public debt will have higher base of revenues, and in another way, the most vulnerable Egyptians will not get harmed. Those sources could be driven from progressive income and corporate taxes, and capital gains. However, while increasing taxes, the GOE should carefully study its effect on the economic growth on the long run while implementing a contractionary fiscal policy; as tax increases may lower debt-to-GDP ratio, but its effect shall appear in the long run.

The GOE should curb expenditures on subsidies as a positive shock in it creates a long-term increase in the debt. This indicates that it is the most influential key point upon which policy makers can formulate effective policies. Indeed, the GOE has been decreasing the spending of

subsidies as a share of government expenditures. However, this decrease must be accompanied by an overall decrease in the government expenditures, not solely on subsidies.

There must be institutional reforms that advocate for fiscal transparency and explains the solid reason behind government debt. This requires the Ministry of Planning and Economic Development in Egypt to have an accurate and transparent database upon which it can formulate its fiscal policies. The Ministry of Finance in Egypt should adjust the budget allocation towards more rationalized budgetary choices. This requires strengthening of institutional and structural factors that cooperate on limiting the size of budget deficits and safeguarding price stability.

To sum up, the fiscal consolidation, or fiscal austerity/ contractionary measures should continue to happen whilst enhancing major economic activities. This shall help decrease the debt-to-GDP without affecting economic growth (Al Nashar, 2019).

9. List of References

Abdel-Baki, M. (2010) "The effects of bank reforms on the monetary transmission mechanism in emerging market economies: evidence from Egypt". African Development Review, Vol. 22(4), 526-539.

Abdel-Haleim, S. (2016) Coordination of Monetary and Fiscal Policies: The Case of Egypt. International. Review of Research in Emerging Markets and the Global Economy (IRREM), 2 (4), 933-954.

Abdel-Khalek, Gouda. 2000. "Domestic Public Debt Accumulation in Egypt: Magnitude, Structure and Consequences". In Abdel-Khalek, Gouda and Karima Korayem (eds.) Fiscal Policy Measures in Egypt: Public Debt and Food Subsidy. Cairo Papers in Social Science, Volume 23, Number 1, Cairo: AUC Press

Abed G. (2020), The Egyptian Economy: In the Clutches of the Deep State, Carnegie Middle East Center.

ADLY, A. I. A. (2011). When Cheap is Costly: Rent Decline, Regime Survival and State Reform in Mubarak's Egypt (1990—2009). *Middle Eastern Studies*, *47*(2), 295–313. http://www.jstor.org/stable/23054299

African Development Bank (1999), Arab Republic of Egypt Structural Adjustment Loan 1991-1994 Project Completion Report 1999-2001.

African Development Bank (2009), Egypt Private Sector Country Profile.

Aiyagari, R., A. Marcet, T. J. Sargent, and J. Seppala. (2002). Optimal Taxation without State Contingent Debt. Journal of Political Economy, 11(6), 1220-1254.

Akitoby, M. B., Komatsuzaki, M. T., and Binder, M. A. J. (2014). Inflation and public debt reversals in the G7 Countries (IMF Working Paper 14/96). Washington D.C.: International Monetary Fund.

Alatrash and Nurmukhametov (2021), Fiscal Policy Effectiveness under Different Debt Regime: The Case of Egypt. The Economic Research Forum.

Alba P., et al. (2004). Fiscal and Public Debt Sustainability In Egypt, Social and Economic Development Group Middle East And North Africa Region, Working Paper Series, No. 38.

Al-Mashat, R. A., & Billmeier, A. (2007). The Monetary Transmission Mechanism in Egypt, *IMF Working Papers*, *2007*(285), A001. Retrieved Dec 24, 2023, from https://doi.org/10.5089/9781451868487.001.A001

Al-Mashat, R. (2011). The Evolution of Monetary Policy in Egypt and Steps towards Inflation Targeting. In M. Boughzala, and D. Cobham, Inflation Targeting in MENA Countries. Ltondon: Palgrave Macmillan.

Al Nashar (2019), What are the Driver's of Egypt's Economic Debt? Economic Research Forum, Working Paper no. 1376.

Al-Shawarby S., El Mossallamy M. (2019). Monetary-fiscal policies interactions and optimal rules in Egypt. Review of Economics and Political Science, 4(2), 138-157. DOI 10.1108/REPS-03-2019-0033.

Alesina A., Favero C., Giavazzi F. (2018) Climbing Out of Debt, International Monetary Fund. https://www.imf.org/en/Publications/fandd/issues/2018/03/alesina

Awad, I.L. (2011). "The impact of recent innovations in monetary policy on the monetary transmission mechanism in Egypt". Economic Studies, Vol. 4, pp. 186-212.

Ayubi, N. N. (1992). POLITICAL CORRELATES OF PRIVATIZATION PROGRAMS IN THE MIDDLE EAST. *Arab Studies Quarterly*, *14*(2/3), 39–56. http://www.jstor.org/stable/41858017

Ball et al. (2021), Measuring U.S. Core Inflation: The Stress Test of COVID-19, International Monetary Fund.

Baldacci, E., S. Gupta, and C. Mulas-Granados, (2012) "Reassessing the Fiscal Mix for Successful Debt Reduction," Economic Policy, Vol. 71, pp. 365–406.

Barro, R. J. (1974). Are Government Bonds Net Wealth? Journal of Political Economy, 82(6), 1095–1117.

Barro, R. J. (1989). The Ricardian Approach to Budget Deficits. Journal of Economic Perspectives, 3(2), 37-54. doi:10.1257/jep.3.2.37.

Barro, R. J. (1990). Government spending in a simple model of endogenous growth. Journal of Political Economy, 98 (5, Part 2), S103-S125. doi:10.1086/261726

Bernanke, B. (2004). The Great Moderation. Remarks at the meetings of the Eastern Economic Association, February. https://www.federalreserve.gov/boarddocs/speeches/2004/20040220

Belghuith O. S. and Omrane H. (2017) Macroeconomic Determinants of Public Debt Growth: A Case Study for Tunisia, Theoretical and Applied Economics. Volume XXIV (2017), No. 4(613), Winter, pp. 161-168

Bianchi, F., and Ilut, C. (2017). Monetary/Fiscal policy mix and agents' beliefs. Review of Economic Dynamics, 113-139.

Blanchard O. (2017) Macroeconomics, Global Edition, 7th edition, Pearson ISBN-13: 9781292160627.

Blanchard, O. (2017). Macroeconomics, Global Edition (7th ed.). Pearson. ISBN-13: 9781292160627.

Blessy Augustine, 2019. "Impact of exchange rate depreciation on external indebtedness: Evidence from a sample of emerging economies," Proceedings of International Academic Conferences 9711810, International Institute of Social and Economic Sciences.

Bordo, M. D., and Levy, M. D. (2020). Do Enlarged Fiscal Deficits Cause Inflation: The Historical Record. NBER Working Paper.

Borensztein E. (1989) The Effect of External Debt on Investment, Finance and Development, the International Monetary Fund.

Casares (2015) A relationship between external public debt and economic growth, Estudios Economicos, vol.30 no.2

Checherita-Westphal, C., and Rother, P. (2011). The Impact of Government Debt on Growth: An Empirical Investigation for the Euro Area. Revue économique, 62(6), 1015-1029. https://www.jstor.org/stable/41307971.

Chadha, Jagjit & Turner, Philip & Zampolli, Fabrizio. (2013). The ties that bind: Monetary policy and government debt management. Oxford Review of Economic Policy. 29. 548-581. 10.1093/oxrep/grt030.

Chaudhary, M. A., Ahmad, N., and Siddiqui, R. (1995). Money Supply, Deficit, and Inflation in Pakistan. The Pakistan Development Review, 34(4), 945-956. Retrieved from https://www.jstor.org/stable/41259914.

Cifuentes-Faura, J., & Simionescu, M. (2023). Analyzing the Importance of the Determinants of Public Debt and Its Policy Implications: A Survey of Literature. Public Finance Review, 0(0). https://doi.org/10.1177/10911421231215019

Clements B., Rodirguez H, Schwartz G. (1998) Economic Determinants of Government Subsidies, Fiscal Affairs Department, International Monetary Fund.

Colombo M. (2023), Trading Short-term Gains for Long-term Costs: the Egyptian Political Economy Under Al-Sisi, CRU Policy Brief, *Netherlands Institute of International Relations.*

Croce, E. (2002). "9 Assessment of the Fiscal Balance". In Macroeconomic Management. USA: International Monetary Fund. Retrieved Dec 4, 2023, from https://doi.org/10.5089/9781589060944.071.ch009

Davig, T., and Leeper, E. (2009). Monetary-Fiscal Policy Interactions and Fiscal Stimulus. NBER Working Paper Series.

De Soyres, C., Kawai, R., and Wang, M. (2022). Public Debt and Real GDP: Revisiting the Impact., IMF Working Paper WP/22/76, Washington DC: International Monetary Fund.

Dixit, A., & Lambertini, L. (2003). Interactions of Commitment and Discretion in Monetary and Fiscal Policies. The American Economic Review, 93(5), 1522–1542. http://www.jstor.org/stable/3132140

Ekouala U. M. (2022), The Role of Socio-political Factors in Public Debt Accumulation: Evidence from CEMAC Countries, *International Studies of Economics*

Evans, P. (1985). Do Large Deficits Produce High Interest Rates? American Economic Review, 75(1), 68-87

Fahmy H., Hashem H. (2019). Sensitivity of public debt to macroeconomic shocks: An application to the Egyptian economy. Business and Economic Horizons, 241. https://www.ceeol.com/search/article-detail?id=889064.

Fisher, I. (1930). The Theory of Interest: As Determined by Impatience to Spend Income and Opportunity to Invest It. New York, NY: The Macmillan Company

Fukunaga I. et al (2020), Inflation and Public Debt Reversals in Advanced Economies, World Bank Group, Policy Research Working Paper 9129.

Gamal El Nazer, The Legal Framework of Foreign Investment in Egypt, 11 Case W. Res. J. Int'l L. 613 (1979) Available at: https://scholarlycommons.law.case.edu/jil/vol11/iss3/6

Galí, J., D. López-Salido, and J. Vallés, 2007, "Understanding the Effects of Government Spending on Consumption," Journal of the European Economic Association, Vol. 5, No. 1, pp. 227–70.

Ghosh, A., and Ghosh, C. (2003). Subsidy, Fiscal Deficit and Inflation in Developing Countries. Indian Economic Review, 38(1), 21-57. https://www.jstor.org/stable/29793776.

Gros, D. (2013). Foreign debt versus domestic debt in the euro area. Oxford Review of Economic Policy, 29(3), 502-517. Retrieved from https://www.jstor.org/stable/23607156.

Hamed, O. (1981). Egypt's Open Door Economic Policy: An Attempt at Economic Integration in the Middle East. *International Journal of Middle East Studies*, *13*(1), 1–9. http://www.jstor.org/stable/163283

Hilscher, J., Raviv, A., and Reis, R. (2014). Inflating away the public debt? An empirical assessment (NBER Working Paper w20339). National Bureau of Economic Research.

Hinnebusch, R. A. (1981). Egypt under Sadat: Elites, Power Structure, and Political Change in a Post-Populist State. *Social Problems*, *28*(4), 442–464. https://doi.org/10.2307/800057

Ibrahim S. and Lofgren H. (1995) Successful Adjustment and Declining Governance? The Case of Egypt, The World Bank, Private Sector Development Department.

Ikram K. (2006). The Egyptian Economy, 1952–2000: Performance, policies, and issues (Chapters 1 and 2). Routledge studies in Middle Eastern economies.

IMF (2009) “From Recession to Recovery: How Soon and How Strong?” in World Economic Outlook, April (Washington: International Monetary Fund).2009b, “Recessions and Recoveries in Asia, What Can the Past Teach Us about the Present Recession?” Asia and Pacific Regional Outlook, April (Washington: International Monetary Fund).

IMF (2010), From Stimulus to Consolidation: Revenue and Expenditure Policies in Advanced and Emerging Economies (Washington: International Monetary Fund).

IMF (2015). IMF Country Report No. 15/33. Retrieved from URL: http://www.imf.org/external/pubs/ft/scr/2015/cr1533.pdf.

IMF (2016). IMF Executive Board Approves US$12 billion Extended Arrangement Under the Extended Fund Facility for Egypt. Press release no.15 501. Available through URL: https://www.imf.org/en/News/Articles/2016/11/11/PR16501-Egypt-Executive-Board-Approves-12-billion-Extended-Arrangement.

IMF (2016), A Chance for Change: IMF Agreement to Help Bring Egypt's Economy to Its Full Potential, IMF country focus, retrieved from URL: https://www.imf.org/en/News/Articles/2016/11/11/NA111116-A-Chance-For-Change-Egypt

IMF (2017), Arab Republic of Egypt: First Review Under the Extended Arrangement under the Extended Fund Facility and Request for Waivers for Nonobservance and Applicability of Performance Criteria.

IMF (2017), Arab Republic of Egypt: Article IV Consultation, Second Review Under the Extended Arrangement under the Extended Fund Facility and Request for Waivers for Nonobservance and Applicability of Performance Criteria.

IMF (2018), Arab Republic of Egypt: Review Under the Extended Arrangement under the Extended Fund Facility and Request for Modification of Performance Criterion.

IMF (2022), Debt Dynamics, Crisis upon Crisis, IMF Annual Report 2022.

IMF (2023), Request For Extended Arrangement under The Extended Fund Facility, Country report No. 23/2

IMF on Monetary Policy and Exchange Rates, retrieved from URL: https://www.imf.org/en/About/Factsheets/Sheets/2023/monetary-policy-and-central-banking#:~:text=A%20country's%20monetary%20policy%20is,with%20a%20flexible%20exchange%20rate.

Jacobs, J. P. A. M., Ogawa, K., Sterken, E., & Tokutsu, I. (2020). Public Debt, Economic Growth and the Real Interest Rate: A Panel VAR Approach to EU and OECD Countries. Applied Economics, 52(12), 1377- 1394. https://doi.org/10.1080/00036846.2019.1673301

Jbili A. and Kramarenko V. (2003) Should MENA Countries Float or Peg? International Monetary Fund, Vol. 40, Number 1.

Johnson (2001) Key Issues for Analyzing Domestic Debt Sustainability, *Debt Relief International Ltd.*

Kaldas T. (2022), Egypt's Next IMF Loan: How to Avoid the Failures of the Past Six Years. The Tahrir Institute for Middle East Policy, retrieved from URL: https://timep.org/2022/06/07/egypts-next-imf-loan-how-to-avoid-the-failures-of-the-past-six-years/

Kaminski, Graciela, Carmen Reinhart, and Carlos Vegh (2004) "When it Rains it Pours: Procyclical Capital Flows and Macroeconomic Policies" in Mark Gertler and Kenneth Rogoff (eds) NBER Macroeconomic Annual 2004, Cambridge, MA: MIT Press.

Kassab D. (2022). Switching Monetary-Fiscal Regimes in Egypt: Is the Fiscal Stimulus necessarily good in bad times? Economic Research Forum, 28th annual conference paper. Available through URL: https://erf.org.eg/publications/switching-monetary-fiscal-regimes-in-egypt-is-the-fiscal-stimulus-necessarily-good-in-bad-times/.

Kerbœuf, A. (2012), 'The Cairo Fire of 26 January 1952 and the Interpretations of History', in Arthur Goldschmidt, and Amy J. Johnson (eds), *Re-Envisioning Egypt 1919-1952* (Cairo, 2005; online edn, Cairo Scholarship Online https://doi.org/10.5743/cairo/9789774249006.003.0008

Khan M., Miller E. (2016) The Economic Decline of Egypt after the 2011 Uprising. Atlantic Council, Retrieved from URL: https://www.atlanticcouncil.org/in-depth-research-reports/report/the-economic-decline-of-egypt-after-the-2011-uprising-2/

Korayem K. (1997) Egypt's Economic Reform and Structural Adjustment (ERSAP). Working Paper No. 19, October 1997, The Egyptian Center for Economic Studies (ECES).

Koussa, Z. (2023). Revolution, Change, and Democratic Transition in Egypt Since 2011: A Critical Political Economy Approach. *Contemporary Review of the Middle East*, *10*(2), 165-187. https://doi.org/10.1177/23477989231154359

Krugman P. (1988) Financing vs. forgiving a debt overhang, Journal of Development Economics, Volume 29, Issue 3, 1988, Pages 253-268, ISSN 0304-3878, https://doi.org/10.1016/0304-3878(88)90044-2.

Kwon, G., McFarlane, L., & Robinson, W. (2009). Public Debt, Money Supply, and Inflation: A Cross-Country Study, *IMF Staff Papers*, *2009*(003), A002. Retrieved Dec 11, 2023, from https://doi.org/10.5089/9781589068209.024.A002

Mabrouk A.F., Hassan S.M. (2012) Evolution of Monetary Policy in Egypt: A Critical Review, The International Journal of Social Sciences, Vol 4. No.1.

Mahmood, T., and Rauf, S. A. (2008). The profile of debt structure: Monetary and fiscal policies: A case of Pakistan (1971-2007). Pakistan Economic and Social Review, 46(2), 201-234. Published by the Department of Economics, University of the Punjab. Retrieved from https://www.jstor.org/stable/25825335.

Mansour T. (2011) Egypt Financial Crisis, Munich Personal RePEc Archive, Faculty of Economics and Political Science, Cairo University.

Maurya, P.K., Bansal, R. and Mishra, A.K. (2023), "Russia–Ukraine conflict and its impact on global inflation: an event study-based approach", Journal of Economic Studies, Vol. 50 No. 8, pp. 1824-1846. https://doi.org/10.1108/JES-01-2023-0003

Megahed, K., & Ghannam, O. (2022). The Rocket in the Haystack: Between Nasser's Developmental Vision and the Neo-Imperialist Mission. *Africa Development / Afrique et Développement*, *47*(1), 59–104. https://www.jstor.org/stable/48645754

Menguy, S. (2020). Tax Competition, Fiscal Policy, and Public Debt Levels in a Monetary Union. Journal of Economic Integration, 35(3), 353-395.* Published by Center for Economic Integration, Sejong University. Retrieved from https://www.jstor.org/stable/10.2307/26927871.

Mohieldin, M, and S Nasr (2003) 'On Bank Privatization in Egypt', ERF Working Paper No. 325.

Morganti P. (2022), Private and Public Debt: Some Implications on Economic Growth, SUERF Policy Brief, No 286

Mountford, A., and Uhlig, H. (2009). What are the effects of fiscal policy shocks? Journal Of Applied Econometrics, 960-992.

Musa, K.; Sohag, K.; Said, J.; Ghapar, F.; Ali, N. Public Debt, Governance, and Growth in Developing Countries: An Application of Quantile via Moments. Mathematics 2023, 11, 650. https://doi.org/10.3390/math11030650

Nasir, M. A., Nugroho, A. D., and Lakner, Z. (2022). Impact of the Russian–Ukrainian Conflict on Global Food Crops. Foods, 11(19), 2979. https://doi.org/10.3390/foods11192979

Nguyen, B. V. (2015). The relationship between public debt and inflation in developing countries: empirical evidence based on difference panel GMM. Asian Journal of Empirical Research, 5(9), 102-116.

Neuman, Lawrence W. 2006. Social Research Methods, Qualitative and Quantitative Approaches. Seventh Edition. Pearson International Edition

Obstfeld, M., Alesina, A., and Cooper, R. (1997). Europe's Gamble. Brookings Papers on Economic Activity, Vol. 1997, No. 2, pp. 241-317.

Ocampo, J.A. (2005). A Broad View of Macroeconomic Stability. United Nations, Department of Economic and Social Affairs (DESA), Working Paper No. 1, October.

Ofori-Abebrese, G., & Pickson, R. B. (2018). Ricardian Equivalence Hypothesis in the Sub-Sahara African Countries. *Journal of Economic Integration*, *33*(3), 466–487. http://www.jstor.org/stable/26484508

Posusney M. (1991) Economic Impact of the Crisis in Egypt, Middle East Research and Information Project: *Critical Coverage of the Middle East Since 1971*

Rana A., Khanna A. (2020) Learning from Power Sector Reform, the Case of the Arab Republic of Egypt. World Bank Group, Energy and Extractives Global Practice.

Richards A. (1980) Egypt's Agriculture in Trouble, Turkish Politics and Class Struggle, Middle East Research and Information Project, no. 84/ January 1980

Sağdiç E. N. and Yildiz F. (2020) Factors Affecting External Debt in Transition Economies: The Case of Central Asia And The Caucasus, International Journal of Management Economics and Business, Vol. 16, No. 4, 2020.

Salem M. (2022) Egypt's Infinite Economic Crisis. The Tahrir Institute for Middle East Policy, retrieved from URL: https://timep.org/2022/12/13/egypts-infinite-economic-crisis/

Schwartz, G., Hugounenq, R., & Clements, B. J. (1995). Government Subsidies, IMF Working Papers, 1995(091), A001. https://doi.org/10.5089/9781451851489.001.A001

Schwartz, G., and Clements, B. (1999). Government Subsidies. Journal of Economic Surveys, 13, 119-148. https://doi.org/10.1111/1467-6419.00079.

Sellon G. H. (1980) The Role of the Discount Rate on Monetary Policy: A Theoretical Analysis. *Economic Review*.

Stock, J. H. and Watson, M. W. (2001): Vector Autoregressions; Journal of Economic Perspectives, Volume 15, Number 4; Fall 2001, pp. 101 - 115.

Stork J. (1982), Egypt's Debt Problem, Middle East Research and Information Project: *Critical Coverage of the Middle East Since 1971*.

Stupak J. M. (2019) Fiscal Policy: Economic Effects, Congressional Research Service, https://crsreports.congress.gov/

Tanzi V., Zee H. (2001) Tax Policy for Developing Countries. International Monetary Fund. Economic Issues NO. 27. https://www.imf.org/external/pubs/ft/issues/issues27/

Tanzi V., Lutz M. (1991) Interest Rates and Government Debt, *the International Monetary Fund.*

Tanzi, V. (1991). "9 Effects of Inflation on Measurement of Fiscal Deficits: Conventional Versus Operational Measures". In How to Measure the Fiscal Deficit. USA: International Monetary Fund. Retrieved Feb 2, 2024, from https://doi.org/10.5089/9781557751928.071.ch009

The Central Bank of Egypt on the External Position of the Egyptian Economy (July/March – 2022/2023)

The Central Bank of Egypt (2021), Economic Outlook - Monetary Policy Report, retrieved from URL: https://www.cbe.org.eg/en/monetary-policy/cbe-economic-outlook

Torrey, G. H. (1965). Nasser's Egypt. *Current History*, *48*(285), 290–308. http://www.jstor.org/stable/45311298

Van Aarie, B., Garretsen, H., and Gobbin, N. (2003). Monetary and fiscal policy transmission in the Euro-area: evidence from a structural VAR analysis. Journal of Economics and Business, Vol. 55, 609-638.

Yared, P. (2019). Rising Government Debt. The Journal of Economic Perspectives, 33(2), 115-140. https://www.jstor.org/stable/10.2307/26621242.

Appendix (1): VAR output

```
Vector autoregression

Sample:  2007q4 - 2020q2                        Number of obs      =        51
Log likelihood =  -28.71224                     AIC                =  7.008323
FPE            =   .0000775                     HQIC               =  9.179522
Det(Sigma_ml)  =   1.24e-07                     SBIC               =  12.69016

Equation              Parms      RMSE     R-sq      chi2     P>chi2
------------------------------------------------------------------
ddebttogdp               25   4.93172   0.7959   198.8518   0.0000
d_logRGDP                25   .028654   0.9116   525.8214   0.0000
dcoreinf                 25   2.41769   0.7855   186.7236   0.0000
ddiscount                25   .836302   0.6540   96.38586   0.0000
logsubsidies             25   .278172   0.9544   1066.496   0.0000
logtax                   25   .122517   0.9897   4884.488   0.0000
------------------------------------------------------------------

------------------------------------------------------------------------------
             |      Coef.   Std. Err.      z    P>|z|     [95% Conf. Interval]
-------------+----------------------------------------------------------------
ddebttogdp   |
  ddebttogdp |
         L1. |   .5795935    .218025     2.66   0.008     .1522723    1.006915
         L2. |   .1470181   .2400637     0.61   0.540     -.323498    .6175342
         L3. |  -.4259752    .271596    -1.57   0.117    -.9582937    .1063433
         L4. |   .3991648   .2705852     1.48   0.140    -.1311724     .929502
             |
   d_logRGDP |
         L1. |   131.5576   37.20775     3.54   0.000     58.63177    204.4835
         L2. |   14.72267   39.68467     0.37   0.711    -63.05786    92.50319
         L3. |  -49.20767   38.04981    -1.29   0.196    -123.7839    25.36859
         L4. |   54.22934   38.42816     1.41   0.158    -21.08846    129.5471
             |
    dcoreinf |
         L1. |  -.4438439   .2521925    -1.76   0.078    -.9381321    .0504443
         L2. |   .7626033   .2661981     2.86   0.004     .2408646    1.284342
         L3. |   .0089109   .2525454     0.04   0.972     -.486069    .5038907
         L4. |  -.0309231   .2168509    -0.14   0.887    -.4559431     .394097
             |
   ddiscount |
         L1. |  -1.416698   1.024301    -1.38   0.167    -3.424291    .5908956
         L2. |  -.5240837   1.081047    -0.48   0.628    -2.642897     1.59473
         L3. |  -.4204002   1.135282    -0.37   0.711    -2.645511    1.804711
         L4. |   .2471987   1.025808     0.24   0.810    -1.763347    2.257745
             |
logsubsidies |
         L1. |  -3.282933   3.195362    -1.03   0.304    -9.545729    2.979862
         L2. |   7.573098   3.221381     2.35   0.019     1.259307    13.88689
         L3. |   2.328502   3.306221     0.70   0.481    -4.151572    8.808576
         L4. |  -1.135974   3.061372    -0.37   0.711    -7.136153    4.864205
             |
      logtax |
         L1. |   3.751074   5.232345     0.72   0.473    -6.504134    14.00628
         L2. |  -14.68838   5.239973    -2.80   0.005    -24.95854   -4.418218
         L3. |  -3.185867   5.379369    -0.59   0.554    -13.72924    7.357503
         L4. |   10.40033   4.890426     2.13   0.033      .815267    19.98539
             |
       _cons |   -44.9396   50.05613    -0.90   0.369    -143.0478    53.16861
------------------------------------------------------------------------------
```

d_logRGDP						
ddebttogdp						
L1.	-.0021385	.0012667	-1.69	0.091	-.0046212	.0003443
L2.	-.0001197	.0013948	-0.09	0.932	-.0028534	.002614
L3.	.0019497	.001578	1.24	0.217	-.0011431	.0050425
L4.	-.0026151	.0015721	-1.66	0.096	-.0056964	.0004662
d_logRGDP						
L1.	-.5500127	.2161796	-2.54	0.011	-.9737168	-.1263085
L2.	-.1116434	.2305706	-0.48	0.628	-.5635535	.3402668
L3.	-.2049937	.221072	-0.93	0.354	-.6382868	.2282995
L4.	-.6312875	.2232702	-2.83	0.005	-1.068889	-.1936859
dcoreinf						
L1.	.0030488	.0014653	2.08	0.037	.0001769	.0059206
L2.	-.0030465	.0015466	-1.97	0.049	-.0060778	-.0000151
L3.	-.0011133	.0014673	-0.76	0.448	-.0039892	.0017626
L4.	-.0028968	.0012599	-2.30	0.021	-.0053662	-.0004274
ddiscount						
L1.	-.0015574	.0059513	-0.26	0.794	-.0132217	.0101069
L2.	.0124172	.006281	1.98	0.048	.0001068	.0247277
L3.	.0166342	.0065961	2.52	0.012	.0037062	.0295623
L4.	.0101752	.00596	1.71	0.088	-.0015062	.0218566
logsubsidies						
L1.	.0064186	.0185653	0.35	0.730	-.0299686	.0428059
L2.	-.0234509	.0187164	-1.25	0.210	-.0601344	.0132327
L3.	-.0350389	.0192094	-1.82	0.068	-.0726886	.0026108
L4.	.0061844	.0177868	0.35	0.728	-.0286771	.0410458
logtax						
L1.	.0398559	.0304003	1.31	0.190	-.0197276	.0994393
L2.	.0494618	.0304446	1.62	0.104	-.0102086	.1091321
L3.	.0267746	.0312545	0.86	0.392	-.0344831	.0880323
L4.	-.0849043	.0284137	-2.99	0.003	-.1405942	-.0292145
_cons	.4198199	.2908295	1.44	0.149	-.1501955	.9898353
dcoreinf						
ddebttogdp						
L1.	.385942	.1068828	3.61	0.000	.1764556	.5954285
L2.	.1269377	.1176868	1.08	0.281	-.1037242	.3575996
L3.	.0368458	.133145	0.28	0.782	-.2241136	.2978052
L4.	-.1662956	.1326494	-1.25	0.210	-.4262837	.0936925
d_logRGDP						
L1.	35.45624	18.24042	1.94	0.052	-.2943165	71.2068
L2.	1.416737	19.45468	0.07	0.942	-36.71374	39.54722
L3.	-41.02095	18.65322	-2.20	0.028	-77.58059	-4.4613
L4.	-23.99258	18.8387	-1.27	0.203	-60.91576	12.93059
dcoreinf						
L1.	.4369289	.1236328	3.53	0.000	.1946132	.6792447
L2.	-.1030789	.1304988	-0.79	0.430	-.3588518	.152694
L3.	.0352348	.1238057	0.28	0.776	-.20742	.2778896
L4.	-.5836068	.1063072	-5.49	0.000	-.7919651	-.3752485
ddiscount						
L1.	-.6265226	.5021449	-1.25	0.212	-1.610709	.3576634
L2.	-.2893813	.5299636	-0.55	0.585	-1.328091	.7493282
L3.	2.104788	.556551	3.78	0.000	1.013968	3.195608
L4.	-.0122351	.5028834	-0.02	0.981	-.9978684	.9733982
logsubsidies						
L1.	.0397956	1.566468	0.03	0.980	-3.030425	3.110016
L2.	.2822149	1.579223	0.18	0.858	-2.813006	3.377436
L3.	-.8256149	1.620814	-0.51	0.610	-4.002353	2.351123
L4.	-4.255142	1.500782	-2.84	0.005	-7.19662	-1.313664
logtax						
L1.	-1.229065	2.565061	-0.48	0.632	-6.256493	3.798363
L2.	-1.960497	2.568801	-0.76	0.445	-6.995255	3.07426
L3.	-2.066305	2.637137	-0.78	0.433	-7.235	3.102389
L4.	6.985434	2.397442	2.91	0.004	2.286534	11.68433
_cons	74.0161	24.5391	3.02	0.003	25.92034	122.1119

ddiscount						
ddebttogdp						
L1.	.018313	.0369718	0.50	0.620	-.0541504	.0907765
L2.	.1818301	.040709	4.47	0.000	.1020418	.2616183
L3.	.0017021	.0460562	0.04	0.971	-.0885663	.0919705
L4.	.0092594	.0458847	0.20	0.840	-.080673	.0991918
d_logRGDP						
L1.	13.67666	6.309539	2.17	0.030	1.310194	26.04313
L2.	16.03348	6.729566	2.38	0.017	2.843769	29.22318
L3.	-6.373616	6.452333	-0.99	0.323	-19.01996	6.272724
L4.	.8737891	6.516492	0.13	0.893	-11.8983	13.64588
dcoreinf						
L1.	-.0091878	.0427658	-0.21	0.830	-.0930072	.0746316
L2.	.0518464	.0451408	1.15	0.251	-.0366279	.1403208
L3.	-.014587	.0428256	-0.34	0.733	-.0985237	.0693496
L4.	-.0211311	.0367727	-0.57	0.566	-.0932043	.0509421
ddiscount						
L1.	.0427351	.1736969	0.25	0.806	-.2977045	.3831747
L2.	-.1410505	.1833196	-0.77	0.442	-.5003504	.2182493
L3.	.1581567	.1925165	0.82	0.411	-.2191687	.535482
L4.	-.0732127	.1739523	-0.42	0.674	-.4141529	.2677276
logsubsidies						
L1.	.1696323	.5418567	0.31	0.754	-.8923872	1.231652
L2.	-.1920467	.5462688	-0.35	0.725	-1.262714	.8786206
L3.	.0959331	.5606556	0.17	0.864	-1.002932	1.194798
L4.	-.5059041	.5191351	-0.97	0.330	-1.52339	.5115821
logtax						
L1.	.3112734	.88728	0.35	0.726	-1.427763	2.05031
L2.	-.4668326	.8885735	-0.53	0.599	-2.208405	1.274739
L3.	-.9280922	.9122118	-1.02	0.309	-2.715994	.85981
L4.	.8159951	.8292987	0.98	0.325	-.8094006	2.441391
_cons	16.51639	8.488316	1.95	0.052	-.1204078	33.15318

logsubsidies						
ddebttogdp						
L1.	-.0054662	.0122976	-0.44	0.657	-.029569	.0186367
L2.	-.0125849	.0135407	-0.93	0.353	-.0391241	.0139544
L3.	-.0212935	.0153193	-1.39	0.165	-.0513187	.0087317
L4.	.0012933	.0152622	0.08	0.932	-.0286202	.0312067
d_logRGDP						
L1.	1.09337	2.098686	0.52	0.602	-3.019979	5.20672
L2.	-.7196602	2.238396	-0.32	0.748	-5.106836	3.667515
L3.	.2218616	2.146183	0.10	0.918	-3.984579	4.428302
L4.	1.613811	2.167523	0.74	0.457	-2.634456	5.862078
dcoreinf						
L1.	-.0199661	.0142248	-1.40	0.160	-.0478462	.007914
L2.	.0363455	.0150148	2.42	0.015	.006917	.0657739
L3.	-.0141402	.0142447	-0.99	0.321	-.0420593	.0137789
L4.	-.0027469	.0122314	-0.22	0.822	-.0267199	.0212262
ddiscount						
L1.	.1312724	.0577753	2.27	0.023	.018035	.2445098
L2.	.0050098	.060976	0.08	0.935	-.114501	.1245205
L3.	.0047551	.0640351	0.07	0.941	-.1207513	.1302615
L4.	.1720715	.0578602	2.97	0.003	.0586675	.2854754
logsubsidies						
L1.	.4851172	.180233	2.69	0.007	.1318671	.8383674
L2.	-.0550667	.1817006	-0.30	0.762	-.4111933	.3010598
L3.	.0517684	.1864859	0.28	0.781	-.3137373	.4172741
L4.	.1887598	.1726753	1.09	0.274	-.1496776	.5271972
logtax						
L1.	-.7481598	.2951281	-2.54	0.011	-1.3266	-.1697194
L2.	-.0943437	.2955584	-0.32	0.750	-.6736274	.48494
L3.	-.1009564	.3034209	-0.33	0.739	-.6956505	.4937377
L4.	1.021537	.2758423	3.70	0.000	.4808956	1.562178
_cons	6.128119	2.823394	2.17	0.030	.5943697	11.66187
logtax						
ddebttogdp						
L1.	-.0071085	.0054163	-1.31	0.189	-.0177243	.0035073
L2.	-.0035079	.0059638	-0.59	0.556	-.0151967	.008181
L3.	-.0025516	.0067472	-0.38	0.705	-.0157758	.0106727
L4.	.0052011	.0067221	0.77	0.439	-.0079739	.0183761
d_logRGDP						
L1.	-.1517893	.9243399	-0.16	0.870	-1.963462	1.659883
L2.	.6612067	.9858733	0.67	0.502	-1.271069	2.593483
L3.	1.287775	.945259	1.36	0.173	-.564899	3.140448
L4.	.6614597	.9546581	0.69	0.488	-1.209636	2.532555
dcoreinf						
L1.	-.0039445	.0062651	-0.63	0.529	-.0162239	.008335
L2.	.0066952	.0066131	1.01	0.311	-.0062662	.0196566
L3.	-.0062274	.0062739	-0.99	0.321	-.0185241	.0060692
L4.	.0039459	.0053872	0.73	0.464	-.0066128	.0145045
ddiscount						
L1.	.0545589	.0254464	2.14	0.032	.0046849	.1044329
L2.	-.0139245	.0268561	-0.52	0.604	-.0665615	.0387125
L3.	.0328767	.0282034	1.17	0.244	-.022401	.0881544
L4.	.0436578	.0254838	1.71	0.087	-.0062895	.0936051
logsubsidies						
L1.	.1394995	.0793813	1.76	0.079	-.0160851	.295084
L2.	-.0722651	.0800277	-0.90	0.367	-.2291165	.0845864
L3.	.0674548	.0821354	0.82	0.411	-.0935276	.2284371
L4.	-.1332997	.0760527	-1.75	0.080	-.2823601	.0157608
logtax						
L1.	-.1726085	.1299854	-1.33	0.184	-.4273753	.0821582
L2.	.1374769	.1301749	1.06	0.291	-.1176613	.3926151
L3.	-.0570991	.1336379	-0.43	0.669	-.3190246	.2048264
L4.	1.118097	.1214913	9.20	0.000	.8799786	1.356216
_cons	-.647762	1.243528	-0.52	0.602	-3.085032	1.789508

Appendix (2): La granger multiplier test

Lagrange-multiplier test

lag	chi2	df	Prob > chi2
1	35.2778	36	0.50275
2	30.2940	36	0.73628

H0: no autocorrelation at lag order