



## سلسلة أوراق عمل معهد التخطيط القومي

# The Sustainability of Public Debt in Egypt: An Analysis Using The DIGNAR Model

Dr. Sherine Boshra Ghaly

Dr. Sarah Hassan Serag

ورقة عمل رقم (5 - 2024)

يوليو 2024



## سلسلة أوراق عمل

# The Sustainability of Public Debt in Egypt: An Analysis Using The DIGNAR Model

د. شرين بشرى غالى  
أستاذ الاقتصاد المساعد - مركز السياسات الاقتصادية الكلية - معهد التخطيط القومي  
sherine.toma@sadatacademy.edu.eg

د. سارة حسن سراج  
مدرس الاقتصاد أكاديمية السادات للعلوم الإدارية  
sarah.serag@sadatacademy.edu.eg

ورقة عمل رقم 2024-5

تم النشر لأول مرة في عام 2024 بواسطة معهد التخطيط القومي.

سلسلة أوراق عمل معهد التخطيط القومي: تستهدف هذه السلسلة عرض بعض النتائج الأولية للبحوث التي يجريها معهد التخطيط القومي بقصد مناقشتها من جانب المعنيين من داخل المعهد وخارجه تمهيدا لتطوير هذه النتائج والارتقاء بمستوي البحث العلمي بالمعهد، وإعادة نشر الورقة في وعاء نشر محكم محليا أو إقليمياً أو دولياً.

حقوق النشر © معهد التخطيط القومي 2024

كل الحقوق محفوظة. لا يجوز إعادة إنتاج أي جزء من هذا المنشور بأي شكل من الأشكال الورقية أو الإلكترونية أو الميكانيكية أو التحريرية، بما في ذلك أنظمة تخزين واسترجاع المعلومات، دون إذن كتابي من الناشر.

النتائج والتفسيرات والاستنتاجات والآراء الواردة في هذه السلسلة لا تعبر بالضرورة عن وجهة نظر المعهد وإنما هي مسئولية المؤلف أو المؤلفين.

WWW.INP.EDU.EG

جمهورية مصر العربية - طريق صلاح سالم - مدينة نصر - القاهرة - مكتب بريد رقم 11765  
A.R.E SALAH SALEM ST. NASR CITY, CAIRO P.O.BOX: 11765

سلسلة أوراق عمل - معهد التخطيط القومي

## **The Sustainability of Public Debt in Egypt: An Analysis Using The DIGNAR Model**

### **استدامة الدين في مصر: تحليل باستخدام نموذج DIGNAR**

**د. شرين بشرى غالى**

أستاذ الاقتصاد المساعد - مركز السياسات الاقتصادية الكلية  
معهد التخطيط القومي

[sherine.toma@sadatacademy.edu.eg](mailto:sherine.toma@sadatacademy.edu.eg)

**د. سارة حسن سراج**

مدرس الاقتصاد

أكاديمية السادات للعلوم الإدارية

[sarah.serag@sadatacademy.edu.eg](mailto:sarah.serag@sadatacademy.edu.eg)

## المستخلص:

على مدى العقد الماضي، ازداد قلق الحكومة المصرية بشأن استدامة دينها العام. وتبحث هذه الدراسة في استدامة الدين العام المصري باستخدام مؤشرات مختلفة، كما أظهرت مؤشرات DSF نتائج متناقضة، حيث أوضحت مؤشرات معظم الديون العامة الخارجية تصنيفات ضعيفة تسمح بمزيد من القدرة على الاقتراض، إلا أن خدمة الدين الخارجي للصادرات كانت بالفعل مرتفعة في عامي 2022 و 2023. علاوة على ذلك، تطبق الدراسة نموذج الديون والاستثمار والنمو والموارد الطبيعية (DIGNAR)، الذي يعتمد على توقعات صندوق النقد الدولي لتحديد تأثير التغيرات في الصادرات والتحويلات الخاصة من 2019 إلى 2026 على الدين العام لمصر، وذلك بافتراض أن جميع المتغيرات الخارجية الأخرى تظل ثابتة. وتكشف النتائج عن تأثير كبير للتغيرات في الصادرات على التغيرات في إجمالي الدين والديون المحلية والديون التجارية الخارجية. ونظرًا لأن توقعات صندوق النقد الدولي تظهر تغييرات طفيفة في التحويلات الخاصة، فقد عزا الباحثون التغيير في الدين العام إلى التغيير في الصادرات. ووفقًا لنتائج DIGNAR، من المتوقع أن ينخفض التغيير في إجمالي الدين العام إلى الناتج المحلي الإجمالي، والديون المحلية إلى الناتج المحلي الإجمالي، والديون التجارية الخارجية إلى الناتج المحلي الإجمالي بنسبة 2.6٪ و 1.6٪ و 1٪ على التوالي. وبالتالي، تقترح الدراسة عدة توصيات سياسية لتعزيز استدامة الدين العام لمصر. ويشمل ذلك تخفيض خدمات الديون من خلال إعادة هيكلة الديون ومقايضة الديون، التقليل إلى أدنى حد من عمليات فوق الخط، والحد من التضخم، والتركيز على استثمارات البنية التحتية ذات العائدات المرتفعة، كما أكدت نتائج نموذج DIGNAR على أهمية تنمية الصادرات مما يستلزم تشجيع الصناعات واعتبار ذلك أولوية قصوى.

**الكلمات المفتاحية:** استدامة الدين، الدين العام، DIGNAR، تحليل الدين، الصادرات.

## **Abstract:**

Over the past decade, the Egyptian government has grown increasingly concerned about the sustainability of its public debt. This study examines the sustainability of Egypt's public debt using various indicators. The DSF indicators showed contradictory results, as most external public debt showed weak ratings that allow more borrowing capacity. However, the debt service on external debt to exports was already high in 2022 and 2023. Moreover, the study applies the Debt, Investment, Growth, and Natural Resources (DIGNAR) model, which relies on the IMF projections to quantify the impact of changes in exports and private remittances from 2019 to 2026 on Egypt's public debt, assuming all other exogenous variables remain constant. The findings reveal a significant effect of changes in exports on changes in total public debt, domestic debt, and external commercial debt. Since the projections of the IMF show slight changes in private remittance, the researchers attributed the change in public debt to the change in exports. According to the DIGNAR results, the change in total public debt to GDP, domestic debt to GDP, and external commercial debt to GDP are expected to decrease by 2.6%, 1.6%, and 1%, respectively. Consequently, the study proposes several policy recommendations to enhance the sustainability of Egypt's public debt. These include reducing debt services through debt restructuring and debt swaps, minimizing stock-flow adjustments, curbing inflation, and focusing on infrastructure investments with high returns. The findings of the DIGNAR model also confirmed the importance of promoting exports, which necessitates encouraging industries as the highest priority.

## **Keywords:**

Debt Sustainability, Public debt, DIGNAR, Debt decomposition, Exports

## **Introduction:**

Public debt sustainability has brought significant attention in recent decades, becoming a keystone of macroeconomic analysis and fiscal policy assessments (Kim et al., 2017; Vidal and Marshall, 2021). The main concern arose when it became evident that the burdened countries could not pay their financial obligations (Ogbeifun and Shobande, 2020). This concern is particularly relevant nowadays, given the rising government debt in developed and emerging economies. The global economy has witnessed a substantial rise in public debt in recent years, driven by developmental initiatives and responses to crises impacting advanced and emerging economies, such as COVID-19 pandemic. Moreover, the escalating geopolitical tensions caused by the Russian-Ukrainian war have tightened global financial conditions, driven high inflation, reduced economic growth, and increased pressure on government budgets. In response to rising inflation, particularly in major advanced economies, central banks have implemented tighter monetary policies, leading to significant increases in borrowing costs, raising concerns about the sustainability of the debt of some economies and the stability of the world economy (IMF, 2023b).

Given that most countries have a significant budget imbalance, governments rely heavily on public debt to handle these fiscal imbalances created by revenue and spending mismatches. This unsustainable debt accumulation can generate serious economic problems for current and future generations if not managed efficiently (Ogbeifun and Shobande, 2020). However, many in the global financial community still believe that the current debt surge has

not yet turned into a "systemic" crisis and is less serious than previous global debt crises. This is due to two reasons: first, a relatively small number of countries (especially among the largest debtors) have defaulted on their external debts in recent years; and second, debt-to-GDP ratios are lower than they were before and during the Latin American debt crisis in the 1980s, or the debt crisis of low-income countries in the 1990s (Holloway, 2023). However, even if it has not yet turned into a systemic crisis or a less serious than previous global debt crises, the continuation of the current situation will undoubtedly lead to a loss of control if all efforts do not come together.

Egypt's debt situation closely mirrors the global trend of rising public debt in recent years. The COVID-19 pandemic has severely affected the tourism industry and the surge in food import costs following the war in Ukraine. The persistent budget deficit and the commitment to a fixed exchange rate have created substantial financing needs, partially met by short-term capital inflows. According to the IMF's Fiscal Monitor report of April 2023, Egypt's total financing requirements for 2023 amounted to 35% of its GDP, rendering the country highly vulnerable to interest rate hikes (Mazarei, 2023).

The situation of public debt in Egypt questions its sustainability: Is Egypt's public debt sustainable? Many studies have tried to analyze the sustainability of public debt in Egypt using several methods and indicators with contradictory findings. However, our study applied the DIGNAR model (The Debt, Investment, Growth, and Natural Resources), an updated tool developed by the IMF, to analyze debt sustainability in Egypt. The model

employs the linkage between public investment, growth, debt, and the private sector response in addition to fiscal reaction functions. Moreover, it quantifies the macro-effects of different variables such as exports and remittances which can help the policymakers (Gurara,2019). Therefore, the study is divided into several sections; following the introduction, the second section deals with the concept of public debt sustainability, followed by a theoretical and literature review of debt sustainability, subsequently followed by a view of the current global debt in advanced, emerging, and developing economies. The study then addresses the debt in Egypt in the fourth section, which addresses some of the debt sustainability indicators used by international financial institutions, after identifying the debt composition methodology using the Finance for Development tool (FDL) - debt decomposition tool- to clarify the complex relationships between public debt and various economic variables such as primary balance and growth. It is crucial to identify the factors contributing to the increase and decrease of public debt, and the intricate interplay among these variables as it may help strengthen financial recommendations. In addition, the study applied some indicators and the Debt, Investment, Growth and Natural Resources (DIGNAR) model to analyze debt sustainability in Egypt. Furthermore, the study illustrates strategies that may contribute to debt sustainability, such as the role of fiscal consolidation in reducing the severity of debt, debt restructuring if other measures are insufficient, as well as the implications of debt swaps.



## **I. The scope of public debt and its sustainability:**

Firstly, it is vital to identify the scope of public debt in studying debt sustainability since limited public debt scope may underestimate the actual debt burden, making it difficult to determine debt sustainability. Secondly, it is essential to highlight the various aspects of public debt sustainability to understand it.

### **1- Public Debt Scope:**

Presenting a comprehensive and coherent image of public debt stocks and public contingent liabilities should be the first step toward achieving sustainability (IMF,2023g). Public debt scope varies from wide to limited, depending on which government agencies and sectors' obligations are included in the total public debt (De Matos et al., 2015). Therefore, the public debt may include (IMF, 2022b):

- a- The Central Government: which consists of a state's institutional units at the national level, as well as non-market non-profit firms that are under its authority.
- b- The General Government: which includes all government units, and any non-market non-profit organizations overseen by these authorities.
- c- The non-financial public sector: consists of government-controlled businesses that manufacture goods such as state-owned enterprises.
- d- The consolidated public sector: consists of the non-financial public sector and public financial firms, in addition to the Central Bank.

For Egypt, although there is no legally binding definition of public debt components, the Ministry of Finance defines public debt as encompassing three main components:(Zaki, et al.,2022)

- a- Central Government Debt: This includes the debt of the local administration and public service entities.
- b- General Government Debt: This encompasses, in addition to the debt of budgetary agencies, the debt of the Investment Bank and pension funds after removing the inter-debt between general government units.
- c- Total Public Debt: This includes, in addition to general government debt, the debt of public economic entities, after removing the inter-debt between all these public units.

The debts of public financial and non-financial firms, whether public business companies or public sector companies are excluded. Furthermore, it excludes the obligations of holding companies and other public companies.

## **2- Definition of Debt Sustainability:**

While a single, universally accepted definition of debt sustainability remains difficult, various approaches emphasize various aspects of this crucial concept. One prominent approach focuses on fiscal sustainability, which emphasizes maintaining a government surplus that gradually reduces the debt-to-GDP ratio over time (D'Erasmus et al., 2016; Deheri and Nag, 2023). It ensures that the government can meet its financial obligations without relying on extraordinary measures (Pamies and Reut, 2020). Another debt sustainability approach is found in the study of Hakura and others (Hakura, 2020; Abdelgany and Al-deen, 2023). In this approach, sustainability rests

on the government's ability to meet current and future debt obligations through policies without jeopardizing economic growth or defaulting. This approach focuses on ensuring manageable debt levels compared to the government's revenue-generating capacity. It is important to recognize that fiscal sustainability (solvency) and debt sustainability (debt servicing) are crucial aspects of debt sustainability. A fiscal policy that maintains a manageable debt-to-GDP ratio ensures that the government can service its debt in the long term. Conversely, maintaining manageable debt service levels prevents excessive debt accumulation that could strain the government's finances and hinder growth (Nathaniel and Olalekan, 2018). Therefore, a comprehensive understanding of debt sustainability requires considering both aspects.

### **Theoretical and Literature Review:**

Debt sustainability analysis is common in literature (Nathaniel and Olalekan, 2018). In this section, we will delve into different public debt sustainability studies to identify the literature gap by reviewing studies in many countries as well as Egypt.

### **3- Debt and Fiscal Sustainability Approaches and Methods:**

Different approaches for measuring fiscal and debt sustainability have been revealed in studies, such as the study of Pradhan (2019), which demonstrated different approaches to sustainability, including the Domar stability approach, Solvency approach, Fiscal Gap approach, Forward-looking approach, Generational Accounts, Ricardian Equivalence approach, and Balance Sheet approach. In 1944, Domar contributed to the initial

investigation and explanation of why fiscal policy should be sustainable by comparing the interest rates on government bonds to economic growth. Any deficit might lead to an unsustainable fiscal policy if borrowing costs are more than the production growth rate (Yoshino and Miyamoto, 2020; Pradhan, 2019). Domar's approach assists in figuring out the primary surplus or deficit required for various growth-interest rates to maintain the debt-to-GDP ratio at a particular level (Pradhan, 2019). According to the solvency approach, also referred to as the Present Value Constraint approach (PVC), fiscal policy is sustainable if the government can meet all its current obligations by producing a primary surplus from future budgetary projections, meaning that the total present value of these surpluses will either equal or surpass the current balance of public debt. (Nathaniel and Olalekan, 2018; Pradhan, 2019). To calculate how much primary deficits need to be decreased over time by implementing policies like raising revenue or cutting spending, the fiscal gap technique estimates the growth in the primary surplus required to reach a specific debt-to-GDP ratio in the future. The forward-looking approach addresses the difficulties in understanding the financial gap and evaluating sustainability by using debt-to-GDP ratio. Generational approach states that future tax payments for coming generations must, at any given moment, be adequate in current value to cover the government's debt and future consumption expenditures (Pradhan, 2019). It has long been evident, according to the work of Buchanan (1958) and Modigliani (1961), that raising taxes to meet today's budgetary responsibilities will cause intergenerational redistribution and burden certain economic actors with public debt. (Bonin and Patxot, 2004). If taxes and debt

financing have a non-neutral impact on current and future generations, then fiscal policy is unsustainable. Conversely, fiscal policy is sustainable if the method of funding government expenditures does not affect intergenerational well-being neutrality. This neutrality of well-being is the cornerstone of the Ricardian approach to financial sustainability. Furthermore, the balance sheet method is an analytical framework that may be used to identify weaknesses and imbalances in the macroeconomic sectors of the country (Pradhan, 2019).

Public debt sustainability literature has been molded by three major techniques (Beqiraj et al., 2018): the cointegration test, the unit root test, and the Bohn sustainability model. The unit root validates the debt variable's stationarity. For cointegration, once government revenue and expenditures are cointegrated, debt is considered sustainable. The Bohn approach is the most often used method for assessing the sustainability of governmental debt (Joy and Panda, 2021; Can, 2023; Renjith and Shanmugam, 2018). It proposes determining if the primary surplus as a percentage of GDP is a linear function of the debt-to-GDP ratio; if so, the public debt is considered sustainable (Ari and Koc, 2018; Beqiraj et al., 2018). The Bohn sustainability test relies on estimating the fiscal reaction function to evaluate the government's response to debt levels and seeks to analyze the fiscal policy response to debt accumulation. The function estimates the fiscal remediation required to sustain the debt (Abdelgany, 2022).

Research has attempted to use many approaches to assess sustainability. Deheri and Nag (2023) assessed India's debt sustainability using a variety of

methods. Initially, they evaluated the function response equation and assessed the sustainability of the debt using the Autoregressive Distributed Lag model (ARDL). The primary surplus was compatible with real interest rates, government spending, economic growth, and debt from the prior period, according to the findings of the ARDL-bounds test. Further, evidence that fiscal policy follows debt-stabilizing guidelines and complies with budgetary restrictions across periods comes from the primary surplus's remarkable and short- and long-term response to the preceding period's debt. A structural break cointegration test was also utilized to examine the long-term relationship between total revenue and total spending. The findings demonstrated a cointegration, meaning fiscal deficit was sustainable.

Unit root and cointegration approaches were employed by Canofari et al. (2020) to evaluate the financial sustainability of the United States. To analyze the sustainability of public finances comprehensively, the study highlighted the need to utilize indicators and tests to offer a thorough analysis. However, when results are inconsistent, indicators might point to a shift in fiscal policy.

Unlike previous studies, International financial institutions (World Bank and the International Monetary Fund (IMF)) quantify the risk of public debt distress to evaluate shocks and prospective scenarios. Some studies have examined this approach (Laskaridis, 2020) and distinguished between economies with extensive access to international financial markets and low-income economies that largely rely on concessional support to cover their external finance needs. The Debt Sustainability Assessment Framework