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The Nonlinear Impact of Public Debt on Economic Growth in Iraq

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ABSTRACT

This paper investigates the relationship between public debt and economic growth in Iraq. This research uses un-processed public data available from many global sources. The types of information analyzed are Public Debt, External Debt, Inflation, and Investment. Public Debt is the major area of analysis but is supported with Sector Data such as Infrastructure, Oil Extraction, and Public-Private Output. The results support the hypothesis that the relationship between public debt and economic growth is non-linear as suggested in other research on Linear Risk, through an increase in fiscal activity in the short-run, and reconstructions after wars. Despite a significant increase in public debt in recent years, the debt-to-revenue ratio for public debt has not significantly increased. The study found a stronger relationship between public debt growth and an increase in the proportion of non-oil revenues. The study determined that Institutional Quality continues to have a significant effect on the effectiveness of debt however its impact on the productivity of public investments is limited due to the oil sector's influence. As oil revenues have remained dominant, a limited percentage of the revenues are generated by non-oil sources, by a few entities, and therefore remain a minor part of the overall economy. Shifting from low oil revenue reliance to a greater reliance on non-oil sources, aligned with reforms of Institutions may result in greater growth; however, without sufficient monetary and institutional capabilities, the only benefit of attaining the growth through debt is limited and spectrally focused.

KEYWORDS: *Public Debt; Debt-Growth Nexus; Non-Oil Revenues; Institutional Quality; Iraq Economy*

1. INTRODUCTION

Public and external debts may play an essential role in and impact the operations of the economy, whether in terms of growth in the economy or management of commodity price shocks. Understanding the structure and nature of the economy, then determining the econometric modeling specification is key in identifying any impact of public and external debt on the economy. Therefore, an existential question revolves around the implications of public and external debt on the economy of a commodity-price dependent economies such as Iraq. The application of such modelling system notably follows and complements the methodology provided by the approach to the study of Nigeria concerning the nature of public debt on the growth of the economy. Thus, using the framework established by three core authors is within the economic discipline is paramount [1].

The first question relates to whether it is still node for concern, whereas concern remains central to the analysis of the growth of the economy. More critically, the focus on the type and level of such assessments continually vary across time, with a total of four critical time points remaining key surrounding commodity price and fiscal constraints. The last aspect simple surrounds the type of improvement needed across the different sectors. Further consideration is also undertaken on the forecasted level of public debt and the level of public debt remains still facilitate further understanding of the economy in transition and growth as showing in figure 1.

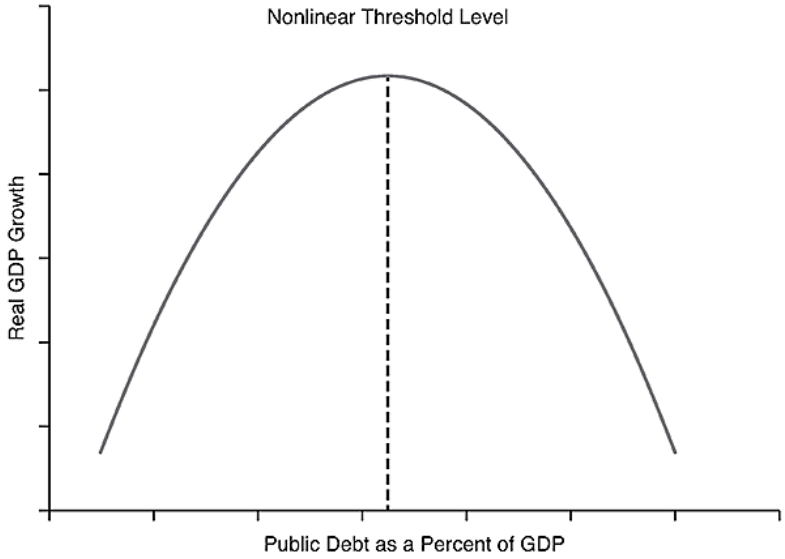

FIGURE 1. The Relationship between Dept. and Growth [2].

2. THEORETICAL FRAMWORK

A nonlinear debt-growth framework is specified for Iraq to account for the unique fiscal and institutional conditions that shape the debt-growth relationship. Indeed, surplus oil revenues conflate debt-financing options with reduced domestic resource mobilization incentives [1] ; ample concessionary debt narrows the fiscal margin, yet boosts growth via infrastructure development; and oil dependence alters the impact of debt accumulation on growth [2]. Jointly, these features engender alternative channels through which debt interacts with growth. Consequently, debt variable choices are crucial. Mortgages, loans, bonds, and bills are predominantly private instruments.

Theoretical underpinnings are drawn from non-commodity-dependent economies and extractive states. Hence, debt-to-GDP and debt-service-to-GDP ratios are adopted as principal indicators.

2.1. Public Debt and Growth: Linear vs Nonlinear Perspectives

One of the major debates among economists continues to be the role that public debt plays in determining the level of economic growth. The mainstream position asserts that government debt acts as a deterrent to growth because it requires taxpayer financing for debt service payments at the same time as it reduces available public funds for investment. A separate view takes the opposite position — that there is a nonlinear effect between public debt and economic growth, with public debt initially providing some measure of stimulus but subsequently acting as a significant impediment to future growth. The governments of many developed nations have implemented fiscal and monetary policies that result in efficient operations, enabling them to use all types of debt to fund public investments without negative consequences (see Chapter 3). By contrast, many developing economies rely on debt to finance their economic growth but lack the efficiencies necessary to make good use of this debt for funding productive investments. The oil-exporting developed nations represent a category of developing economies, which have a large pool of financial resources from their oil exports, that have not been able to invest these resources in a manner that produces increases in economic growth (Gulf Cooperation Council case study). Iraq has built up a large amount of public debt in the last few decades through the use of both internal and external sources. The characteristics of this public debt and its impact on economic growth should be evaluated using the specific characteristics of Iraq's public debt and its unique situations.

2.2. Mechanisms Linking Debt to Growth in extractive and oil-dependent economies

Existing studies delineate the relationship between the debt ratios (debt-to-GDP and debt-service-to-GDP) of a commodity-dependent economy, particularly demonstrating how these ratios exhibit an increasing rate of deterioration of economic performance after crossing certain thresholds (in this case 40% for the debt-to-GDP ratio and 10% for the debt-service-to-GDP ratio). The presence of a large public debt may lead to impediments to growth in many ways. Liquidity constraints may make it more difficult for governments to meet their current obligations to pay for expenditures and/or to service pre-existing debts. Fears of government default on debt could create a disincentive for lenders to lend to the government at lower interest rates. Priority may shift from public investment to debt-service. Public finance that has deteriorated may have led to increased public debt-service costs

due to increased risk premiums associated with rollovers beyond commodity-price cycles. The nonlinear characteristic associated with crossing certain thresholds is consistent with the Humpback Theory.Total public debt (which consists of both domestic debt and foreign debt) and total debt service are both analyzed for the purposes of developing the model. A one-period lag has been included in these variables so that their value will be observable to prospective borrowers in the first period of time that they are available for the purpose of borrowing.

3. INSITUATION AND MACROECONOMIC CONTEXT IN IRAQ

Iraq's economy depends largely on its commodities, and its unique institutions determine the flow of money through public debt and the economy. Iraq's fiscal system is made primarily of oil revenue (which makes up about 86% of the total) and Government-funded sectors usually offer a large return on investment. Because of this structure, there may be a positive correlation between debt and growth [4]. On the other hand, Iraq suffers from several political economy issues that prevent the establishment of stable policies. There is a high level of corruption and nearly all indicators for governance place Iraq in the bottom 20% globally. With so little information available, it is difficult to determine if the Fiscal Policy and the Efficiency of Investments will remain for the future [3].

3.1. Fiscal Structure and Debt Composition

The economy of Iraq is dependent on public debt and how fast it reacts to changes in the level of debt. Public spending drives most economic growth, in addition to being affected by oil price fluctuations. Therefore, this indicates that the composition of the debt (e.g., domestic vs. foreign; concessional vs. non-concessional) is important for understanding how effectively the debt can stimulate growth. The poor performance of public investment limits the growth potential of further debt [1].

Between 2005 and 2021, public debt represented an approximately 26% portion of the Gross Domestic Product (GDP). Approximately 80% of the total debt paid back and projected will come from borrowing internationally at non-concessional rates, taking a large portion from the total funding for public services (for instance).

3.2. Political Economy and Governance

In Iraq, public debt is directly linked to the benefits of new borrowing as well as how strength of the impact of new governmental debt which comes from investing it into areas to enhance the economy. Three key components determine how a government is going to transform capital into growth. 1 The current economy suffers from the Dutch Disease due to its past oil wealth. This will eventually result in lack of investment in other sectors and decreased access to existing infrastructure and capital. Additional debt is incurred through financing new growth-based infrastructure projects but will mainly fund growth through funding of current employees and government salaries. With the money going toward employees and salaries, and little addition to the capital base there is very little if any added economic growth. Although there are financing rules for public investment on reconstruction and maintenance, and any funds spent to run the current capital stock are not going to be sufficient on a larger basis due to the existing funds spent on salaries and current operations.

4. METHODOLOGY AND DATA

There are various characteristics regarding the relationship between debt and economic growth in Iraq; therefore, it is possible to describe this linkage as being nonlinear. The analysis will start with a discussion of the foundational theories defining how debt impacts economic growth, which will also provide insight into the empirical modelling and testing of such relationships as established through econometric modelling. Theoretically, the marginal impact of debt on economic growth may decrease or begin to turn negative following increases in the proportion of total debt to gross domestic product of a country, as showing of the following Figure.

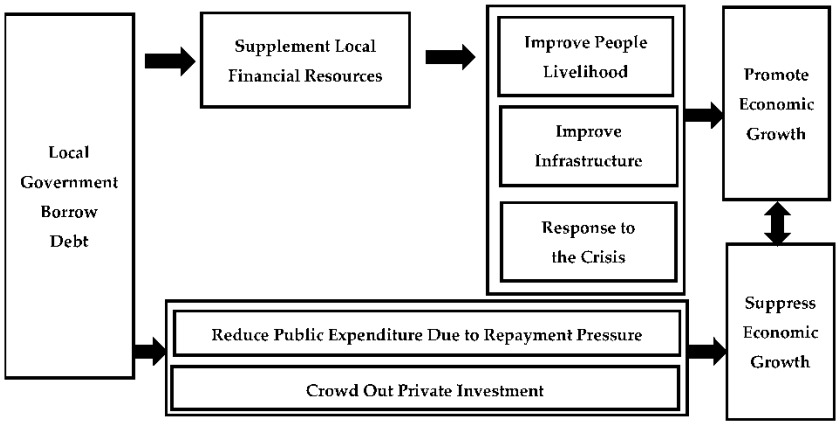

FIGURE 2. Mechanism of the effect of local government debt on regional economic growth in Iraq.

Consequently, the econometric modelling process will create multiple 'thresholds' within which possible interruptions in the debt and growth relationship may be identified; additionally, other structural shifts may also be identified in relation to events occurring within the economy

4.1. Data Sources and Variables

In this paper comprises two aspects: the first is characterizing post-conflict Iraq's public-debt trajectory and the second is developing a framework for determining the relationship between public debt and economic growth in a post-conflict, extractive economy. In developing this framework, we have considered data from around the world where public-debt levels returned positive economic growth, particularly in those countries whose economies are dependent on one or more commodities [1]. In this context, identify the level of public indebtedness relative to economic activity, i.e., the size of public indebtedness as a percentage of GDP and the ratio of debt-service payments to gross domestic product, gross public debt as the primary determinants of public-debt dynamics and economic growth in a post-conflict extractive economy having large and highly volatile foreign-exchange earnings from oil exports.

In the first stage, we will focus on quantifying the relationship between public debt and economic growth in the GNP per capita category in a post-conflict extractive state with a highly variable foreign exchange revenue (due primarily to the price volatility of oil). We will also look at new data (see the table below) related to domestic economic activity that may suggest a need for a fuller analysis of the public-debt relationship with economic growth in a post-conflict, extractive economy.

In the second stage, we will use quantitative methods to define the relationship between public debt and economic growth as a function of changes in debt-to-GDP ratios (in percentage terms) and debt-service ratios. This analysis will allow us to develop a composite measure of public-debt ratios for post-conflict economies that can be compared across countries and regions, and to enable further investigation of the public-debt relationship to economic growth in a post-conflict, extractive economy.

In 1999-2022, the ratio of public debt to GDP declined significantly alongside sustained economic recovery. Such a decline based on fiscal policy alone cannot be expected to restore macroeconomic stability. Several empirical models estimate the extent to which continuous economic recovery contributes to sharpening the negative association between public debt and economic growth.

Time-series and panel data compiled from various sources facilitate analysis of the linkage between public debt and economic growth in Iraq. Key variables include the nominal stock of public debt, debt-service payments in domestic currency, the ratio of public debt to GDP, and the ratio of debt-service payments to nominal GDP. Because the emphasis is on the stock of publicly held debt which captures the cumulative effects of past fiscal operations data extend from 1990 as showing in figure 3.

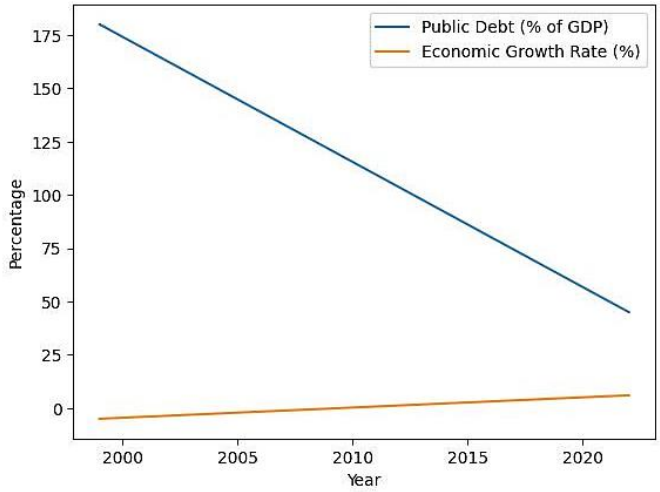

FIGURE 3. Illustrative Public Debt and Economic Growth Dynamics in Post Conflict Iraq (1999-2022).

4.2. Econometric Specification

Econometric models aim to capture the nonlinear relationship between public debt and growth, allowing for threshold, spline, or smooth-transition linkages. A fundamental difference separates linear from nonlinear frameworks. In the former, the growth elasticity of debt (level or service) is constant; increases or decreases exert equal marginal effects on growth. The coefficient estimates remain stable across different debt-service averages applied to the explanatory variable, whether trend-filtered or level. Thus, within a simple linear specification, hypothesis tests solely target the expected sign (negative) rather than shape (diminishing returns, thresholds, downturns).

The nonlinear model relaxes these restrictions. The estimated coefficients and underlying relationships depend upon the average monthly debt-service ratio employed, threshold values determining whether debt elevates or depresses growth, and the passage of time since debt levels increase. Growing total debt or debt service first stimulates sales and output prior to deterring investment and curbing expansion; under specific conditions, temporary debt-service reductions from prolonged higher oil prices or post-catastrophe international support—may even renew growth as showing in figure 4.

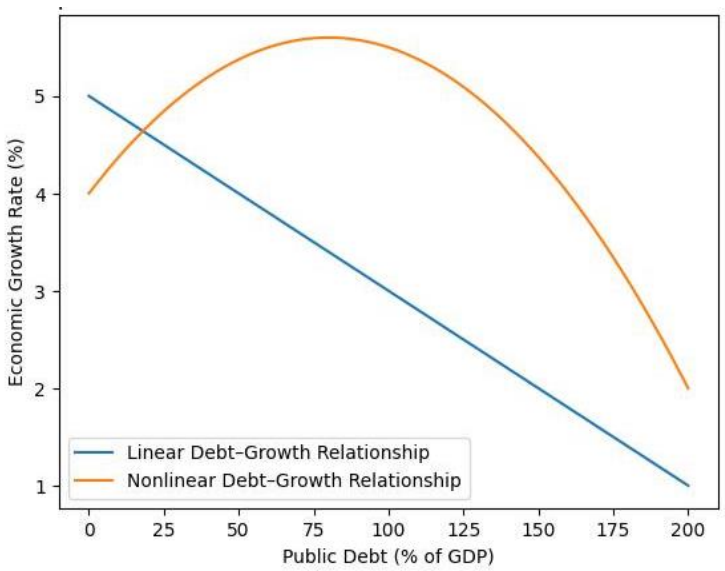

FIGURE 4. Comparison between Linear and Nonlinear Public Debt-Growth

4.3. Policy-Relevant Implications

The findings from the empirical analysis show that the debt-growth relationship in Iraq follows a nonlinear pattern that is consistent with theoretical predictions. Similar to other economies that are heavily dependent on oil, there is a threshold level of debt after which any additional debt inhibits growth, and this threshold works primarily

through a debt service rather than a direct debt stock channel. A second regime is shown where the statistically insignificant impact occurs within certain ranges of debt service, thus indicating that there can be little or no growth effect from debt servicing. The experiences pre- and post-2015 with negative oil price shocks show that the economy remains susceptible to such exogenous shocks. As a result of the increase in the debt to GDP ratio since 2020 and the continued volatility in oil prices following COVID-19, the role of debt in generating economic growth in Iraq is an urgent policy issue. There are many policy implications that can be derived from the nonlinear relationship between public debt and economic growth as showing in figure 5.

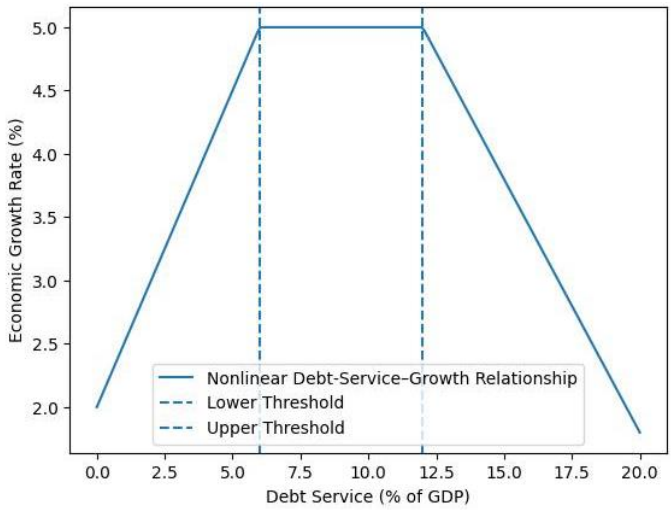

FIGURE 5. Nonlinear Debt-Service Threshold effects on Economic Growth in Iraq

The predominant policy areas that warrant attention include aligning public debt management with an economic stimulus programmed through the adoption of a debt sustainability framework. The growth-oriented fiscal rules to augment the positive impact of public debt on the economy; and prioritizing the implementation of institutional reform aimed at enhancing the efficiency of public expenditure and public investment, thereby enhancing the growth potential of public investment.

5. POLICY IMPLICATION AND RECOMMENDATION

The empirical findings point to a nonlinear debt-growth relationship in Iraq consistent with these theoretical underpinnings. Similarly to other oil-dependent economies, a threshold exists beyond which debt becomes detrimental to growth. The threshold appears to operate through a debt-service channel rather than a direct debt-stock effect. A second regime emerges where debt service exerts no statistically discernible impact, suggesting that within certain ranges of debt service, its growth effect may be negligible. Pre- and post-2015 episodes of negative oil-price shocks also highlight the exposure of the economy to such exogenous shocks. With the debt-to-GDP ratio increasing significantly since 2020 and oil-price volatility post-COVID-19 remaining a concern, the capacity of debt to generate growth in Iraq's economy has become a pressing policy issue [2].

5.1. Debt Sustainability and Growth-Oriented Fiscal Rules

Since the early 1990s, external shocks (e.g., a recession) and internal shocks (e.g., an influx of job seekers from a war zone) can result in a substantial decline in output, and that post-recession debt adjustments have a positive effect on growth; this model also supports Treasury or other public investments in long-term economic development. The influx of public capital following reconstruction following a natural disaster or other significant economic disruption can have an immediate positive impact on total investment; however, domestic investment policies that use all available resources on rebuilding will reduce the impact of additional public or private debt-financed total investments. Budget and foreign exchange crises are key focal points for national economic policy development and offer additional insight. Alternative methods to identify partial investment growth are also clearly acknowledged throughout the paper.

Explicit strategy specification emphasizes avoiding emergent nonlinearities rather than preempting posterior shifts, facilitating the assessment of theoretical erogeneity. Unprocessed data from international sources preferentially govern debt and inflation indicators, adhering to publicly available frameworks frequently referenced in recent analyses. Both private and public external debt receive attention, and the public debt subcomponent remains central to the investigation. Public data also guide measures of infrastructure capital,

investment pricing, and sectorial performance. Systematic investment and public-investment share estimates for the post-conflict period continue to rely on private underpinning. Data series on oil extraction and sectorial oil-endowed output corroborate national tracking of public-financed projects: sectorial output filmic remains a decisive selection criterion.

Iraq's nonlinear debt-growth relationship resonates with linear-risk literature, suggesting beneficial additional effects, activity specifically intended to counter cyclical downturns, and ongoing reconstruction. Formal consideration of alternative fiscal rules addressing these themes could enhance and extend the argument.

5.2. Institutional Reforms and Revenue Composition

Despite the rapidly increasing size of public debt, it has not been accompanied by a similar rise in the debt-service-to-revenue ratio. A more pronounced positive link, on the other hand, appears to have emerged between the growth of public debt and non-oil revenue composition. The case for improved government effectiveness and accountability in the management of debt resources still holds, as do the wider institutional recommendations for developing the quality of contract enforcement and reducing political instability. The impact of institutional quality on the productivity of public investment is likely to remain muted given the low share of public investment and the dominance of the oil sector, which is generally governed by a separate quality-of-institution constraint.
Growth-enhancing adjustments to revenue composition—by shifting the mix towards non-oil revenues and away from oil revenues—can be complemented by institutional improvements to advance management capacity and the credibility of public policies. The fiscal structure is skewed heavily towards a reliance on oil revenues, with non-oil revenues limited mainly to customs duties (collected primarily at border crossings), company income taxes (mostly from foreign companies producing oil), telecommunications fees, and specified recurrent municipal charges. Furthermore, only a small share of non-oil revenues is assigned to municipal governments, thus hampering local development at the grass roots. Such adjustments are nonetheless unlikely to boost debt-effectiveness growth beyond protracted, narrow peaks centered on the oil sector until the remaining monetary and wider institutional capabilities capable of capturing deposits for re-investment in the sector become more firmly established [9].

6. ROBUSTNESS AND LIMITATION

In Iraq, the available data on public debt are limited—especially where long time-series or substantial cross-section variation is required for nonlinear econometric modeling. These data constraints preclude testing and evaluation of certain nonlinear specifications that have been found relevant in less contextualized studies of commodity-dependent economies, and restrict investigation into specific nonlinear patterns widely cited within the literature (e.g., ceiling effects on debt-GDP ratios; multi-dimensional frameworks encompassing debt accumulation, servicing costs, or macroeconomic shocks). Further, the standard assumption of strict exogeneity may not hold in the Iraqi context. Measurement error risk also arises from growing concern surrounding the accuracy of macroeconomic statistics since the 2014 crisis. Attention should, therefore, be drawn to possible structural changes in the parameterization of the debt-growth relationship. Avenues for additional inquiry include the estimation of nonlinear specifications more explicitly aligned to Iraq’s circumstances and the collection of additional data beyond the desired timeframe of 1995–2022, which would enable a broader or alternative set of tests. [4]

7. CONCLUSION

The relationship between public debt and economic growth in Iraq is a complex, nonlinear one; therefore, in order to achieve sustainable levels of public debt while supporting economic growth, it is essential to have an accurate understanding of the relationship between these two factors. The relationship can be established through sound theoretical foundations that identify either the positive effect that public debt might have on economic growth (by increasing productive public investment through borrowing) or the negative effects of poor management of public debt (reducing economic growth through inefficient accumulation and servicing). The combination of those two factors can help to explain the nonlinear relationship that occurs when examining the historical relationship between public debt and economic growth in Iraq. As levels of public debt in Iraq continue to increase, their effect on economic growth will become less positive and may eventually become negative. In addition to the debt-to-GDP and debt-service-to-GDP, there are many other variables that will influence the amount of public debt that a country incurs. The use of a long-time series database (2002 to 2020) demonstrates that there is a nonlinear relationship between public debt and economic growth in Iraq. This is evident because during the period of 2002 to 2020, economic growth has been positively correlated with both the debt-to-GDP and the debt-service-to-GDP ratios, however the turning points (when economic growth begins to decline) for the debt-to-GDP ratio is at levels below the average observed for the debt-to-GDP ratio in Iraq and the turning points for the debt-service-to-GDP ratio are well within the historical range of the debt-service-to-GDP ratios in Iraq.

Cumulative yearly growth losses due to increasing public debt that are beyond certain point estimates indicate that the average annual economic growth will be diminished by 4.5% a year. This has implications that should not be ignored.

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