Budget Deficit, Primary Deficit and Ponzi Games

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Abstact

The budget deficit, defined as the excess of government expenditures over revenues within a fiscal year, is a central indicator of a nation's fiscal health and a critical variable in macroeconomic policy analysis. This paper examines the budget deficit from both theoretical and applied perspectives, integrating definitions, classifications, and competing economic interpretations. It explores the structural, cyclical, and political economy factors that contribute to fiscal imbalances, as well as the short- and long-term economic implications of persistent deficits for debt sustainability, inflation dynamics, private sector investment, and external sector stability. Special attention is given to the interaction between the budget deficit and the balance of payments through the twin deficits hypothesis, highlighting the mechanisms by which domestic fiscal policy can influence external imbalances. The paper also discusses the principal methods of financing budget deficits and assesses their macroeconomic consequences. The analysis culminates in a case study of the Republic of Moldova, providing historical trends, policy evaluations, and an assessment of fiscal–external linkages. The findings underscore the importance of maintaining a sustainable fiscal stance through a combination of prudent expenditure management, effective revenue mobilization, and coherent coordination between fiscal and monetary policies, while recognizing the role of temporary deficits in counter-cyclical economic management.

Keywords: Budget deficit; Fiscal deficit; Primary deficit; Structural deficit; Cyclical deficit; Public debt; Fiscal policy; Twin deficits hypothesis; Balance of payments; Debt sustainability; No-Ponzi-game condition; Economic growth; Public finance; Government borrowing; Fiscal adjustment.

Jel Classification: E62, H62, H63, F32, F41, O23, P24

Introduction

Definition of the budget deficit

A **budget deficit** refers to the situation in which a government's total expenditures exceed the revenues it generates within a specified fiscal period, typically one year. In macroeconomic terms, the budget deficit can be expressed as the difference between government spending and government income, primarily derived from taxation, non-tax revenues, and other public income sources (OECD, 2024). A budget deficit indicates that the public sector is operating with a financing gap, which must be covered through borrowing, monetary expansion, or the utilization of accumulated reserves. Economists distinguish between various forms of budget deficits, such as the **fiscal deficit**—the overall shortfall excluding borrowings; the **primary deficit**—which excludes interest payments on existing debt; and the **structural deficit**—which is adjusted for cyclical fluctuations in economic activity (Blanchard & Johnson, 2013). Persistent budget deficits may have significant macroeconomic implications, influencing debt sustainability, inflationary pressures, and external sector balances.

Importance in macroeconomic policy

The budget deficit occupies a central role in macroeconomic policy, as it directly reflects the government's fiscal stance and its impact on overall economic performance. A deficit can serve as a deliberate policy instrument in counter-cyclical fiscal management, allowing governments to stimulate aggregate demand during economic downturns through increased public spending or tax reductions (Keynes, 1936). In this context, moderate and well-targeted deficits can support economic recovery, reduce unemployment, and maintain social stability. Conversely, persistent or large deficits, particularly those driven by structural imbalances rather than cyclical needs, may undermine macroeconomic stability by increasing public debt, exerting upward pressure on interest rates, and constraining future fiscal space (IMF, 2023). The budget deficit also interacts with other macroeconomic objectives, including inflation control, exchange rate stability, and balance of payments equilibrium, making it a critical variable in the design and coordination of fiscal, monetary, and external sector policies.

Overview of the paper's scope and structure

This paper examines the budget deficit from both a theoretical and applied perspective, combining macroeconomic analysis with a focused country case study. The first section outlines the conceptual foundations of the budget deficit, including definitions, classifications, and theoretical interpretations. The second section explores the principal causes and determinants of fiscal imbalances, distinguishing between structural, cyclical, and policy-induced factors. The third section analyses the economic implications of budget deficits in both the short and long term, with particular emphasis on their interaction with public debt, inflation, and private investment. The paper then discusses the methods and instruments available for financing budget deficits, followed by an in-depth examination of the link between fiscal deficits and the balance of payments, grounded in the twin deficits hypothesis. The final part presents a case study of the Republic of Moldova, analysing historical trends, policy responses, and the relationship between the budget deficit and external sector performance. The paper concludes with policy recommendations aimed at ensuring fiscal sustainability while supporting economic growth and macroeconomic stability.

Theoretical Foundations

Definition & formula

Types of deficits:

Fiscal deficit

The **fiscal deficit** represents the gap between a government's total expenditure and its total revenue, excluding funds obtained through borrowing, within a given fiscal year. It reflects the extent to which government spending exceeds the resources generated from taxation, non-tax revenues, and other internal income sources (World Bank, 2023). The fiscal deficit is a key indicator of a government's financial position and is closely monitored by policymakers, investors, and international institutions, as it influences public debt dynamics and macroeconomic stability. A moderate fiscal deficit may be consistent with sustainable economic growth, particularly if it finances productive investments that enhance long-term output capacity. However, a persistently high fiscal deficit can lead to increased borrowing requirements, higher debt servicing costs, and reduced fiscal flexibility, potentially crowding out private sector investment and undermining confidence in fiscal management (Blanchard & Johnson, 2013).

Primary deficit

The **primary deficit** measures the fiscal imbalance excluding interest payments on the government's outstanding debt. It is calculated as the fiscal deficit minus interest expenditures, thereby capturing the difference between the government's non-interest spending and its total revenues within a given fiscal period (IMF, 2023). The primary deficit is a critical indicator for assessing the sustainability of public finances, as it reflects the government's underlying fiscal position without the burden of past borrowing costs. A primary surplus indicates that current revenues exceed non-interest expenditures, enabling the government to reduce its debt stock over time, while a primary deficit implies that additional borrowing will be required even before servicing existing debt obligations. Persistent primary deficits can signal structural weaknesses in fiscal policy, reduce investor confidence, and increase vulnerability to debt crises, especially in economies with high debt-to-GDP ratios or volatile financing conditions (Blanchard & Johnson, 2013).

Structural vs. cyclical deficit

The **structural deficit** refers to the portion of the budget deficit that persists even when the economy is operating at its full potential, reflecting underlying imbalances in fiscal policy independent of the business cycle. It is determined by structural factors such as tax system design, expenditure commitments, demographic pressures, and institutional inefficiencies (OECD, 2024). In contrast, the **cyclical deficit** arises from temporary fluctuations in economic activity over the business cycle. During recessions, tax revenues tend to decline while social spending, such as unemployment benefits, increases, leading to a larger cyclical deficit. Conversely, in periods of economic expansion, cyclical deficits may shrink or even turn into surpluses as revenues rise and counter-cyclical spending falls (Blanchard & Johnson, 2013). Distinguishing between structural and cyclical components is essential for sound fiscal policy design, as it enables policymakers to identify the portion of the deficit that will correct itself with economic recovery versus the portion that requires structural reforms. This distinction also plays a central role in the application of fiscal rules and in assessments by international institutions regarding fiscal sustainability.

- Economic theories on deficits: Keynesian vs. classical view

Economic thought offers contrasting interpretations of the role and implications of budget deficits, most prominently reflected in the **Keynesian** and **Classical** schools of macroeconomic theory. The **Keynesian perspective**, originating from the work of John Maynard Keynes (1936), views budget deficits as a potentially beneficial policy instrument during periods of economic downturn. Keynesians argue that, in the presence of underutilized resources and insufficient aggregate demand, deficit-financed public spending can stimulate economic activity, increase employment, and accelerate recovery. In this framework, temporary deficits are not inherently harmful if they support economic stabilization and are reversed during periods of growth.

In contrast, the **Classical view**, rooted in pre-Keynesian economic thought and later reinforced by neoclassical models, regards persistent budget deficits as detrimental to long-term economic stability. Classical economists emphasize the crowding-out effect, whereby government borrowing raises interest rates and displaces private investment, reducing the economy's productive capacity over time. They also stress the importance of fiscal discipline, balanced budgets, and the intertemporal budget constraint, arguing that deficits primarily lead to higher public debt, potential inflationary pressures, and lower investor confidence (Barro, 1979).

The divergence between these two perspectives reflects deeper differences in assumptions regarding price and wage flexibility, the responsiveness of private investment to interest rate changes, and the effectiveness of fiscal policy in influencing output and employment. Modern policy debates often integrate elements of both views, recognizing that the desirability of budget deficits depends on their size, duration, financing method, and the broader macroeconomic context.

The twin deficits hypothesis (link to BoP)

The **twin deficits hypothesis** posits a positive relationship between a country's fiscal deficit and its current account deficit, suggesting that deterioration in the government's budget balance is often accompanied by a deterioration in the external balance. The theoretical basis for this relationship lies in the national income identity, where the current account balance reflects the difference between national saving and investment. A fiscal deficit, by reducing public saving, can lower overall national saving; if domestic investment remains constant, the resulting saving–investment gap must be financed through increased borrowing from abroad, manifesting as a current account deficit (Summers, 1988).

From a macroeconomic perspective, expansionary fiscal policy that increases the budget deficit tends to raise aggregate demand, part of which spills over into higher imports, thereby worsening the trade balance—a key component of the current account. The financing of larger external deficits typically requires capital inflows, which are recorded in the financial account of the balance of payments. In the long run, sustained twin deficits may lead to rising external debt, currency appreciation pressures, and increased vulnerability to shifts in investor sentiment (IMF, 2023).

Empirical studies show mixed evidence: while many economies—especially emerging markets—exhibit a strong linkage between fiscal and current account deficits, others display a weaker connection due to factors such as exchange rate regimes, capital mobility, and the role of private saving adjustments. Nonetheless, the twin deficits framework remains a central analytical tool in assessing the interaction between domestic fiscal policy and external sector performance.

Causes of Budget Deficits

Structural factors (economic structure, demographics)

Structural factors, such as the underlying economic structure and demographic trends, play a significant role in shaping a country's budget balance over the long term. The composition of an economy determines the stability and elasticity of its revenue base: economies heavily reliant on volatile sectors—such as commodities or agriculture—are more vulnerable to fluctuations in global prices, which can cause persistent fiscal imbalances during downturns (World Bank, 2023). Likewise, economies with a narrow tax base or significant informal activity may experience chronically low revenue mobilization, constraining their ability to finance public expenditures without resorting to borrowing. Demographic dynamics also exert long-term pressure on fiscal balances. An ageing population increases pension and healthcare expenditures while reducing the share of the working-age population, thereby limiting tax revenue growth. Conversely, in developing economies with youthful populations, high dependency ratios may increase education and healthcare spending needs before productivity gains are realized. These structural

determinants of fiscal outcomes are difficult to alter in the short term, often requiring deep institutional reforms, diversification of the economic base, and long-term policy planning to achieve sustainable public finances.

Cyclical factors (business cycles)

Cyclical factors, primarily driven by the fluctuations of the business cycle, exert a significant short-term influence on the budget balance. During periods of economic contraction, tax revenues from income, consumption, and corporate profits decline as economic activity slows, while public expenditures on social protection—such as unemployment benefits and welfare programs—automatically increase. These automatic stabilizers, though essential for mitigating the social and economic impacts of recessions, widen the fiscal deficit in the short run (OECD, 2024). Conversely, during economic expansions, rising revenues and lower social spending often improve the fiscal position, potentially generating budget surpluses if expenditure growth is contained. The magnitude of these cyclical effects depends on the responsiveness of revenues and expenditures to changes in output, which varies across countries depending on their tax structure, labor market characteristics, and social safety nets. While cyclical deficits are generally self-correcting as the economy recovers, prolonged or deep recessions can transform temporary imbalances into structural deficits if they lead to permanent revenue losses or politically entrenched expenditure increases.

Ponzi Games

In the context of public finance, a **Ponzi game** refers to a fiscal strategy in which a government finances interest payments on existing debt by issuing new debt, without generating sufficient primary surpluses to eventually repay the principal (Blanchard & Weil, 1992). This mechanism resembles a Ponzi scheme in the private sector, as it relies on continuously rolling over debt obligations rather than on sustainable revenue generation or expenditure control. While such a strategy may be feasible in the short term—particularly if interest rates remain below the rate of economic growth—it is inherently unsustainable in the long run. Once the growth–interest rate differential turns unfavorable, debt service obligations grow faster than the economy's capacity to finance them, leading to an explosive debt trajectory. In the context of budget deficits, a Ponzi game signals the absence of credible fiscal adjustment measures and the reliance on perpetual borrowing to cover both current expenditures and past obligations. This can undermine investor confidence, raise risk premiums on sovereign debt, and, in extreme cases, precipitate fiscal or balance-of-payments crises. For this reason, most macroeconomic sustainability frameworks, including those of the IMF and World Bank, explicitly reject fiscal strategies consistent with a Ponzi game equilibrium

The **no-Ponzi game (NPG) condition** is a sustainability requirement derived from the government's intertemporal budget constraint. Let BtB_tBt represent the nominal stock of government debt at time ttt, rrr the real interest rate, and ggg the real growth rate of GDP. The NPG condition requires that the **present value of government debt converges to zero in the long run**, formally expressed as:

$$\lim_{T\to\infty} \frac{B_T}{\prod_{t=1}^{T}(1+r)} = 0$$

In real terms, under constant interest and growth rates, this implies:

$$\lim_{T\to\infty} \frac{B_T}{(1+g)^T} = 0$$

The intuition is that the debt-to-GDP ratio cannot grow indefinitely faster than the economy's productive capacity. A Ponzi game violates this condition by continually refinancing maturing debt and interest payments without generating sufficient **primary surpluses** (PStPS_tPSt) to stabilize or reduce the debt ratio. The government's intertemporal budget constraint can be expressed as:

$$B_t = \sum_{s=0}^{\infty} \frac{-PS_{t+s}}{\prod_{k=1}^{s}(1+r_k)}$$

For debt sustainability, the discounted sum of future primary surpluses must equal the current debt stock. If this equality does not hold, the fiscal path implies a Ponzi-type financing strategy, which is generally considered unsustainable in the absence of exceptional conditions (e.g., permanently negative real interest rates).

Mathematical condition (rigorous)

Below is a concise, rigorous derivation of the **no-Ponzi-game (NPG)** / debt-sustainability condition starting from the government budget constraint and moving to the debt-to-GDP dynamics and steady-state condition.

1. Nominal government budget constraint (period t to t+1)

$$B_{t+1} = (1+r_t)B_t + G_t - T_t$$

where Bt is nominal debt, rt the real interest rate (or effective real yield), Gt government expenditure, and Tt tax and non-debt revenue. Define the **primary deficit** PDt≡Gt− Tt (positive if deficit).

2. Iteration and the intertemporal budget constraint (IBC)
Iterate forward from ttt to TTT:

$$B_T = \Big(\prod_{k=t}^{T-1}(1+r_k)\Big)B_t + \sum_{s=0}^{T-t-1}\Big(\prod_{k=t+s+1}^{T-1}(1+r_k)\Big)PD_{t+s}.$$

Divide both sides by the cumulative discount factor and take the limit T→◊ T\to\inftyT→◊ . Imposing the **transversality / no-Ponzi** condition

$$\lim_{T\to\infty}\frac{B_T}{\prod_{k=t}^{T-1}(1+r_k)} = 0$$

yields the IBC (present value form):

$$B_t = -\sum_{s=0}^{\infty}\frac{PD_{t+s}}{\prod_{k=0}^{s}(1+r_{t+k})}.$$

Interpretation: current debt equals the discounted present value of future primary surpluses. A Ponzi game violates the transversality condition.

Let $Y_{t+1} = (1+g)Y_t$ and define $b_t \equiv B_t/Y_t,\ p_t \equiv PD_t/Y_t$. Assume constant r and g. Then

$$\begin{aligned} b_{t+1} = \frac{B_{t+1}}{Y_{t+1}} &= \frac{(1+r)B_t + PD_t}{(1+g)Y_t} \\ &= \underbrace{\frac{1+r}{1+g}}_{=\phi} b_t \ + \ \frac{p_t}{1+g}. \end{aligned}$$

So the multiplier $\phi = (1+r)/(1+g)$ determines inertial behavior of the debt ratio.

4. Stability condition and steady state

- If $\phi < 1$ (i.e. $r < g$ approximately), the debt ratio is stable *without* requiring a permanent primary surplus: deviations decay over time.
- If $\phi \geq 1$ (i.e. $r \geq g$), the debt ratio will explode unless the government runs a sufficiently large and persistent *primary surplus*.

Assuming constant $p_t = p$ and $\phi \neq 1$, the steady-state debt ratio b^* satisfies

$$b^* = \frac{p/(1+g)}{1-\phi} = -\frac{p}{r-g} \quad \text{(approximate form for small rates)}.$$

Rearranged, the primary surplus required to stabilize a target b^* is

$$p = -(r-g)\, b^*.$$

So when $r > g$, a **primary surplus** is required ($p < 0$ meaning surplus) to prevent unsustainable debt dynamics. When $r < g$, the economy can tolerate a (small) persistent primary deficit and still stabilize the debt ratio.

5. Special/limiting cases

- If $r = g$: the dynamics reduce to $b_{t+1} = b_t + p_t/(1+g)$. Debt-to-GDP is stable only if the long-run average of p_t is zero (no persistent deficit).
- The NPG/transversality condition is the formal requirement that rules out financing via perpetual roll-over; it is necessary for the IBC to hold and for the present value decomposition to be well defined.

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(CEFR). Moreover, the article uses ChatGPT and Google Gemini demonstrating significant potential in academic writing, though challenges in academic integrity and AI-human balance. Also, it tests Cambridge Proficiency in English C2 (Academic English) in all five skills: writing, speaking, reading, listening and use of English– in modules.

References

- Barro, R. J. (1979). On the determination of the public debt. *Journal of Political Economy, 87*(5), 940–971. https://doi.org/10.1086/260807
- Blanchard, O., & Johnson, D. R. (2013). *Macroeconomics* (6th ed.). Pearson.
- Blanchard, O. J., & Weil, P. (1992). Dynamic efficiency, the riskless rate, and debt Ponzi games under uncertainty. *Belfer Center for Science and International Affairs Discussion Paper Series*, Harvard University.
- International Monetary Fund (IMF). (2023). *Fiscal Monitor: Public finances in the wake of the pandemic*. IMF. https://www.imf.org/en/Publications/FM
- Keynes, J. M. (1936). *The general theory of employment, interest, and money*. Macmillan.
- Organisation for Economic Co-operation and Development (OECD). (2024). *Government at a glance*. OECD Publishing. https://doi.org/10.1787/9789264265716-en
- Summers, L. H. (1988). Tax policy and international competitiveness. In J. Frenkel (Ed.), *International aspects of fiscal policies* (pp. 349–386). University of Chicago Press.
- World Bank. (2023). *World development indicators*. The World Bank. https://databank.worldbank.org/source/world-development-indicators