Ghana's unsustainable public indebtedness: Causes, consequences and remedies

Emmanuel Akuoko-Konadu[1] and Imhotep Paul Alagidede[2]
Mendel University in Brno, Czech Republic[1],
University of the Witwatersrand, Johannesburg, South Africa; University of Ghana, Legon,
Accra, Ghana[2]

Abstract

This paper examines the causes and long-run consequences of public debt on economic growth and inflation in Ghana from 1990 to 2022. The study assesses key drivers of public debt, including interest rates, money supply, and financial development. Using the autoregressive distributed lag (ARDL) bounds testing approach and accounting for structural breaks, the findings reveal a significant negative relationship between public debt and economic growth, indicating that high levels of indebtedness may hinder sustainable development by diverting resources away from productive investments. Interestingly, the analysis also uncovers a counterintuitive negative relationship between public debt and inflation, suggesting that effective fiscal and monetary policies have mitigated potential inflationary pressures associated with rising debt levels. From a policy perspective, the study advocates for prudent debt management strategies that prioritize investments in productive sectors. It is also imperative for policymakers to consider rigorous cost-benefit analyses to ensure that borrowing decisions are aligned with high-return projects that generate sufficient economic output to repay the debt.

Keywords: *Public debt, economic growth, inflation, Ghana, ARDL.*

1   Introduction

Ghana's economic narrative is deeply intertwined with the legacies of colonial exploitation and the persistent challenges of post-colonial development, which have collectively shaped its modern-day debt dependency. Since gaining independence in 1957, Ghana has sought economic self-determination but has often found itself ensnared in cycles of financial instability and under-development (Kusi, 2015; Ncube & Brixiová, 2015; Ackah et al., 2020). The legacy of colonialism, which positioned the then Gold Coast as a critical player in the imperialist race for resources, laid the groundwork for an unbalanced economy heavily reliant on primary commodity exports (Alagidede et al., 2013). Despite initial strides toward economic sovereignty, Ghana's trajectory has been repeatedly hindered by debt crises, particularly during the 1980s and 1990s, as plunging commodity prices and escalating debt severely constrained the country's development ambitions (Osei, 1995; Aimola & Odhiambo, 2018; Abotebuno, 2023). Ghana joined the Heavily Indebted Poor Countries (HIPC) Initiative in 2002 due to an unsustainable debt burden that hindered its economic growth. By 2000, the country's public debt to GDP ratio had reached 181.65%, with debt servicing consuming up to 40% of export revenues, leaving little room for essential infrastructure, health, and education investments (Osei and Quartey, 2001; Alagidede et al., 2013). By 2006, the public debt to GDP ratio experienced a sharp decline to 26.25%, primarily driven by debt write-offs under the Heavily Indebted Poor Countries Initiative (HIPC). This relief reduced the debt burden and provided fiscal space for the government to redirect resources toward vital sectors such as

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****Corresponding author.**   *E-mail address:: xakuokok@mendelu.cz , akuokokonadu@icloud.com*

education, health, and infrastructure. However, despite this achievement, the fundamental issues within Ghana's economic structure persisted. Before HIPC, a significant portion of government spending was allocated to wages and debt servicing, constraining investments in productive sectors (Osei and Quartey, 2001).

Consequently, while debt relief presented an opportunity for growth, it did not guarantee it. The effective use of the newly available fiscal space depended on government actions, emphasizing the need for improved export performance and economic diversification to sustain growth and prevent future debt accumulation. Research (see Osei and Quartey, 2001; Kusi, 2015) indicates that although debt reduction enhanced Ghana's fiscal position, its impact on overall economic growth was limited, reflecting mixed outcomes of foreign aid, where strategic resource utilization was critical for fostering sustainable development. After 2007, the country gradually accumulated new debt due to increased borrowing for infrastructure projects, social programs, and budget deficits. However, the formal declaration of a debt crisis in July 2022 marked a new chapter in this ongoing struggle. This announcement was preceded by months of consistent downgrades of Ghana's long-term local and foreign currency issuer default ratings by several agencies, notably Moody's, Fitch Ratings, and S&P Global Ratings (MOF, 2022a). These systematic downgrades were driven by rising debt stock, increasing debt service levels, and heightened liquidity constraints. External debt snowballed in the decade leading up to 2022, with an 80% increase between 2015 and 2021 alone, from USD 20.1 billion to USD 36.2 billion (Aimola & Odhiambo, 2021; Abotebuno, 2023). During that period, external debt service costs more than tripled, from USD 1.05 billion to USD 3.23 billion (Bank of Ghana, 2022b). At the same time, Ghana's domestic debt also surged, rising from USD 10.6 million in 2015 to over USD 30 million by the end of 2021 (Ministry of Finance, 2021). This was primarily driven by increased government borrowing to finance fiscal deficits, which expanded due to spending on public sector wages, energy sector liabilities, and pandemic-related relief efforts. The high domestic borrowing also led to a crowding-out effect, raising interest rates from 16% in 2019 to 30% in 2023 (Bank of Ghana, 2023), and limiting credit access for the private sector. Additionally, domestic debt service costs soared, with interest payments consuming significant government revenue, contributing to liquidity constraints. These developments put immense pressure on Ghana's economy, culminating in the July 2022 debt crisis announcement.

The impact of this crisis was immediate and profound. The cedi, which had already lost 19.2% of its value against the US dollar in the first half of 2022, further depreciated by 54.2% by November 2022 (Bank of Ghana, 2022a). This depreciation and rising inflation—reaching over 54% by the end of December 2022—exacerbated the economic situation. The Bank of Ghana's attempts to curb inflation through interest rate hikes further strained the economy, driving up the cost of living. This economic turmoil fueled widespread public dissatisfaction, leading to protests and calls for the resignation of key government officials.

In response to the crisis, the government pursued a domestic debt exchange program, a controversial move that sparked further tensions. Initially aimed at delaying payments to institutional bondholders, the program was met with resistance, particularly from pension funds and other financial institutions. The subsequent inclusion of individual bondholders, including pensioners, in the debt exchange led to public outcry, with the Pensioners Association of Ghana and public figures like former Chief Justice Sophia Akuffo vocally opposing the program. The challenges in restructuring domestic debt, coupled with the government's failure to meet a critical Eurobond payment deadline in February 2023, underscored the severity of the crisis (Abotebuno, 2023).

This situation highlighted the longstanding vulnerabilities in Ghana's economic model and the recurrent reliance on international borrowing, particularly from the IMF, to manage debt. By 2023, Ghana turned to the IMF for the 17th time in its history, securing a USD 3 billion facility under an extended credit arrangement (Ministry of Finance, 2022b). This reliance on external support underscored the deeper structural issues within the economy, where new debts often failed to generate sufficient revenue for repayment, further entrenching the cycle of dependency. The government's debt-to-GDP ratio, which reached an alarming 92.40% in 2022 (Ministry of Finance, 2022b), reflects the urgency of addressing these challenges through comprehensive and sustainable economic reforms.

This paper explores the complex causes of Ghana's internal and external indebtedness, critically assesses the economic consequences of the debt crisis, and proposes actionable remedies. These include diversifying away from a commodity-dependent economy and more responsible bor-

rowing practices. The paper argues for a more equitable distribution of the costs associated with debt, where lenders share the burden of irresponsible lending and advocate for policies that ensure economic growth benefits are more effectively captured through improved domestic revenue mobilization.

The remainder of the paper is structured as follows: Section 2 provides an overview of the trends in Ghana's public debt, revenue, and expenditure. Section 3 reviews the relevant theoretical and empirical literature. Section 4 outlines the methodology and section 5 presents the empirical findings. Finally, Section 6 offers concluding remarks and policy recommendations.

2 Public debt, revenue, and expenditure in Ghana

Ghana's public debt has undergone significant changes over the last two decades. As a percentage of GDP, public debt increased from 49.9% in 2000 to over 80% by 2022, with notable fluctuations driven by economic conditions and fiscal policies. Following external debt relief under the HIPC Initiative in 2004 and the Multilateral Debt Relief Initiative (MDRI) in 2006, Ghana saw its debt-to-GDP ratio decline from 58.3% in 2003 to a low of 26% in 2006. However, these gains were short-lived as public debt rose steadily after 2007, reaching critical levels in the 2010s. This was primarily due to increased borrowing to finance infrastructure projects, rising fiscal deficits, and growing reliance on external financing through Eurobond issuances. For example, Ghana's issuance of Eurobonds began in 2007, with the first US $750 million issued at a yield of 8.5%. By 2013, the country's reliance on Eurobonds had surged, as demonstrated by the issuance of a $1 billion Eurobond at a yield of 7.875%. This trend continued, and in 2021, Ghana issued a $3 billion Eurobond at rates of 7.875%, 8.125%, and 9.950% for the 7-year, 12-year, and 31-year bonds, respectively, aimed at refinancing maturing debts and supporting infrastructure development, including the construction of roads, energy projects, and social infrastructure (Ministry of Finance, 2014). By 2020, debt had risen sharply, exacerbated by the COVID-19 pandemic and higher borrowing costs, pushing the debt-to-GDP ratio above 70%. This was attributed mainly to pandemic-related profligate spending, relaxed public procurement practices, and emergency relief measures from multilateral institutions (Abotebuno, 2023; Klutse et al., 2023). In response to the economic fallout from COVID-19, the government implemented expansive fiscal interventions, including free water and electricity programs, business relief funds, and health sector investments, which significantly strained public finances.

Meanwhile, the relaxation of public procurement rules during this period created inefficiencies and potential mismanagement in government spending, leading to inflated costs and further contributing to rising debt. Emergency financial support from multilateral development banks, such as the IMF's $1 billion Rapid Credit Facility and additional loans from the World Bank (WB, 2024c), added to external debt obligations. Combined with rising borrowing costs, these factors exacerbated Ghana's debt-to-GDP ratio, raising concerns about long-term fiscal sustainability. Expenditures on infrastructure, public sector wages, and social programs have consistently exceeded revenue, contributing to Ghana's debt accumulation (World Bank, 2024b). For instance, in 2018, total revenue was GH¢47.6 billion, while expenditures reached GH¢67.4 billion, leading to a deficit of GH¢10.6 billion. By the end of 2021, the deficit had increased to GH¢42.4 billion, representing a 300% increase (Ministry of Finance, 2021). This is further elaborated on at the 8th Economic Update of Ghana held in Accra on July 22, 2024, which stressed that Ghana's tax collection has been relatively low compared to its peers. It was emphasized that between 2017 and 2021, Ghana's average tax collection was 13.2% of GDP, well below the Sub-Saharan Africa average and 8% points short of the country's estimated tax capacity of 21.2% (World Bank, 2024a). This fiscal imbalance has been a long-term issue, with government spending on education and infrastructure rising by nearly 50% from 2000 to 2004 while revenue lagged (Obeng, 2015). The persistent deficits were often financed through borrowing, which has driven Ghana's public debt to over 70% of GDP by 2020 (Ministry of Finance, 2022a).

In contrast, in recent years, the need to manage public health crises like COVID-19 and service high-interest debt obligations has put further pressure on the fiscal budget. These rising expenditures have been financed mainly through domestic and external borrowing, increasing public debt. The combined effects of low revenue generation and high spending have significantly contributed to the accumulation of Ghana's debt, raising concerns over fiscal sustainability and the ability to manage future debt servicing obligations.

Figure 1 illustrates that the gross public debt to GDP ratio experienced a sharp decline from 181.65% in 2000 to 26.25% in 2006. This period saw a concerted effort to reduce debt levels, and a significant reason is attributed to the HIPC program that the country subscribed to in 2002. A reversal occurred in 2007, with the ratio increasing to 31.05%, reaching 54.57% in 2015. This upward trend may be attributed to global economic challenges and increased borrowing. From 2016 to 2022, the ratio remained relatively stable, fluctuating around the mid-50% range. Notably, there was a peak in 2020 at 74.41%, likely influenced by economic challenges related to the COVID-19 pandemic.
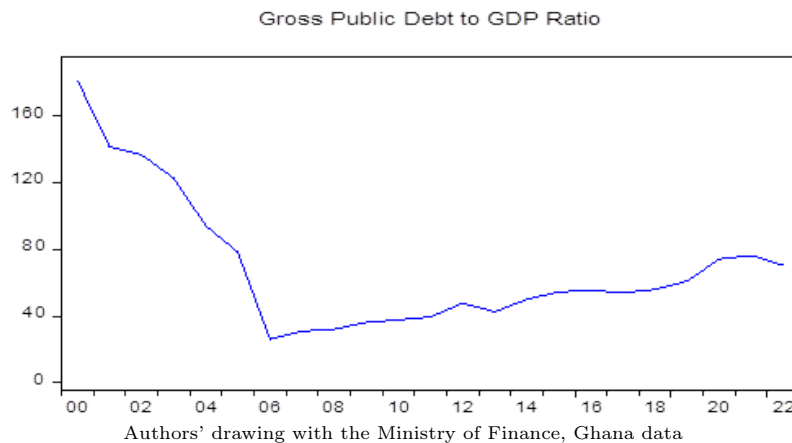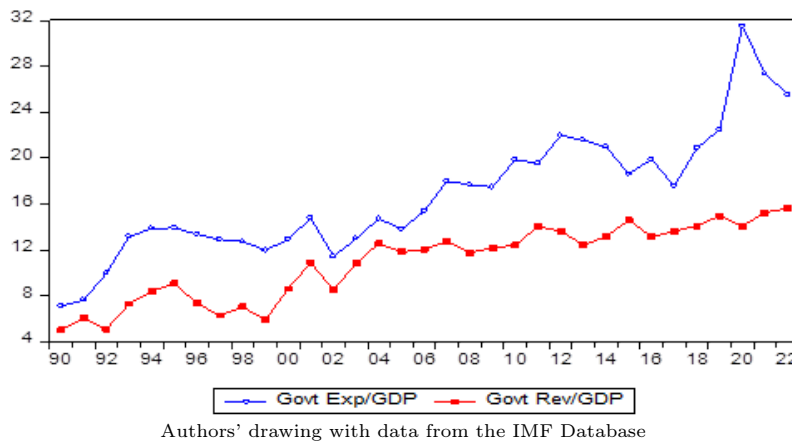
Figure 1: Gross Public Debt to GDP Ratio in Ghana (%)

Authors' drawing with the Ministry of Finance, Ghana data

Figure 2: Government Spending and Revenue as a Percentage of GDP in Ghana

Authors' drawing with data from the IMF Database

There is no gainsaying the fact that a significant reason for the increased government debt in Ghana and most developing countries can be attributed to a situation where government spending growth outpaces the corresponding tax revenue increase more than proportionately. This indicates a misalignment between the expansion of expenditures by the government and the need for more growth in funds generated through taxation. This argument is substantiated in Figure 2, where the consistent increase in government revenue, especially from 2001 to 2010, indicates efforts to enhance fiscal capacity. However, the sustained rise in government expenditure, possibly due to economic mismanagement and external economic shocks like the global financial crisis and the COVID-19 pandemic, has contributed to a broader gap between revenue and expenditure, hence a continuous increase in the public debt to GDP ratio. Compounding these fiscal challenges is Ghana's external balance, which shows persistent current account deficits. For instance, the external deficit in 2013 was GH¢ 12.3 billion, decreasing to GH¢ 2.2 billion by 2016. Although slight surpluses were noted from 2017 (GH¢ 3.7 billion) to 2020 (GH¢ 1.3 billion), the overarching trend

has been negative, culminating in a substantial external deficit of GH¢ 2 billion in 2023 (World Bank, 2024c). The dual fiscal and external imbalances intensify Ghana's economic vulnerabilities. This pattern of fiscal and external deficits reflects a twin deficit issue, where internal (fiscal) and external (current account) imbalances are present. This scenario makes it unavoidable to accumulate debt, as external borrowing is essential to cover government expenses and trade deficits. Ghana must manage expenditures, improve revenue collection, and rectify external imbalances to reduce escalating debt levels. A balanced approach to domestic fiscal policies and international trade is crucial for sustainable economic growth.

3 Literature Review

This section explores the relevant theoretical and empirical literature on the causes and consequences of persistent public debt in Ghana.

3.1 Theoretical Review

Different economic theories provide varying perspectives on the effects of debt, each offering insights into how economies respond to financial obligations. At the forefront, Keynesian economics (Keynes, 1936) advocates a proactive approach during economic downturns, where governments use fiscal policy to boost demand through increased public spending. This often leads to budget deficits and accumulating debt. Keynesians argue that during economic hardships, the short-term benefits of increased government spending, even if financed by debt, outweigh the long-term costs, as this injection of demand can expedite recovery (Keynes, 1936). However, Keynesian theory is often criticized for assuming that governments can perfectly time their interventions to avoid inflationary pressures once recovery begins (Barro, 1995; Sargent & Wallace, 1981). It overlooks the long-term consequences of persistent public debt, such as the crowding out of private investment due to rising interest rates (Cochrane, 2011; Gale & Orszag, 2004). These critiques underscore the need for alternative approaches to understanding the repercussions of debt on economic growth. One such alternative is the Ricardian Equivalence theory (Barro, 1989; Elmendorf & Mankiw, 1999; Gale & Orszag, 2004), which challenges the effectiveness of Keynesian demand management. According to this theory, forward-looking individuals anticipate future tax increases to retire government debt. As a result, they adjust their savings behaviour, effectively neutralizing the stimulative effect of government spending financed by debt. In this way, Ricardian Equivalence suggests that government debt may not have the intended impact on overall demand, as consumers save more to prepare for future tax burdens. This critique highlights the limitations of using fiscal stimulus as a reliable tool for driving economic growth, as it suggests that individuals' expectations can offset government policy effects (Barro, 1989; Elmendorf & Mankiw, 1999). Building on these critiques, the Debt Overhang Theory (Borensztein, 1990; Reinhart et al., 2012) offers further insight into the long-term consequences of excessive debt. This theory posits that when debt levels become unsustainable, they create uncertainty, leading investors and businesses to hesitate in pursuing productive investments. High debt servicing costs can further constrain governments' ability to invest in growth-promoting initiatives, setting the stage for slow economic growth or stagnation (Borensztein, 1990; Reinhart et al., 2012). In the context of the crowding-out effect, reduced public investment—particularly if it complements private sector initiatives—can diminish growth rates (Diaz-Alejandro et al., 1984; Akuoko-Konadu, 2023). The Debt Overhang Theory thus provides a valuable extension to the Keynesian framework by emphasizing that beyond short-term fiscal stimulus, long-term debt accumulation can generate a self-reinforcing cycle of economic slowdown (Gale & Orszag, 2004; Abille & Kilic, 2023). The negative consequences of high public debt extend beyond investment and interest rates. Dotsey (1994) highlights the risk of future discretionary taxation, while Sargent and Wallace (1981), Barro (1995), and Cochrane (2011) emphasize the inflationary pressures that can result from excessive debt, introducing further volatility. Aghion and Kharroubi (2007) also contribute to this discussion by showing how elevated public debt levels can trigger banking and currency crises, compounding economic volatility and stagnation. As a result, excessive borrowing may crowd out private investment and lead to systemic risks that further impair long-term growth (Kumar & Woo, 2010).

3.2   Causes of debt crises in developing countries.

Debt crises in developing countries, such as Ghana, are driven by a complex interplay of factors. Recent studies have highlighted several key drivers of changes in public and private debt in Ghana. These include fiscal imbalances, low commodity prices, a narrowing tax base, and higher borrowing costs (Ghana Medium-Term Debt Strategy, 2010; Africa Forum and Network on Debt and Development, 2013). High borrowing costs, fiscal dominance, and the persistent decline in export earnings have all played significant roles in the accumulation of public debt (Aimola & Odhiambo, 2018). The situation is exacerbated by unfavorable terms of trade and a heavy reliance on primary commodities, making the economy particularly vulnerable to external shocks such as adverse weather events and global market fluctuations (Filip, 2019; Brooks et al., 1998). Furthermore, inadequate macroeconomic adjustments and ineffective policy coordination have compounded these vulnerabilities, hindering the structural reforms necessary to stabilize the economy and prevent the relentless cycle of debt accumulation (Brooks et al., 1998). The burden of public debt is not merely a financial challenge but a significant obstacle to poverty reduction and broader socioeconomic development. A large portion of government revenue, which could otherwise be invested in critical sectors such as healthcare and education, is consumed by debt servicing obligations (Osei & Quartey, 2001). While initiatives like the Heavily Indebted Poor Countries (HIPC) program have provided some relief, their long-term impact on economic growth and poverty alleviation has been modest (Osei & Quartey, 2001). Additionally, large-scale government projects, often requiring substantial capital, are frequently undermined by political instability, poor debt management, and leadership failures. These issues contribute to economic stagnation, revenue loss, and rising unemployment (Damoah, 2015). As Ghana and other developing nations strive to improve their healthcare and education systems through initiatives like e-health, they face additional challenges related to infrastructure, technology, and human resource capacity (Yusif & Jeffrey, 2014). These challenges are further compounded by the well-documented negative relationship between external debt and economic growth, where excessive debt hampers progress and limits the ability of these countries to invest in future development (Chowdhury, 2001). While external borrowing can play a crucial role in financing vital investments and boosting consumption, an overreliance on debt, without implementing prudent management strategies, deepens economic difficulties (McDonald, 1982). Addressing the pervasive debt problem in countries like Ghana requires a comprehensive approach. This includes cautious economic projections, rigorous debt management practices, and policies aimed at diversifying exports and reducing dependence on external financing (Brooks et al., 1998). Such measures are essential not only to break the cycle of debt but also to lay a sustainable foundation for long-term economic growth and development. The relationship between public debt, inflation, and economic growth in developing countries is complex and often contradictory. While some studies find adverse effects of public debt on growth (Van Bon, 2015; Saungweme & Odhiambo, 2018), others report positive impacts through fiscal multiplier effects (Saungweme & Odhiambo, 2018). The interaction between public debt and inflation can affect regional growth (Van Bon, 2015). Some research supports the Ricardian Equivalence Hypothesis, suggesting no relationship between public debt and growth (Saungweme & Odhiambo, 2018; Yamin et al., 2023). Additionally, the impact of public debt on inflation is generally positive, while inflation tends to affect public debt negatively (Van Bon, 2015). Factors influencing these relationships include the level of development, data coverage, methodology, and choice of control variables (Saungweme & Odhiambo, 2018; Yamin et al., 2023). The literature reveals inconclusive results, highlighting the need for context-specific analysis in policymaking.

3.3   Empirical Literature Review

Recent studies on Ghana's public debt provide a multifaceted view of its effects on the economy and financial sector. A prominent area of focus has been the relationship between public debt and inflation. Aimola and Odhiambo (2021) employed the Autoregressive Distributed Lag (ARDL) bounds testing approach to analyze data from 1983 to 2018, revealing that public debt significantly positively impacts inflation in the short and long term. This finding underscores the need for prudent fiscal management to prevent inflationary pressures from destabilizing the economy.

The relationship between public debt and economic growth presents a more nuanced picture. Abille and Kılıç (2023) used the Nonlinear Autoregressive Distributed Lag (NARDL) model to investigate the asymmetric effects of public debt on economic growth. Their study found that

positive shocks to public debt have an insignificant impact on growth, while adverse shocks significantly hinder economic growth in the short run. This suggests that the inefficient utilization of borrowed funds may contribute, highlighting the importance of effective debt management.

Similarly, Forson (2019) found that Ghana's debt is unsustainable and negatively impacts economic growth, particularly in the long run. Using the neoclassical growth model and fiscal reaction function, Forson emphasized the need for the government to channel borrowed funds into productive activities to foster sustainable economic growth.

Contrasting these findings, Owusu-Nantwi and Erickson (2016) identified a positive long-term relationship between public debt and economic growth, emphasizing that when debt is used to finance high-priority, self-sustaining projects, it can contribute positively to economic development. Hilton (2021) further explored the causal relationships between public debt and GDP, finding that while no short-run causal link exists, public debt positively influences GDP in the long run. This study reinforces the importance of fiscal discipline and targeted investments to maximize the benefits of public borrowing.

The study by Anning et al. (2016) contributes to this discourse by focusing on the impact of both external and domestic debt on Ghana's economic growth. Using a simple Ordinary Least Squares (OLS) methodology with data from 1990 to 2015, the authors found a negative relationship between debt and economic growth. They highlighted Ghana's high dependency on external aid and loans, particularly after being classified as a Heavily Indebted Poor Country (HIPC) by the IMF and World Bank in 1999. The study recommends discouraging further government debt borrowing and instead suggests increasing the revenue base through tax reforms as a more sustainable approach.

The financial sector's response to public debt has also been examined, with Amponsah (2015) observing a neutral impact of public debt on bank profitability and efficiency from 2004 to 2013. However, more recent research by Osei-Amoako and Aboagye-Debrah (2024) indicates that high levels of public debt can lead to conservative lending practices, higher interest rates, and reduced credit availability, which may hinder financial sector efficiency and restrict economic growth.

Early work by Sowa (1994) provides an essential context, particularly regarding inflation. Sowa used an error correction model (ECM) to analyze inflation dynamics in Ghana, finding that output volatility, rather than monetary factors, had a more significant influence on inflation. The study also noted that inconsistent fiscal policies, especially regarding budgetary deficits, exacerbated inflationary pressures in the late 1980s. Sowa's findings highlight the need for consistent budgetary policy and supply-side interventions to manage inflation effectively.

In conclusion, the literature suggests that while public debt has a consistent relationship with inflation, its impact on economic growth and the financial sector is more variable and dependent on the effective management and utilization of borrowed funds. To optimize the benefits of public debt, Ghana must adopt more robust debt management strategies, ensure fiscal discipline, and prioritize productive investments. These measures ensure that public debt contributes positively to economic growth and stability rather than burdening the economy.

4   Methodology

This section outlines the methodological framework used in the study, detailing the model specification, data sources, and the chosen estimation approach.

4.1   Data

The study relied on annual time-series data from 1990 to 2022; this was chosen due to the availability of trustworthy and accurate data for the variables concerning Ghana. Most of the data, including economic growth, inflation, and other macroeconomic indicators, was sourced from the World Bank's World Development Indicators (WDI). However, public debt and interest rate data were gleaned from the International Monetary Fund's World Economic Outlook (WEO) database. This ensures the use of credible and reliable data throughout the analysis. Furthermore, Table. A.1 (see Appendix) outlines how each variable was measured.

4.2   Empirical strategy and model specifications

We employ the ARDL bounds testing approach for cointegration, as proposed by Pesaran et al. (2001), alongside the error correction model (ECM) for this study due to its several advantages

over alternative cointegration methods, which typically require strictly $I(1)$ stationary variables. The ARDL bounds test is particularly robust because it can handle variables strictly $I(0)$, $I(1)$, or a combination of both, making it well-suited for small sample sizes, as is the case in this study with only 33 annual observations. All variables are transformed into natural logarithms (ln) to mitigate the effects of outliers and reduce heteroscedasticity. The analysis begins by examining the stationarity properties of the variables in models 1, 2, and 3. To do this, the parametric Augmented Dickey-Fuller (ADF) test by Dickey and Fuller (1979; 1981) and the non-parametric Phillips-Perron (PP) test by Phillips and Perron (1988) are employed. Checking for stationarity is crucial to prevent spurious regressions. These methods are particularly suitable for small sample size time series data like this study. Additionally, the PP test acts as a robustness check for the ADF test results, as it can address higher-level serial correlation and heteroscedasticity that may affect the ADF results. These tests evaluate the null hypothesis of a unit root, indicating non-stationarity, against the alternative hypothesis of no unit root, indicating stationarity. Table A.2 (see Appendix) demonstrates that apart from $lnPD$, $lnINT$, $lnGFCE$, and $lnMS$, which are stationary at $I(1)$, all other variables are integrated of order zero.

After conducting the unit root tests, dummy variables are introduced into the models to capture the period-specific effects of the structural breaks in public debt, economic growth, and inflation. The structural break in public debt was identified in 2009, economic growth in 2013, and inflation in 2003, as determined by the Zivot-Andrews endogenous structural break test in Table. A.3 (see Appendix). These dummy variables are incorporated to account for regime shifts or policy changes during these periods, allowing for more accurate estimations of the relationships between the dependent variables and the explanatory factors. Cointegration (see results in Table 1) is then assessed using the Autoregressive Distributed Lag (ARDL) bounds test approach (see Pesaran et al., 2001). After confirming the presence of long-run relationships among all the variables, we estimated the ARDL model. Our first model considers the significant causes of public debt in Ghana, and it is specified as follows:

$$
\begin{aligned}
lnPD = \beta_0 &+ \beta_1 lnEXR_t + \beta_2 lnINF_t + \beta_3 lnINT_t + \beta_4 lnGFCE_t + \\
&\beta_5 lnMS_t + \beta_6 DUM2009_t + \beta_7 lnFD_t + \beta_8 lnGDPgr_t + \epsilon_t
\end{aligned} \tag{1}
$$

The second and third model estimate the consequences of public debt on economic growth and inflation, and they are specified as follows:

$$
\begin{aligned}
lnGDP_{gr} = \theta_0 &+ \theta_1 lnEXR_t + \theta_2 lnINF_t + \theta_3 lnFDI + \theta_4 lnGFCF_t \\
&+ \theta_5 lnPD_t + \theta_6 lnOPEN_t + \theta_6 DUM2013_t + \epsilon_t
\end{aligned} \tag{2}
$$

$$
\begin{aligned}
lnINF = \varphi_0 &+ \varphi_1 lnINTt + \varphi_2 lnMSt + \varphi_3 lnGDPgrt + \varphi_4 lnGFCFt + \\
&\varphi_5 lnPDt + \varphi_6 lnOPENt + \varphi_7 DUM2003t + \epsilon_t
\end{aligned} \tag{3}
$$

The description and measurement of variables are seen in Table A.1 of the Appendix section. The conditional Error Correction Model (ECM) used for the ARDL estimation is then specified as follows:

$$
\Delta PD_t = \beta_0 + \sum_{i=1}^{P} \beta_1 \Delta PD_{t-i} + \sum_{i=0}^{P} \beta_k \Delta X_{t-i} + \delta PD_{t-1} + \delta_k X_{t-1} + \mu_t \tag{4}
$$

$$
\Delta GDPgr_t = \theta_0 + \sum_{i=1}^{P} \theta_1 \Delta GDPgr_{t-i} + \sum_{i=0}^{P} \theta_k \Delta X_{t-i} + \delta GDPgr_{t-1} + \delta_k X_{t-1} + \mu_t \tag{5}
$$

$$\Delta INF_t = \varphi_0 + \sum_{i=1}^{P} \varphi_1 \Delta INF_{t-i} + \sum_{i=0}^{P} \varphi_k \Delta X_{t-i} + \delta_1 INF_{t-1} + \delta_k X_{t-1} + \mu_t \qquad (6)$$

In equations 4, 5, and 6, Δ denotes the first difference operator, k represents the number of regressors, and μ_t signifies the error term. The independent and dependent variables are X and PD, $GDPgr$, and INF, respectively. The Error Correction Model (ECM) is estimated using the Ordinary Least Squares (OLS) method. The null hypothesis of no cointegration ($H_0 : \delta_1 = \delta k = 0$) is tested against the alternative hypothesis of cointegration ($H_1 : \delta_1 \neq \delta_k \neq 0$) using the F-test. The bounds test provides critical values for determining the presence of cointegration, with the upper bound assuming all variables are $I(1)$ and the lower bound assuming they are $I(0)$. Cointegration is confirmed if the F-statistic exceeds the upper bound critical value; no cointegration is indicated if it is below the lower bound critical value. If the F-statistic falls between these bounds, the results are inconclusive. Long- and short-run estimates are obtained if cointegration is confirmed. The test is performed using Stata 15.

Table 1: Results of ARDL Bounds Test for Cointegration Relationship

Testing for existence of a level relationship among the variables in the ARDL model				
	95% Level		90% Level	
F-statistic	Lower Bound	Upper Bound	Lower Bound	Upper Bound
Model 1	7.172	2.22	3.39	1.95	3.06
Model 2	6.794	2.32	3.5	2.03	3.13
Model 3	4.843	-2.86	-4.57	-2.57	-4.23

Notes: The result is inconclusive if the test statistic falls within the critical value bounds—a value above the upper bound leads to rejecting the null hypothesis, indicating a level effect. Conversely, a value below the lower bound means the null hypothesis of no level effect cannot be rejected. The critical value bounds are determined through stochastic simulations with 20,000 replications.

The results indicate that the F-test statistics reject the null hypothesis of no long-run equilibrium relationship in all three models at the 5% significance level. This suggests that the variables are cointegrated, implying that the model's parameters can be consistently estimated without assuming exogeneity.

5   Results and discussions

Table 2 presents the long-run estimation results for models 1, 2, and 3, where the dependent variables are public debt ($lnPD$), GDP growth ($lnGDPgr$), and inflation ($lnINF$), respectively.

5.1   Causes of public debt

The analysis reveals several important drivers of public debt in Ghana. The negative and statistically significant relationship between the exchange rate ($lnEXR$) and public debt (-0.953) suggests that a currency appreciation of the Ghana cedi corresponds to an increase in public debt. If a significant portion of a country's public debt is denominated in foreign currencies, an appreciation makes it cheaper to service or repay foreign debt. Also, an appreciating currency could negatively affect exports by making them more expensive in global markets. This could lead to lower revenues from trade, causing the government to borrow more to cover deficits or fund its budget, thereby increasing public debt (Cain et al., 2010; Ouihibi and Hammami, 2020). Moreover, the negative effect of inflation ($lnINF$) on public debt (-1.009) further supports this theory, as rising inflation erodes the real value of nominal debt. This is consistent with earlier empirical findings that shows that inflation can ease the debt burden in developing countries (Fisher, 1933). On the other hand, interest rates ($lnINT$) are positively associated with public debt (1.813), as higher borrowing costs lead to increased debt accumulation. Government final consumption expenditure ($lnGFCE$) is also positively related to public debt (0.604), which reflects the financing of government spending through borrowing. Additionally, the money supply ($lnMS$) significantly increases public debt (2.153), likely due to government borrowing from domestic financial markets. The structural break in 2009 (DUM2009) had a positive and significant effect (0.122), suggesting

that the global financial crisis and domestic policy shifts during that period increased public debt. Financial development ($lnFD$) has a negative and statistically significant effect (-0.434), indicating that a more developed financial sector helps mitigate public debt, potentially by improving financial management and reducing borrowing needs. Economic growth ($lnGDPgr$) did not significantly influence public debt within the study period.

Table 2: Results of the Estimated ARDL Long-Run Coefficients.

Variables	Model 1	Model 2	Model 3
$lnEXR$	-0.953**	1.137*	
	(0.393)	(0.625)	
$lnINF$	-1.009**	0.286*	
	(0.307)	(0.156)	
$lnINT$	1.813***		0.850*
	(0.323)		(0.473)
$lnGFCE$	0.604*		
	(0.311)		
$lnMS$	2.153***		4.697***
	(0.469)		(1.276)
$DUM2009$	0.122**		
	(0.038)		
$lnFD$	-0.434**		
	(0.177)		
$lnGDP_{gr}$	0.094		-0.248
	(0.074)		(0.140)
$lnFDI$		0.044	
		(0.094)	
$lnGFCF$		-0.947***	1.38**
		(0.308)	(0.608)
$lnPD$		-0.798***	-0.49**
		(0.253)	(0.202)
$lnOPEN$		1.593***	-2.084**
		(0.348)	(0.817)
$DUM2013$		0.532***	
		(0.153)	
$DUM2003$			-0.215**
			(0.092)

Note: *** (**) and * denote rejection of null hypothesis at 1% (5%) and 10% significance level. Standard errors in parenthesis.

5.2 Consequences of Public Debt: Impact on GDP and Inflation

In model 2, the exchange rate (lnEXR) positively influences GDP (1.137), suggesting that a depreciated currency can boost economic growth, possibly through enhanced export competitiveness. The coefficient of inflation (lnINF) suggests that a 1% increase in inflation is associated with a 0.286% increase in GDP, significant at the 10% error margin. Moderate inflation can stimulate economic activity by encouraging spending and investment, although high inflation typically has a negative impact. The foreign direct Investment (lnFDI) coefficient did not significantly impact economic growth during the study period. Gross fixed capital formation (lnGFCF) also significantly negatively affects GDP (-0.947), possibly indicating diminishing returns on investment or inefficiencies in capital utilization. However, the positive effect of trade openness (lnOPEN) on GDP (1.593) is significant at a 1% error margin, supporting the export-led growth hypothesis, which posits that integration into global markets fosters economic expansion . Ghana's reliance on export-driven sectors, such as agriculture and mining, means that trade openness is crucial in driving growth. This result echoes the findings of Asiedu (2013) and Sakyi (2011), who emphasize the importance of trade liberalization in enhancing economic performance in Ghana. The structural break in GDP (DUM2013) is statistically significant and positive (0.532), reflecting a period of economic recovery or reform that positively affected growth. The negative relationship

between public debt (lnPD) and GDP (-0.798) suggests that rising debt levels have a detrimental effect on economic growth in Ghana. This finding supports the debt-overhang hypothesis, which posits that excessive debt reduces growth prospects by diverting resources away from productive investments. This finding aligns with the notion that excessive debt can crowd out productive investments, thereby slowing down long-term growth. This result is consistent with previous findings (see Panizza et al., 2014; Calderón and Fuentes, 2013; Law et al., 2021) but contrary to the findings of (see Frimpong and Oteng-Abayie, 2006; Owusu-Nantwi and Erickson, 2016).

In the inflation model (Model 3), public debt (lnPD) negatively affects inflation (-0.49), which suggests that higher debt levels, while detrimental to growth, may impose fiscal constraints that reduce inflationary pressures. This aligns with Fisher's (1933) argument that disciplined fiscal policy, often necessitated by high debt, can contribute to lower inflation. The outcome aligns with (see Saani et al., 2024) but contrasts the results of (Aimola and Odhiambo, 2021). The strong positive effect of money supply (lnMS) on inflation (4.697) reflects the classical quantity theory of money, where excessive liquidity leads to rising prices (Friedman, 1970). The results further indicate that higher interest (lnINT) rates are associated with rising inflation in Ghana. This supports the cost-push inflation theory, where increased borrowing costs lead to higher production prices (Mankiw, 2001). Although the relationship between GDP growth and inflation is negative, it is statistically insignificant. Additionally, gross fixed capital formation (lnGFCF) positively impacts inflation, as increased investment drives resource demand, raising prices. Trade openness, however, helps reduce inflation by increasing competition and lowering costs through cheaper imports, consistent with the Balassa-Samuelson effect (Balassa, 1964; Samuelson, 1964). Lastly, the structural break in 2003 (DUM2003) highlights the role of macroeconomic reforms in stabilizing inflation, mainly through the HIPC initiative and early inflation-targeting policies (Fosu and Aryeetey, 2008).

It is important to note that the statistical fit and adequacy of the estimated ARDL models depend crucially on the estimated coefficient of the ECM. For this reason, we report the ECM results and the diagnostic and stability tests in Table 6 (see Appendix A.4.). For all the estimated models, we find the coefficient of the ECM to be negative and statistically significant across all models, indicating a swift adjustment to equilibrium after any short-term deviation. Furthermore, the magnitude of the estimate of the error correction term suggests a reasonably high speed of adjustment from short-run disequilibrium. The coefficients of the ECM imply that approximately 72% to 87% of disequilibria from the previous year's shock converge back to the long-run equilibrium in the current year. The estimated models passed all diagnostic tests for heteroscedasticity, serial correlation, and normality. Substantial evidence supports Ramsey's RESET test, which suggests that the estimated models are well specified. The results of the Cumulative Sum (CUSUM) and Cumulative Sum of Squares (CUSUMQ) for the estimated models indicate that the parameters of the models are highly stable over the sample period since the plot of the CUSUM and CUSUMSQ statistics fall within the critical bounds at the 5% confidence interval of parameter stability (see plot in Appendix).

6   Conclusion

This paper examined the causes and consequences of public debt in Ghana, focusing on the impact of public debt on economic growth and inflation. Using the ARDL bounds testing approach and accounting for structural breaks, the findings reveal a negative relationship between public debt and inflation, contrary to the expectations of many economic theories, such as the Fiscal Theory of the Price Level, which posits that rising public debt generally leads to inflationary pressures. This result suggests that, in Ghana's context, public debt may not have the inflationary effects typically observed in other economies. One possible explanation is the effective fiscal and monetary policies implemented during the study period, which mitigated the potential inflationary impacts of public debt. Additionally, the negative relationship might reflect the capacity of debt-financed investments to enhance productivity in key sectors, thereby dampening inflation. On the other hand, the study also highlights a negative relationship between public debt and economic growth, reinforcing concerns about the long-term sustainability of debt-driven economic strategies. Excessive borrowing, particularly when not invested in productive sectors, can hinder economic growth by crowding out private investment and increasing future debt-servicing costs. From a policy perspective, these findings suggest that while public debt has not significantly contributed to inflation in Ghana, the government should still exercise caution in debt accumulation. Effective

debt management strategies should focus on directing debt into productive investments, such as infrastructure and export-oriented industries, to bolster economic growth without triggering inflation. Improving tax collection efficiency, broadening the tax base, and enhancing compliance can increase government revenues without significantly raising tax rates. It is also imperative for policymakers to consider rigorous cost-benefit analyses to ensure that borrowing decisions are aligned with high-return projects that generate sufficient economic output to repay the debt. Enhancing value-added exports can further mitigate the adverse effects of debt on the economy. A more nuanced approach to debt management that distinguishes between domestic and external debt may provide insights into the specific impacts on inflation and growth. Future studies should explore these relationships further, perhaps through nonlinear models, to capture the complexities and dynamics of debt in Ghana's economy.

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Appendix

Table A.1

Variables	Description (Expectation)	Measurement
PD	Public debt	Total public debt (% of GDP)
INF	Inflation	Consumer prices (annual %)
GDPgr	Economic growth	Annual percentage growth rate of GDP at market prices based on constant local currency
EXR	Exchange rates	Adjusted nominal exchange rate index for price/cost changes
INT	Interest rates	Monetary policy rate (annual %)
GFCE	General government final consumption expenditure (annual % growth)	Annual percentage growth of government consumption expenditure in constant local currency.
MS	Money supply	Broad money supply (% of GDP)
FD	Financial Development (Domestic Credit)	Private sector funding from deposit-taking corporations (less central banks)
OPEN	Trade openness	Sum of imports and exports measured as a share of gross domestic product
FDI	Foreign Direct Investment	Net investment inflows for 10%+ ownership in a foreign enterprise
GFCF	Private investment	Gross fixed capital formation (% of GDP)

Table A.2: Results of Unit root test

Variables	ADF Test		Phillips-Perron Test	
	Constant	Constant + Trend	Constant	Constant + Trend
Level				
$lnPD$	-1.226	-1.709	-1.455	-1.785
$lnINF$	-3.020**	-2.614	'-3.086**	'-3.179*
$lnGDPgr$	-4.827***	-4.758***	'-4.819**	'-4.780**
$lnEXR$	-16.169***	-27.732***	'-10.585***	'-20.795***
$lnINT$	-1.794	-1.846	-2.067	-2.638
$lnGFCE$	-2.215	-4.472***	-2.176	'-3.921*
$lnMS$	-2.295	-2.991	-2.219	-3.041
$lnFD$	'-9.93***	-7.711***	'-7.754***	'-7.712***
$lnOPEN$	-6.481***	-5.819***	'-6.154***	'-5.939***
$lnFDI$	-12.405***	-9.886***	'-9.697***	'-9.886***
$lnGFCF$	'-8.611***	-7.466***	'-7.433***	'-7.371***
First Difference				
$lnPD$	-5.407***	-5.264***	-5.391***	-5.257***
$lnINF$	-5.612***	-5.547***	-6.404***	-6.379***
$lnGDPgr$	-5.876***	-5.819***	-19.024***	-19.256***
$lnEXR$	-32.927***	-30.970***	-58.926***	-52.768***
$lnINT$	-4.465***	-4.391***	-4.599***	-4.529***
$lnGFCE$	-6.078***	-6.052***	-8.068***	-8.515***
$lnMS$	-8.546***	-8.425***	-8.445***	-8.380***
$lnFD$	-15.726***	-15.809***	-15.726***	-70.476***
$lnOPEN$	-4.737***	-4.970***	-7.870***	-8.781***
$lnFDI$	-14.360***	-14.250***	-16.670***	-18.987***
$lnGFCF$	-11.310***	-11.039***	-11.599***	-11.267***

Table A.3: Zivot-Andrews structural break unit root test

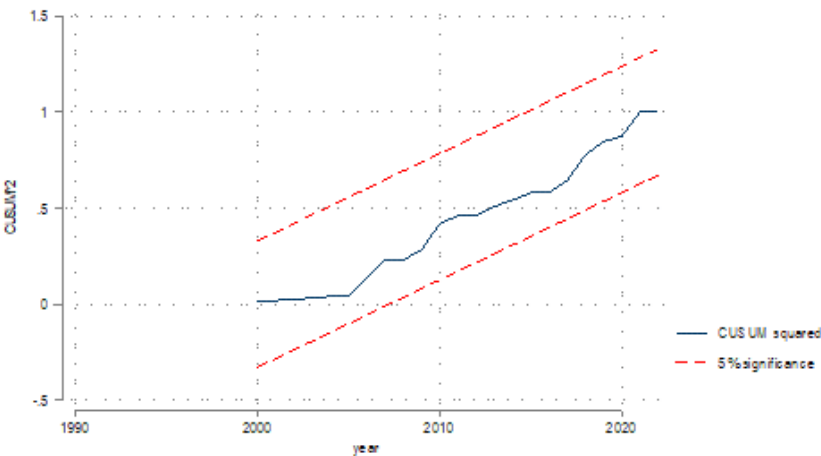|	ZA test at level		ZA test at First Difference	
Variables	T-statistic	Break year	T-statistic	Break year
$lnPD$	-2.287	2009	-6.351***	2001
$lnINF$	-5.379***	2003	-6.000***	1997
$lnGDPgr$	5.735***	2013	-6.160***	2012

Table A.4: Model diagnostic and stability tests.

	lnPD	lnINF	lnGDPgr
Test Statistic	Model 1	Model 2	Model 3
Serial Correlation $\chi2(1)$	2.760	0.307	3.344
	(0.197)	(0.579)	(0.067)
Functional Form $\chi2(1)$	0.450	2.620	1.730
	(0.723)	(0.176)	(0.191)
Heteroscedasticity $\chi2(1)$	0.570	1.00	0.240
	(0.448)	(0.317)	(0.625)
Normality $\chi2(1)$	2.192	0.401	0.821
	(0.334)	(0.818)	(0.663)
CUSUM	Stable	Stable	Stable
CUSUMSQ	Stable	Stable	Stable
ECM (-1)	-0.722***	-0.866***	-0.723**
	(-0.140)	(-0.132)	(-0.210)

The probability values for serial correlation, functional form, heteroscedasticity, and normality tests are presented in parentheses. The ECM (-1) standard errors are also shown in parentheses. Asterisks (***, **) indicate the rejection of the null hypothesis at the 1% and 5% significance levels, respectively.
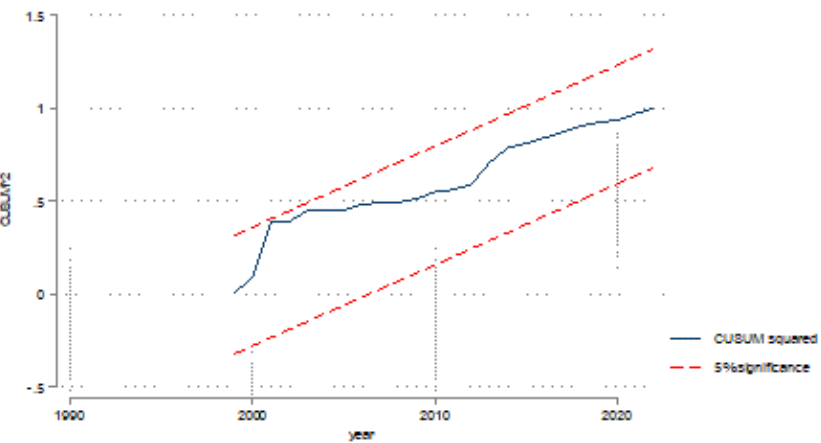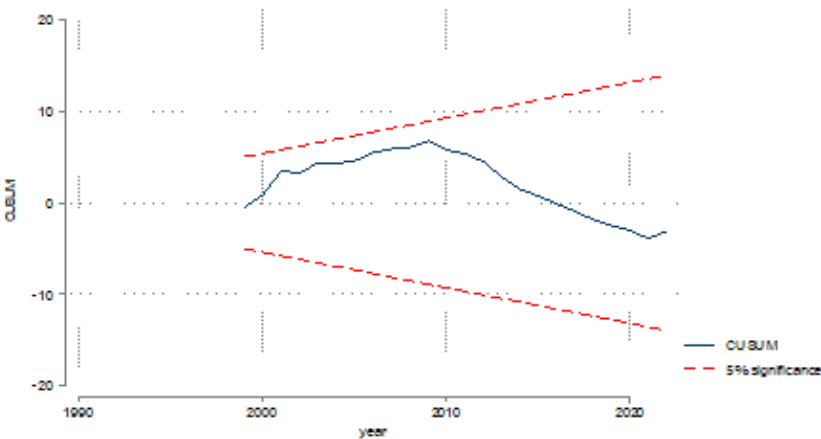
Plot of $CUSUM$ and $CUSUM^2$ for all Models

Model.1

Model.2

Model.3