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Research article

Granger causality between public debt and inflation: Evidence from panel data

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Abstract: This study explores the causal links between public debt and inflation. To that end, we employ the novel homogeneous approach to test for Granger noncausality in heterogeneous panels in a sample of 121 countries from 1995 to 2022. This methodological approach is particularly appropriate for datasets characterized by highly persistent processes, a moderate temporal scope, and the presence of heterogeneous nuisance parameters. Our results suggest that, despite a unidirectional Granger causality relationship being detected from public debt to inflation in some cases, bidirectional Granger causality was identified for most countries under study when examining the pairwise relationship. However, when controlling for the explanatory variables consistently identified as conditioning the inflation–debt nexus, we found evidence of bidirectional Granger causality between public debt and inflation in all cases (with the only exception of advanced economies according to the International Monetary Fund and the group of countries with greater independence from the central bank that show a unidirectional Granger causality relationship from debt to inflation).

Keywords: public debt; inflation; causality; panel data

JEL Codes: C33, E31, H63, O40, O50

1. Introduction

More than a decade after the Euro area's sovereign debt crisis, the COVID-19 pandemic prompted an unprecedented wave of fiscal stimulus, despite already elevated debt-to-gross domestic product (GDP) ratios in many southern eurozone economies. Since then, global public debt has continued its upward trend, with International Monetary Fund (IMF) forecasts indicating it may surpass 100% of global GDP by the decade's end, a level not seen since the aftermath of World War II (IMF, 2025). This sustained increase, fueled by structural fiscal imbalances, rising interest burdens, and demographic headwinds, has intensified concerns about long-term debt's sustainability and global macroeconomic resilience (United Nations Trade and Development (UNCTAD), 2025).

Furthermore, a combination of factors is exerting upward pressures on prices, namely rising energy and food commodity prices and several supply and logistics bottlenecks, both caused by the adjustment induced by the pandemic but exacerbated by the outbreak of war in Ukraine. This situation has generated renewed interest in the relationship between public debt and inflation, which is vital for the adequate design of economic policies (IMF, 2023), given that the intensification and expansion of inflationary pressures promote a more rapid normalization of monetary policy, causing an increase in official interest rates that could compromise the solvency of some states.

This study provides an in-depth examination of the relationship between public debt and inflation, considering a balanced panel of 121 countries worldwide. The study period, which spans from 1995 to 2022, includes significant global events such as the 2000s energy crisis (2003–2008), the peak of globalization in 2008 and the start of "slowbalization" (Irwin, 2020), the 2007–2008 world food price crisis, the 2007–2009 global financial crisis, the Great Recession (2007–2009), and the COVID-19 recession (2020–2022), among others. Examining this large sample of countries over this eventful period may help us better understand the link between public debt and inflation.

The paper tries to contribute to the existing literature in four fundamental aspects. First, we use the noncausality test in the Granger sense proposed by Juodis et al. (2021) for panel data, which is well-suited for heterogeneous panel data. This method accounts for cross-sectional dependence, corrects for Nickell bias, and allows for country-specific dynamics, which are key advantages when analyzing macroeconomic interactions across diverse economies. Its robust statistical properties and flexibility make it an appropriate tool for detecting directional causality in complex fiscal-monetary settings. Second, we incorporate a set of conventional macroeconomic control variables to more accurately isolate the causal relationship between public debt and inflation. By accounting for these confounding factors, the analysis ensures that the estimated effects are not spuriously driven by omitted variable bias, thereby enhancing the robustness and interpretability of the results. Third, we refrain from imposing a unidirectional causality assumption. Instead, we allow for bidirectional causality between public debt and inflation, acknowledging that fiscal and monetary dynamics may interact in complex, mutually reinforcing ways. This approach enables us to capture feedback loops and cyclical dependencies that are often overlooked in linear or single-equation frameworks. Finally, we explore the debt-inflation nexus across distinct country groupings, including advanced, emerging, and developing economies. This classification allows us to assess whether the nature and intensity of the relationship vary systematically with structural characteristics such as institutional quality, monetary credibility, and fiscal capacity. By doing so, the paper contributes to a more nuanced understanding of how the macroeconomic context conditions the transmission mechanisms between public debt and inflation.

The remainder of the paper is organized as follows: Section 2 provides a concise review of the relevant literature. Section 3 details the econometric methodology. Section 4 introduces the analytical framework. Section 5 discusses the dataset and presents the empirical findings. Section 6 concludes with final remarks.

2. Literature review

2.1. The impact of the public debt on inflation

One of the pioneering studies on this relationship was developed by Musgrave (1949), who highlighted that if, during some period of time, the private holders of government securities tried to liquidate all or some percentage, whether or not the fiscal authorities were the only buyers, then credit would spread, leading to highly inflationary pressures.

Theoretical discourse on public debt and inflation is fundamentally divided into two paradigms: Ricardian (monetary dominance) and non-Ricardian (fiscal dominance). The Ricardian perspective, rooted in monetarist principles (Friedman, 1968), asserts that price stability is the exclusive domain of the monetary authority, while fiscal policy remains passive, as government bonds do not constitute net private wealth. Within this framework, fiscal policy is considered to be passive; it does not independently drive inflation because government bonds are not perceived as net wealth. Instead, monetary policy maintains price stability by manipulating the interest rates. This logic extends to debt dynamics, where high public debt can impose pressure on domestic interest rates and the money supply. Consequently, if a central bank monetizes this debt by expanding the monetary base, it risks lowering interest rates at the cost of higher inflation, a relationship supported by the long-run quantity theory of money (Afonso, 1993; Attiya et al., 2008). This school of thought thus hinges on the demand for liquid assets and its gradual influence on prices (Javid et al., 2008). However, the universal applicability of the Ricardian equivalence has been increasingly challenged, particularly in developing nations and, more recently, in advanced economies (e.g., Attiya et al., 2008; Loyo, 1999).

Contrasting sharply with the monetarist view, the fiscal theory of the price level (FTPL) posits that the price level's trajectory is fundamentally determined by fiscal policy, not monetary expansions. This non-Ricardian framework establishes a regime of fiscal dominance, characterized by an active fiscal authority and a passive, accommodating monetary policy. Within this paradigm, price dynamics are primarily a fiscal phenomenon, with monetary aggregates relegated to a secondary role (Arce, 2007). The core mechanism hinges on the government's intertemporal budget constraint, which acts as an equilibrium condition that is not automatically satisfied at any price level. From a Keynesian standpoint, this translates to expansionary fiscal measures—such as tax cuts or increased debt—boosting disposable income and aggregate demand. This stimulates positive wealth effects and, ultimately, generates inflationary pressures (Elmendorf and Mankiw, 1999; Wickens, 2008). This logic is reinforced by Kwon et al. (2009), who argue that the stance of fiscal policy, defined by the present and future paths of public debt and taxes, is the principal driver of inflation. According to Woodford (1998), government bonds distort households' lifetime budget sets, and fiscal policies can modify inflation through the effect of wealth on private demand. For this reason, authors such as Marzieh (2015), Loyo (1999), Christiano and Fitzgerald (2000), and Attiya et al. (2008) stand out as saying that anti-inflationary policies are not enough to ensure price stability, and they emphasize an appropriate mix of monetary and fiscal policy. In particular, the validity of Ricardian policies has been questioned in developing countries and, for most

periods, in developed economies. The main argument for developing nations is that these countries issue domestic currency debt and they often do not have enough fiscal capacity to collect tax revenues. Authors such as Blanchard (2005), and Favero and Giavazzi (2005) claim that increases in interest rates in countries characterized by high levels of public debt imply a higher cost of debt services and default probability. The main consequences are capital outflows and exchange rate depreciation, which finally translate into high inflation.

Central to the Ricardian proposition, formalized by Barro (1974, 1989), is the axiom that public debt possesses no inherent capacity to influence price levels, as sovereign bonds merely represent future tax liabilities rather than net wealth. This Ricardian equivalence theorem (RET) fundamentally refutes the existence of fiscal wealth effects, positing that rational economic agents internalize the government's intertemporal budget constraint by offsetting current fiscal deficits with expectations of future tax increases. As Erdogdu (2002) clarified, the nature of the debt–inflation nexus hinges on this very distinction: A regime is considered Ricardian when the government's intertemporal budget constraint holds for any price level, implying that monetary and fiscal policy adjustments endogenously ensure fiscal solvency without generating inflationary wealth effects. In such a framework, fiscal policy is inherently noninflationary.

In addition to the theoretical literature, Nastansky and Strohe (2015) emphasize that the relationship between public debt and the inflation rate can either be direct or indirect. On the one hand, central banks can generate more inflation by buying public bonds. On the other hand, it may be indirect when the private sector meets the demand for public bonds. Households' lifetime budgets could be affected by an increase in the value of government bonds, and fiscal disturbances can affect price levels through wealth effects on private consumption demand. Castro et al. (2003) highlight the positive wealth impact of government debt policy on higher private spending or private consumption demand. According to Branson (1989), and Sargent and Wallace (1981), expansionary fiscal policy in the short term may contribute to positive wealth effects, as higher disposable income leads to grater price-level pressures. Another possible explanation for considering an indirect impact is the banking sector's demand for public bonds or inflation expectations, driven by significantly high public debt levels. It is important to note that when the government wants to pay off debt without printing more money or raising taxes, it can do so by issuing new debt, which leads to higher inflation regardless of the policies followed by the monetary authorities (Sims, 2013, 2014, 2016). Recent experimental evidence also highlights the role of information shocks in shaping inflation expectations. Grigoli and Sandri (2024) show that households tend to underestimate public debt levels and revise their inflation expectations upward when informed of the actual figures. The magnitude of this revision depends on the size of the information surprise, and trust in central banks significantly dampens the sensitivity of expectations to debt news. Moreover, Beirne and Renzhi (2024) show that unexpected debt shocks in emerging economies tend to depress output while raising inflation, with the magnitude of these effects shaped by the initial debt levels and financial conditions.

Therefore, the literature seems to indicate that fiscal and monetary policies' interaction is pertinent to avoiding inflationary pressures, since it does not only depend on the control of the money supply (see, for instance, Leeper, 1991; Marzieh, 2015; Woodford, 1997, 2001, among others). Authors such as Sargent and Wallace (1981) or Kwon et al. (2006, 2009) outline the necessity of coordination between fiscal and monetary policies, since more than money supply is needed to pin down the time path of inflation.

The empirical literature needs to clarify the impact of the relationship between public debt and inflation. Depending on the sample period analyzed, the estimation technique, or even the group of countries examined, mixed results are detected. Studies such as Afonso and Ibraimo (2020), Romero and Marin (2017), da Veiga et al. (2016), Nguyen (2015), Nastansky and Strohe (2015), Ngerebo (2014), Bilan and Roman (2014), Ahmad et al. (2012), Faraglia et al. (2012), Reinhart and Rogoff (2010), Bildiric and Ersin (2007), and Leeper (1991) support the direct impact of public debt on inflation. In contrast, Essien et al. (2016), Reinhart and Rogoff (2010) (for advanced economies), Castro et al. (2003), Karakaplan (2009), Taghavi (2000), Wheeler (1999) and Bleaney (1996) (for the 1983–1989 period) identify a negative effect of public debt on inflation. On the contrary, Janssen et al. (2002) detected an insignificant impact. Cherif and Hasanov (2012) found that the impact of public debt on inflation is only temporary. Additionally, studies such as Karakaplan (2009) verified that external public debt's effects on inflation vary across countries, since that analysis supported the belief that external public debt results in less inflation in countries characterized by well-developed financial markets. Along the same lines, Romero and Marin (2017) did not identify a significant link between these two variables for developed countries, in contrast to indebted developing economies, in which a higher debt-to-GDP ratio is associated with substantial increases in price levels.

2.2. The impact of inflation on public debt

Historically, a higher inflation rate can be seen as a relevant factor contributing to public debt reversals after World War II (Fukunaga et al., 2021). For this reason, inflation can be understood as a fundamental instrument for public debt reversals at the current juncture, and this line of research is worth revisiting (Rogoff, 2013; Sims, 2016).

In the theoretical literature, there are three main channels through which higher inflation can reduce public debt. According to Akitoby et al. (2017), the first channel is based on the fact that governments are able to capture real resources through creating base money, known as seigniorage. The secondary transmission mechanism operates through inflation's capacity to erode the real economic burden of public debt. This channel works by effectively devaluing creditors' claims held, thereby reducing the real debt-to-GDP ratio. Contemporary scholarship identifies this debt depreciation effect as inflation's most significant impact on sovereign debt's sustainability. The magnitude of this effect, however, is structurally contingent upon three critical debt characteristics: The temporal profile of debt maturity, the currency composition of outstanding obligations, and the interest rate environment governing debt servicing costs. It can be understood that when foreign creditors hold a significant share of, for instance, dollar-denominated US federal debt, they will share the burden of any increase in US inflation along with domestic creditors (Aizenman and Marion, 2011). More aspects should be considered in this perspective: Short-run debt and maturing long-run debt will require refinancing at higher interest rates. Moreover, currency depreciation increases the local-currency value of foreign-currency-denominated debt, which translates to higher inflation levels. Reinhart et al. (2015) argue that inflation is a good option for substantially reducing debt as long as it is denominated in domestic currency. The last channel is based on the primary balance, since Abbas et al. (2014) showed that inflation can determine the primary balance if income brackets are not indexed under a progressive income tax.

Using a simulation approach based on standard debt dynamics equations and an estimation procedure based on the local projection method, Fukunaga et al. (2021) analyzed the effect of inflation

shocks on public debt in advanced countries. The results for 19 advanced economies showed that a 1% inflation rate shock can decrease the public debt-to-GDP ratio by about 0.7 percentage points on average across countries.

Empirical research by Akitoby et al. (2017) confirmed the inverse relationship between inflation and public debt levels in advanced economies. Their analysis quantified this dynamic through counterfactual scenarios: Maintaining zero inflation for five years would raise the average net debt-to-GDP ratio by approximately five percentage points. Conversely, an inflation rate sustained at 6% over the same period would reduce public debt burdens by 11 percentage points under full Fisher effect conditions or by 14 percentage points under partial Fisher effect conditions, demonstrating inflation's material impact on fiscal sustainability through nominal debt erosion mechanisms.

Complementing this perspective, Equiza-Goñi (2016) demonstrated, through an empirical analysis of European nations, that elevated inflation would paradoxically exacerbate their fiscal burden rather than alleviate it. This counterintuitive finding aligns with research by Krause and Moyen (2016), who used a New Keynesian framework incorporating debt maturity structures and imperfectly observed inflation targets to argue that inflation alone is insufficient solution to address advanced economies' fiscal challenges. Their nuanced approach contrasts with Rogoff's (2010) proposition that temporary inflation surges could relieve balance sheet pressures, instead showing that a permanent two to six percentage point increase in the inflation target would only offset approximately 29% of additional real government debt—a partial mitigation that underscores the limited efficacy of inflationary approaches to debt reduction.

Besides, the model proposed by Aizenman and Marion (2011) provided evidence that a moderate inflation rate of 6% could diminish the debt-to-GDP ratio by 20% within four years. Moreover, the simulations by Abbas et al. (2014) indicate that an increase in inflation of 6% over five years would reduce the average net debt by <10 percentage points by the end of the period in most countries. Nevertheless, the empirical literature is not conclusive. For instance, Hilscher et al. (2022) emphasized that the effect of higher inflation on fiscal burden is only modest. In particular, these authors highlighted financial repression as one of the main factors in reducing debt, as it ensures that a decade of repression, along with high inflation, removes almost half of the debt. On the same line, Janssen et al. (2002) detected an insignificant impact of government debt, explaining the inflationary path of prices.

In a more recent study analyzing public debt's dynamics in transition economies, Carrasco and Tovar-García (2024) revealed that inflation operates through two countervailing channels. Primarily, inflation indirectly erodes debt burdens by driving nominal GDP growth, thereby reducing debt-to-GDP ratios. However, the real exchange rate smooths this impact. In particular, successful inflation control fosters currency appreciation, which mechanically deflates the value of external debt denominated in foreign currencies. Thus, while disinflation may initially strain debt servicing due to higher real interest rates, the resulting currency stability and strengthened monetary credibility provide a crucial counterbalance to medium-term fiscal sustainability, particularly in economies with high liability dollarization.

2.3. Causality analysis

Some empirical analyses have previously addressed the causal relationship between public debt and inflation. Nonetheless, many of them have been conditioned by the omission of variable bias[1] or by spurious regressions (see, for instance, Burdekin and Wohar, 1990; Darrat, 1990; Guess and Koford, 1986, among others). In a more recent study, Saungweme and Odhiambo (2022) investigated this link in Tanzania for the 1970–2020 period using the autoregressive distributed lag (ARDL) approach, since this estimation procedure provides unbiased estimates of the long-run model and valid *t*-statistics even when some regressors are endogenous, and it does not require mutual integration of the time series (Pesaran et al., 2001). Recent panel-based evidence by Ahmad et al. (2012) reinforces the bidirectional nature of the debt–inflation nexus in developing economies. Their findings, based on Granger causality tests across 57 countries, highlight the role of institutional factors, such as central banks' independence, in shaping the direction and intensity of causal links.

Studies such as Wolde-Rufael (2008), Darrat (1990), Burdekin and Wohar (1990), and Cox (1985) have identified a causal relationship running from budget deficit to inflation for Ethiopia during 1964–2003, the USA during 1961–1987, nine European Union countries during 1961–1982, and the USA during 1942–1984, respectively. However, authors such as Kwon et al. (2009), Burdekin and Wohar (1990), Hafer and Hein (1988), and Guess and Koford (1986) offer evidence of no causality between these two variables for many countries during 1963–2004 for the USA, and the 17 Organisation for Economic Cooperation and Development (OECD) countries during 1949–1981. Most of them apply Granger causality tests, and it can be seen that there is no consensus on the direction of causality, as both the Ricardian and non-Ricardian views have been supported. In a more recent study, Hilscher et al. (2022**)** pointed out the relevance of both policies[2].

3. Econometric methodology

Following Juodis et al. (2021), we consider the following dynamic panel data model:

$$y_{it} = \alpha_{0,i} + \sum_{p=1}^{P} \alpha_{p,i} y_{i,l-p} + \sum_{p=1}^{P} \beta_{p,i} x_{i,l-p} + \epsilon_{i,t} \quad i = 1, \dots, N\,; t = 1, \dots, T, \tag{1}$$

where $\alpha_{0,i}$ represents the individual specific effects, $\alpha_{p,i}$ denotes the heterogeneous autoregressive coefficients, $\beta_{p,i}$ reflects Granger causality parameters (also called heterogeneous feedback coefficients), and $\epsilon_{i,t}$ is the error term.

Under the null hypothesis, the Granger causality parameters are zero, so the feedback coefficients are homogeneous, as follows:

$$H0\colon \beta_{p,i} = 0, for\ all\ i\ and\ p, \tag{2}$$

With the alternative hypothesis being

[1] According to Saungweme and Odhiambo (2022), not including the money supply or interest rate could cause some omission bias.

[2] In fact, these authors emphasize that inflation by itself is unlikely to lower the US fiscal burden caused by public debt being concentrated at short maturities; additionally, inflation shocks are associated with low short-run persistence and are small.

$$H1: \beta_{p,i} \neq 0, for\ some\ i\ and\ p, \tag{3}$$

The rejection of the null hypothesis indicates that the independent variable $x_{i,t}$ Granger-causes the dependent variable y_{it}. One of the distinctive and novel characteristics of this test proposed by Juodis et al. (2021) is that these authors apply the pooled fixed effects estimator, which is more convenient, given that it has a faster convergence rate than other alternative estimators.

However, this estimator may be associated with the so-called "Nickell bias" (Nickell, 1981) and may lead to a reduction in power tests even if the bias is corrected (Karavias and Tzavais, 2016). This is the reason why Juodis et al. (2021) employed the half-panel Jackknife estimator[3] which not only eliminates bias but also performs adequately in a wide variety of settings and outperforms existing procedures.

The test developed by Juodis et al. (2021) represents a significant improvement over conventional panel causality methods. In contrast to first-generation tests such as that of Dumitrescu-Hurlin (2012), which assume parameter homogeneity, and mean group estimators, which suffer from Nickell bias in samples with a small T dimension, the approach of Juodis et al. (2021) overcomes these limitations through a transformation that enables the use of a simple t-statistic within a fixed-effects framework. This methodology not only circumvents the bias and computational complexity issues of its predecessors but also maintains robustness to unobserved heterogeneity and cross-sectional dependence, while simultaneously allowing for unit-specific lag orders. The result is a test with precise size and superior power, particularly in panels with a limited time dimension, establishing it as a more robust and accessible alternative for empirical research[4].

Specifically, the pooled least squares estimator of β is calculated as follows:

$$\hat{\beta} = \left(\sum_{i=1}^{N} X_i^{'} M_{Z_i} X_i\right)^{-1} \left(\sum_{i=1}^{N} X_i^{'} M_{Z_i} y_i\right), \tag{4}$$

where $M_{Z_i} = I_T - Z_i\left(Z_i^{'} Z_i\right)^{-1} Z_i^{'}$. Fernández-Val and Lee (2013) show that, under general conditions and when N, T→∞ with N/T →κ2 ∈ [0; ∞], we find that:

$$\sqrt{NT}\left(\hat{\beta} - \beta_0\right) \rightarrow J^{-1} N(-\kappa B, V),$$

where $= p \lim_{N,T\to\infty} (NT)^{-1} \sum_{i=1}^{N} X_i^{'} M_{Z_i} X_i$, V represents the variance and covariance matrix, and B is the bias, given that N and T are of the same order. Therefore, to subtract the bias associated with the pooled

[3] See Dhaene and Jochmans (2015) for more details.

[4] Recent empirical studies have increasingly adopted the panel Granger noncausality test proposed by Juodis et al. (2021) to explore macroeconomic relationships across heterogeneous country samples. For instance, Wanhai et al. (2022) applied this methodology to examine the causal links among economic growth, economic complexity, and CO_2 emissions. Nazlioglu and Karul (2024) focused on the Granger causality between exports and economic growth within OECD countries, while Focacci (2025) investigated the dynamic relationship between investment and saving. Heidinger et al. (2024) centered their analysis on the interplay between employment in knowledge-intensive sectors and overall change in employment. Additionally, Ramos-Herrera and Sosvilla-Rivero (2025) studied the causal nexus between public debt and economic growth using this approach.

estimator, these authors implement the half-panel Jackknife estimator proposed by Dhaene and Jochmans (2015), defined as:

$$\tilde{\beta} = \hat{\beta} + \left(\hat{\beta} - \frac{1}{2}\left(\hat{\beta}_{\frac{1}{2}} + \hat{\beta}_{\frac{2}{1}}\right)\right) = \hat{\beta} + T^{-1}\hat{B}, \tag{5}$$

Thus, the Wald test of non-Granger causality can be calculated as follows:

$$\widehat{W}_{HPJ} = NT\tilde{\beta}'(\hat{J}^{-1}\hat{V}\hat{J}^{-1})^{-1}\tilde{\beta} \rightarrow \mathcal{X}^2(P), \tag{6}$$

where $\hat{J} = (NT)^{-1}\sum_{i=1}^{N} X_i' M_{Z_i} X_i$. It is important to mention that under the assumptions of homoskedasticity over time and transversal dimensions for the errors, then:

$$\hat{V} = \hat{\sigma}^2\hat{J}, \tag{7}$$

With

$$\hat{\sigma}^2 = \frac{1}{N(T-1-P)-P}\sum_{i=1}^{N}\left(y_i - X_i\hat{\beta}\right)' M_{Z_i}\left(y_i - X_i\hat{\beta}\right), \tag{8}$$

If the errors are transversally heteroskedastic.

4. Analytical framework

In this paper, we test for the presence of linear Granger causality relations between public debt and inflation after controlling for potential influential variables in their relationship. In particular, we consider several explanatory variables that are consistently associated with the debt–inflation nexus in the literature: The degree of openness, lagged inflation, the unemployment rate, foreign direct investment (FDI), the long-term interest rate, money supply, and debt maturity (see, among others, Dumitrescu et al., 2022; Garriga and Rodriguez, 2020; Jasová et al., 2020).

Regarding the degree of openness, Rogoff's (1985) model suggests that more open countries are associated with lower inflation levels, since they gain less from surprise inflation. As Alfaro (2005) points out, the more open the economy is, the more the real exchange depreciates. Based on the 'new growth theory', openness is more likely to affect inflation through its effects on output. In fact, Jin (2000) highlights different channels through which it affects inflation: (i) better allocation of resources; (ii) an increment in foreign investment, which can boost output growth and translate into a higher level of prices; (iii) better efficiency, which leads to lower costs; and (iv) the expansion of capacity utilization. Much empirical evidence supports this relationship (e.g., Cooke, 2010; Jafari Samimi et al., 2011; Okun, 1981; or Zakaria, 2010).

As for the unemployment rate, according to the Phillips curve, there is an inverse relationship between unemployment and inflation (e.g., Berentsen et al., 2011; Phillips, 1958; Tobin, 1972, among others).

In dealing with FDI, the literature has documented that FDI inflows may influence inflation in the host economies. Specifically, Addison and Baliamoune-Lutz (2017) claimed that FDI inflows oriented towards the nontradable will generate a higher relative price of the nontradable to the tradable, which leads to a lower inflation rate. Moreover, Blalock and Gertler (2005) supported the idea that

FDI can smooth the negative impact of financial crises by helping firms maintain continuous access to credit through their parent companies. This paper considers FDI as another control factor, as shown by Dumitrescu et al. (2022) and Durguti et al. (2021).

As regards the long-term interest rate, it plays a crucial role in monetary policy, being one of the primary tools used for its implementation. Booth and Ciner (2001), Fave and Auray (2002), and Lardic and Mignon (2003), among others, have empirically documented the existence of a long-run relationship between the interest rate and inflation rate.

In relation to money supply, the link between money supply and inflation is often associated with the economic theories of Fisher and Friedman and extended Phillips curve specifications. Numerous studies have demonstrated that monetary expansion and inflation have a close, long-term causal relation (e.g., Assenmacher-Wesche and Gerlach, 2007; Benati, 2009; Kaufmann and Kugler, 2008).

Finally, in relation to debt maturity, some studies, such as Klein (1975) andLeijonhufvud (1977), have observed that there is an inverse relationship between inflation and the maturity structure of the debt market. This is because participants in the credit market believe they can accurately predict short-term inflation during inflationary conditions but are less confident about long-term predictions.

Concretely, we use the following panel model:

$$Inf_{\mathrm{it}} = \sum_{\mathrm{j=1}}^{\mathrm{p}} \alpha_{\mathrm{ij}} \mathrm{Inf}_{\mathrm{i,t-j}} + \sum_{\mathrm{j=0}}^{\mathrm{q}} \mathrm{X}_{\mathrm{i,t-j}} \gamma_{\mathrm{ij}} + \mu_{\mathrm{i}} + \varepsilon_{\mathrm{it}}, \quad (9)$$

where Inf_{it} is the inflation rate, and X_{it}, in addition to public debt (which is the main objective of this study) includes the explanatory factors commonly used throughout the literature, such as economic growth in real terms (*ec_gr*), the unemployment rate (*Un*), the degree of openness (*Open*), the long-term interest rate (*Int*), money supply (*MS*), and debt maturity (*Maturity*). In addition, μ_i captures the country-specific effect, ε_{it} is the error term, and *p* and *q* represent the number of lags of dependent and independent variables, respectively.

5. Data and empirical results[5]

We use annual data from 121 countries over the period 1995–2022. Our primary source is the World Development Indicators of the World Bank, although we have also used complementary information from the IMF (2023) and Romelli (2022). The definitions and sources of the variables used to examine the nexus between public debt and inflation are presented in Table 1[6].

Although our empirical analysis draws on the most reputable international databases, we acknowledge that cross-country differences in statistical methodologies and reporting standards may affect the comparability of key macroeconomic indicators, particularly public debt and inflation. This issue is especially relevant when combining data from both advanced and developing economies, where disparities in institutional capacity and transparency can be considerable. Moreover, while the Granger framework employed in this study facilitates the identification of directional relationships, concerns regarding potential endogeneity persist. Reverse causality, omitted variable bias, and

[5] In the empirical application, we use the Stata command proposed by Xiao et al. (2023).

[6] Considering Chebyshev's theorem (Amidan et al., 2005), we deal with outliers in our sample by winsorizing the variables at 5% and 95%.

simultaneous policy responses may still influence the estimated effects, warranting a cautious interpretation of the causal claims.

Table 1. Explanatory variables and data sources used in the estimation.

Variable	Description	Source
Real economic growth	Growth rate of real GDP per capita in annual percentage	The World Bank's World Development Indicators
Unemployment rate	Unemployed as a percentage of the active population	The World Bank's World Development Indicators
FDI	FDI, net inflows as a percentage of GDP	The World Bank's World Development Indicators
Inflation	Inflation measured by the consumer price index in annual percentage	The World Bank's World Development Indicators
Long-run interest rate	Long-term interest rate, annual percentage	IMF and the World Bank's World Development Indicators
Openness degree	Absolute sum of exports and imports over GDP	The World Bank's World Development Indicators
Money supply	M3 money supply as a percentage of GDP	The World Bank's World Development Indicators
Central bank independence	A generated variable that classifies the central banks of the countries under study as low, medium-low, medium-high, or high, with the cut-off points between each of the groups being the first, second, and third quartiles.	Romelli (2022)
Debt maturity	Short-term debt expressed as a percentage of the total external debt	World Bank, International Debt Statistics

Given that in the empirical application of Juodis et al.'s (2021) test, it is necessary to work with balanced panels, we have used two complementary econometric techniques to generate this type of panel. We begin by applying the multiple imputation algorithm proposed by King et al. (2001), which allows us to approximate omitted data. Subsequently, we use the predictors of simultaneous analogy developed by Fernández-Rodríguez et al. (1999) to infer omitted values from patterns found in other similar observations.

While the study covers a broad sample of 121 countries, caution is warranted when generalizing the results. The heterogeneity in institutional frameworks, monetary regimes, and fiscal capacities across countries may condition the debt–inflation relationship in ways that the panel approach does not fully capture. As such, the findings may be more indicative of average patterns than universally applicable dynamics, particularly when drawing policy implications for specific country groups.

Table 2 presents the results obtained by testing the existence of Granger causality in pairs between the public debt/GDP ratio and the inflation rate for the entire sample and by grouping the countries exogenously into groups according to the income level (using the classification of the IMF and the

World Bank), by geographic areas (according to the World Bank's classification), and by the independence of the central bank[7].

As an additional exercise to ensure the reliability of the empirical results, we have applied the grouped fixed effects (GFE) estimator proposed by Bonhomme and Manresa (2015) to classify countries into endogenous groups. The GFE estimator considers the possibility that different countries experience different dynamics in the debt–inflation relationship, with time patterns specific to each group, with individual group assignments carried out without restrictions and estimated from the data. Furthermore, the GFE estimator addresses the endogeneity caused by unobserved heterogeneity better than other estimators. In our case, the GFE estimator classifies the countries into four groups, for which debt impacts inflation differently. The GFE estimator is described in detail in Appendix 1. Appendix 2 provides a list with the classification of the countries belonging to each group. In Graph 1, the reader can find a map of the countries belonging to each group.

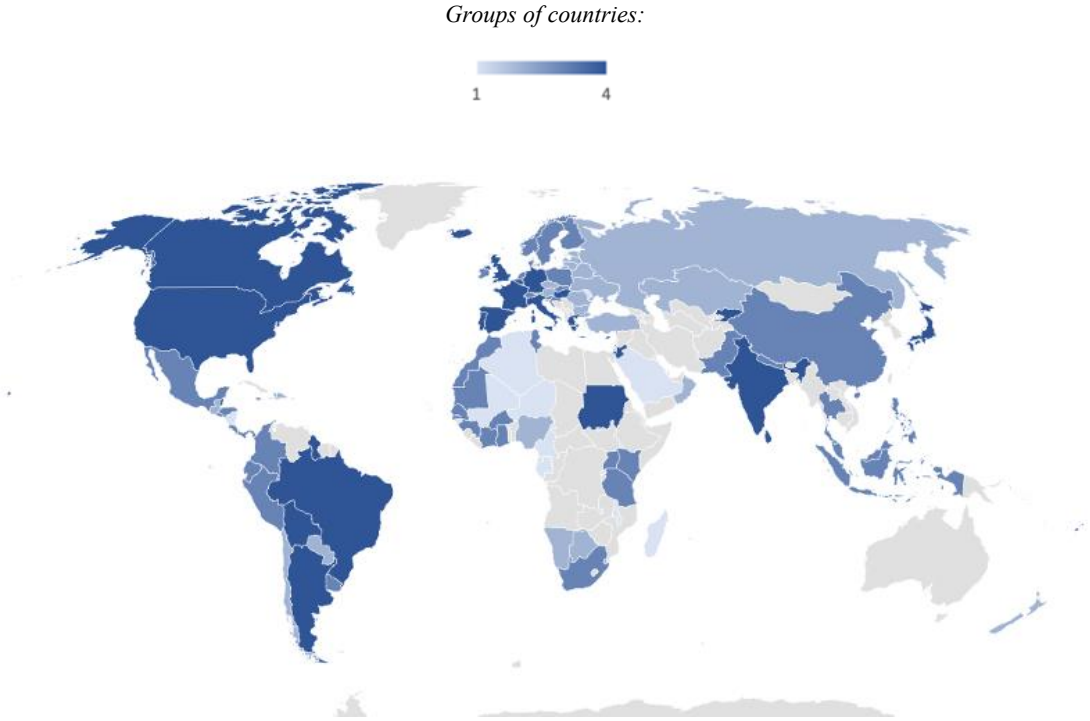

Figure 1. Country groups identified by the GFE estimator.

As shown in Table 2, the results suggest the existence of unidirectional causality from public debt to inflation in upper-middle-income countries and in Group 4 (which has been endogenously identified by the GFE estimator). On the other hand, according to the World Bank's income

[7] An essential line of empirical research focused on the relationship between central banks' independence and inflation suggests that average inflation is negatively related to the central banks' independence measure (see Klomp and De Haan, 2010). We rely on Romelli's (2022) database to check this hypothesis, which offers good coverage regarding countries and periods. In particular, we follow the same criteria used by the World Bank for its classification of income level (see Fantom and Serajuddin, 2016). Thus, we classify the central banks of these countries as low, medium-low, medium-high, and high, with the cut-off points between each of the groups being the first, second, and third quartiles.

classification, upper-middle-income countries, like low-income countries, present a unidirectional causality from inflation to debt, as is the case with low-income developing economies according to the IMF's income classification. The same conclusion has been reached for countries with a central bank with medium-low independence. Group 3 (identified in the GFE estimation) shows no causal relation between these two variables under study. Our results also indicate a bidirectional causal relation between inflation and debt when considering all countries in the sample, in advanced economies, in emerging countries, in Groups 1 and 2 of the GFE, and the groups of countries with central banks with low, medium-high, and high independence. These findings align with those of Beirne and Renzhi (2024), who document nonlinear inflationary responses to debt shocks in emerging market economies, suggesting that structural factors condition the debt–inflation nexus.

Regarding the geographical situation[8], the results show that South Asia, Europe and Central Asia, South Asia, East Asia and the Pacific, Sub-Saharan Africa, and Latin America offer evidence of bidirectional causality. In contrast, a unidirectional causality from inflation to debt is detected in the Middle East and North Africa.

[8] The North American region is not shown, as we have few data points for these estimates to be consistent.

Table 2. Pairwise Granger causality between public debt and inflation.

			Debt→Inflation			Inflation→Debt			
			Coeff.	HPJ Wald test	BIC		Coeff.	HPJ Wald test	BIC
All countries		Lag1_ debt	0.1979*	5.5525	16460.01	Lag1_ Inflat	0.2833***	138.8835	11013.44
			(0.1251)	[0.0623]			(0.0278)	[0.0000]	
		Lag2_ debt	–0.1081			Lag2_ inflat	–0.0143*		
			(0.1242)				(0.0086)		
World Bank income classification	Low income	Lag1_ debt	0.6851***	7.0949	4912.07	Lag1_ Inflat	0.1265***	298.2820	2498.28
			(0.2682)	[0.0288]			(0.0087)	[0.0000]	
		Lag2_ debt	–0.4999**			Lag2_ inflat	–0.0423***		
			(0.2459)				(0.0040)		
	Lower-middle income	Lag1_ debt	0.0725	4.5339	1398.77	Lag1_ Inflat	–0.0772	7.2425	2421.19
			(0.0809)	[0.1036]			(0.1095)	[0.0267]	
		Lag2_ debt	–0.0878			Lag2_ inflat	0.1134***		
			(0.0674)				(0.0481)		
	Upper-middle income	Lag1_ debt	0.0590	5.8020	1816.41	Lag1_ Inflat	–0.1982	3.2749	2514.21
			(0.0507)	[0.0550]			(0.1217)	[0.1945]	
		Lag2_ debt	–0.0211			Lag2_ inflat	0.0717		
			(0.0440)				(0.0515)		
	High income	Lag1_ debt	0.2465	1.7723	4204.40	Lag1_ Inflat	0.3960***	4.2e+03	3416.20
			(0.2354)	[0.4122]			(0.0937)	[0.0000]	
		Lag2_ debt	–0.1741			Lag2_ inflat	0.0403		
			(0.2320)				(0.0578)		
IMF income classification	Advanced economies	Lag1_ debt	–0.0239**	6.5085	557.43	Lag1_ Inflat	0.4805***	57.8702	2646.47
			(0.0104)	[0.0386]			(0.0955)	[0.0000]	
		Lag2_ debt	0.0153			Lag2_ inflat	–0.5970***		
			(0.0110)				(0.0872)		

Continued on next page

			Debt→Inflation			Inflation→Debt			
			Coeff.	HPJ Wald test	BIC		Coeff.	HPJ Wald test	BIC
IMF income classification	Emerging economies	Lag1_ debt	0.3431**	6.0169	8246.07	Lag1_ Inflat	0.0872***	52.5843	4927.97
			(0.1498)	[0.0494]			(0.0120)	[0.0000]	
		Lag2_ debt	–0.2516*			Lag2_ inflat	0.0124***		
			(0.1394)				(0.0048)		
	Low-income developing countries	Lag1_ debt	0.1957	2.7710	3886.06	Lag1_ Inflat	0.3719***	5.3E+03	3147.18
			(0.2201)	[0.2502]			(0.0957)	[0.0000]	
		Lag2_ debt	–0.0680			Lag2_ inflat	0.0648		
			(0.2237)				(0.0631)		
GFE estimator classification	Group 1	Lag1_ debt	0.0908	34.4380	635.08	Lag1_ Inflat	–0.5117*	10.6341	1161.30
			(0.0845)	[0.0000]			(0.2834)	[0.0049]	
		Lag2_ debt	–0.0212			Lag2_ inflat	0.5961***		
			(0.0676)				(0.1868)		
	Group 2	Lag1_ debt	0.8048***	17.8916	4714.61	Lag1_ Inflat	0.0903***	274.5053	2418.52
			(0.2780)	[0.0001]			(0.0280)	[0.0000]	
		Lag2_ debt	–0.1780			Lag2_ inflat	0.0789***		
			(0.3715)				(0.0053)		
	Group 3	Lag1_ debt	0.0050	2.8918	2466.11	Lag1_ Inflat	–0.0254	0.0647	3344.01
			(0.0450)	[0.2355]			(0.1075)	[0.9682]	
		Lag2_ debt	0.0268			Lag2_ inflat	0.0045		
			(0.0409)				(0.0593)		
	Group 4	Lag1_ debt	0.3155	201.7004	3287.92	Lag1_ Inflat	–0.0326	2.9427	3736.95
			(0.2405)	[0.0000]			(0.0351)	[0.2296]	
		Lag2_ debt	–0.3804*			Lag2_ inflat	0.3004*		
			(0.2184)				(0.1775)		

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			Debt→Inflation			Inflation→Debt			
			Coeff.	HPJ Wald test	BIC		Coeff.	HPJ Wald test	BIC
Classification by World Bank regions	South Asia	Lag1_ debt	–0.1043*** (0.0256)	44.1992 [0.0000]	223.35	Lag1_ Inflat	–0.0591 (0.1102)	6.7009 [0.0351]	277.91
		Lag2_ debt	0.1980*** (0.0342)			Lag2_ inflat	–0.2238 (0.1657)		
	Europe and Central Asia	Lag1_ debt	0.4614** (0.2042)	6.3408 [0.0420]	6055.37	Lag1_ Inflat	0.0381*** (0.0085)	319.5471 [0.0000]	3285.79
		Lag2_ debt	–0.2749 (0.1836)			Lag2_ inflat	0.0876*** (0.0052)		
	Middle East and North Africa	Lag1_ debt	0.0141 (0.0221)	0.9512 [0.6215]	617.27	Lag1_ Inflat	0.0712 (0.0595)	5.1414 [0.0765]	892.91
		Lag2_ debt	–0.0060 (0.0267)			Lag2_ inflat	0.1097* (0.0631)		
	East Asia and Pacific	Lag1_ debt	–0.1286*** (0.0211)	37.3426 [0.0000]	576.95	Lag1_ Inflat	0.6117*** (0.0548)	197.3278 [0.0000]	712.33
		Lag2_ debt	0.1601*** (0.0422)			Lag2_ inflat	–0.2380*** (0.0390)		
	Sub-Saharan Africa	Lag1_ debt	0.2177 (0.2442)	16.1073 [0.0003]	2787.44	Lag1_ Inflat	–0.0563 (0.0394)	20.7521 [0.0000]	3032.88
		Lag2_ debt	–0.2286 (0.2128)			Lag2_ inflat	0.2904** (0.1367)		
	Latin America and the Caribbean	Lag1_ debt	0.0415 (0.0496)	4.8774 [0.0873]	3213.56	Lag1_ Inflat	0.3708*** (0.0114)	3.3e+03 [0.0000]	2346.89
		Lag2_ debt	0.2463** (0.1274)			Lag2_ inflat	–0.1692*** (0.0030)		

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			Debt→Inflation			Inflation→Debt			
			Coeff.	HPJ Wald test	BIC		Coeff.	HPJ Wald test	BIC
Classification by World Bank regions	North America	Lag1_ debt Lag2_ deuda	–0.0195*** (0.0033)	33.5757 [0.0000]	1.519	Lag1_ Inflat Lag2_ inflat			
Classification according to the independence of the Central bank	Low	Lag1_ debt Lag2_ debt	0.5640*** (0.2385) –0.6468*** (0.2274)	11.2648 [0.0036]	3333.97	Lag1_ Inflat Lag2_ inflat	0.0869 (0.0542) –0.0188 (0.0593)	132.3916 [0.0000]	2865.87
	Lower-middle	Lag1_ debt Lag2_ debt	0.0449 (0.0283) –0.0315 (0.0268)	4.3424 [0.1140]	1457.01	Lag1_ Inflat Lag2_ inflat	–0.7040** (0.3126) 0.0906 (0.0570)	5.2923 [0.0709]	2700.46
	Upper-middle	Lag1_ debt Lag2_ debt	0.1129** (0.0497) 0.1501 (0.1113)	9.1719 [0.0102]	3821.34	Lag1_ Inflat Lag2_ inflat	0.1588*** (0.0274) 0.1436*** (0.0084)	812.6244 [0.0000]	3016.37
	High	Lag1_ debt Lag2_ debt	–0.2769 (0.4062) 0.6143** (0.3107)	214.8871 [0.0000]	4865.80	Lag1_ Inflat Lag2_ inflat	0.2120*** (0.0018) –0.3340*** (0.0019)	2.4e+05 [0.0000]	2240.96

Notes: The corresponding *z*-statistics, calculated using White's (1980) heteroskedasticity-robust standard errors, are given in parentheses below the parameter estimates. Between the brackets below the specification contrasts, the *p*-values are given. *, **, and *** indicate significance at 10%, 5%, and 1%, respectively.

Table 3. Panel estimation for all economies.

	FE	RE	POLS
Debt	0.0877***	0.0325***	0.0325
	(0.0216)	(0.0136)	(0.0281)
Inf_t-1	0.2254***	0.3298***	0.3298***
	(0.0138)	(0.0136)	(0.1367)
ec_gr	0.6593***	0.7041***	0.7041**
	(0.1333)	(0.1307)	(0.3384)
Un	–0.4651***	–0.0361	–0.0361
	(0.1925)	(0.0858)	(0.1120)
Open	0.0140	–0.0100	–0.0100
	(0.0260)	(0.0085)	(0.0113)
Int	–1.2942***	–0.7125***	–0.7125*
	(0.0502)	(0.0381)	(0.4131)
MS	0.0446**	–0.0080	–0.0080
	(0.0234)	(0.0114)	(0.0317)
Maturity	0.0249	0.0376**	0.0376***
	(0.0273)	(0.0206)	(0.0144)
Constant	–10.7186***	–7.0387***	–7.0387
	(3.8167)	(2.8502)	(9.5903)
Country FE	Yes	Yes	No
Year FE	Yes	Yes	Yes
R^2 overall	0.2770	0.3269	0.3269
R^2 within	0.3221	0.2792	
R^2 between	0.2951	0.5422	
BIC	27311.69		27896.93
AIC	27107.29		27692.53
Breusch and Pagan test	0.00		
(POLS vs. RE)	[1.0000]		
F-test for fixed effects	5.34		
(POLS vs. FE)	[0.0000]		
Hausman test	2650.05		
(FE vs. RE)	[0.0000]		

Notes: The parentheses below the parameter estimates present the corresponding *z*-statistics, computed using White's (1980) heteroskedasticity-robust standard errors. The square brackets below the specification tests present the associated *p*-values. *, **, and *** indicate significance at 10%, 5%, and 1%, respectively. In bold type, we highlight the relevant estimation method for each case according to the specification tests.

Table 3 reports the empirical results obtained when estimating Equation (9) by the fixed-effects (FE), the random-effects (RE), and the pooled-Ordinary Least Squares OLS (POLS) methods, with FE

being the relevant one in our case[9]. As can be seen, the coefficients of the explanatory variables have the expected sign and are primarily significant at conventional levels.

On the basis of these results, we proceed to the case of Granger causality tests, controlling for potential economic variables that intervene in the debt-inflation nexus. Table 4 shows the results obtained. As can be seen, except for advanced economies according to the IMF classification and the group of countries with a highly independent central bank (where a unidirectional relation between public debt and inflation can be seen), we detect a bidirectional Granger causality relation between inflation and public debt. This relation is quite robust, since the same conclusions are obtained regardless of the income classification of the World Bank, the IMF, the groups identified by the GFE estimator, or the geographical region.

Table 4. Pairwise Granger causality between public debt and inflation, controlling for economic variables.

		Debt→inflation		Inflation→debt	
		HPJ Wald test	BIC	HPJ Wald test	BIC
All countries		48.2609 [0.0000]	11232.84	442.3095 [0.0000]	9639.29
World Bank income classification	Low income	2.3e+03 [0.0000]	2857.50	1.9e+03 [0.0000]	2026.86
	Lower-middle income	142.6981 [0.0000]	1334.43	4e+03 [0.0000]	2050.52
	Upper-middle income	45.4399 [0.0000]	1421.85	177.2118 [0.0000]	1788.37
	High income	8.6e+04 [0.0000]	3757.16	3.4e+04 [0.0000]	2987.94
IMF income classification	Advanced economies	178.0353 [0.0000]	118.07	–4.0e+02 [1.0000]	2000.96
	Emerging economies	61.5462 [0.0000]	4677.12	582.1765 [0.0000]	4244.26
	Low income developing countries	1.6e+04 [0.0000]	3481.47	225.3684 [0.0000]	1860.39

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[9] We consider three basic panel regression methods: The FE method, the RE model, and the POLS method. In order to determine the empirical relevance of each of the potential methods for our panel data, we make use of several statistical tests. In particular, we test FE versus RE using the Hausman test statistic to test for noncorrelation between the unobserved effect and the regressors. To choose between POLS and RE, we use Breusch and Pagan (1980)'s Lagrange multiplier test to test for the presence of an unobserved effect. Finally, to discriminate between POLS and RE, we use the *F*-test for fixed effects to test whether all unobservable individual effects are zero.

		Debt→inflation		Inflation→debt	
		HPJ Wald test	BIC	HPJ Wald test	BIC
GFE estimator classification	Group 1	659.8977 [0.0000]	496.56	3.8e+03 [0.0000]	954.23
	Group 2	1.6e+03 [0.0000]	3180.57	2.1e+03 [0.0000]	1809.23
	Group 3	221.5180 [0.0000]	2142.73	296.9665 [0.0000]	2372.36
	Group 4	1.8e+03 [0.0000]	2621.51	103.6774 [0.0000]	3400.26
Classification by World Bank regions	South Asia	1.8e+03 [0.0000]	225.95	431.9678 [0.0000]	285.06
	Europe and Central Asia	2.4e+03 [0.0000]	3409.20	746.3880 [0.0000]	2739.00
	Middle East and North Africa	5.6e+03 [0.0000]	480.64	2.1e+04 [0.0000]	696.58
	East Asia and Pacific	11.0898 [0.0496]	573.47	2.2e+03 [0.0000]	548.96
	Sub-Saharan Africa	3.8e+04 [0.0000]	2256.22	176.3496 [0.0000]	2662.61
	Latin America and the Caribbean	3.1e+04 [0.0000]	2588.08	1.1e+03 [0.0000]	1969.38
Classification according to the independence of the central bank	Low	2.4e+03 [0.0000]	3060.70	133.4675 [0.0000]	2445.39
	Lower middle	392.2952 [0.0000]	1064.45	156.0562 [0.0000]	2325.39
	Upper middle	259.3864 [0.0000]	3104.46	3.0e+03 [0.0000]	2714.85
	High	0.0000 [1.0000]	1277.20	2.0e+04 [0.0000]	1504.63

Notes: The brackets below the specification contrasts give the *p*-values. *, **, and *** indicate significance at 10%, 5%, and 1%, respectively.

6. Conclusions

This paper offers additional evidence on the causal relation between public debt and the inflation rate, using annual data for 121 countries covering the period 1995–2022 and applying the new

homogeneous approach proposed by Juodis et al. (2021) based on the Granger noncausality test in a heterogeneous panel.

Like any empirical research, the results should be taken cautiously because they were obtained from a specific set of countries within a given time period, using specific control variables and a particular econometric technique. In addition, the inherent complexities and policy trade-offs involved in managing public debt and inflation further underscore the need for careful interpretation. With these caveats, our results indicate that when examining the pairwise relationship, in some cases, a unidirectional Granger causality relationship is detected that goes from public debt to inflation (in the case of upper-middle-income countries according to the World Bank and Group 4 identified by the GFE estimator), and bidirectional Granger causality between both variables for the majority of the countries under study. However, when controlling for the explanatory variables consistently identified as conditioning the relation between the two variables, we found evidence of bidirectional Granger causality between public debt and inflation in all cases (with the only exception of advanced economies according to the IMF and the group of countries with greater independence from the central bank, which show a unidirectional Granger causality relation from debt to inflation). This latest finding indicates that public debt curbs inflation regardless of the income level and government borrowing, or whether the countries have advanced economies, emerging market economies, or low-income developing economies. At the same time, the inflation rate also impacts the public debt level.

This study sheds light on the importance of formulating the causal hypothesis and the model-building stage, following well-established theories and prior knowledge, rather than examining only the pairwise relation. It also shows the importance of controlling for endogeneity in empirical estimates of the relation between public debt/GDP and inflation, using the two-stage least squares methodology with panel-corrected standard errors grouped by country, and exogenous variables and their gaps as potential instruments.

From an economic policy standpoint, the findings highlight the importance of strengthening institutional coordination between fiscal and monetary authorities, particularly given the predominantly bidirectional causality observed between public debt and inflation. Managing these two variables concurrently involves navigating complex trade-offs and structural constraints. For example, fiscal consolidation aimed at reducing debt may dampen aggregate demand and help contain inflation, but it also risks curbing economic growth and inadvertently increasing debt-to-GDP ratios. Similarly, monetary tightening aimed at controlling inflation often raises debt-servicing costs, potentially undermining fiscal sustainability.

This interdependence creates a policy trilemma, in which pursuing price stability, debt sustainability, and economic growth simultaneously becomes inherently difficult. Policymakers are thus frequently compelled to prioritize among competing objectives and adopt carefully sequenced policy interventions.

In this context, integrated strategies that jointly address fiscal and monetary challenges are preferable to isolated approaches. For advanced economies, this entails preserving the central bank's independence while anchoring fiscal policy through credible and transparent frameworks. In contrast, emerging economies may benefit from binding debt limits that explicitly incorporate inflationary risks. The empirical evidence further supports the development of policy models that account for key control variables and the endogenous nature of the debt–inflation relationship. Moreover, institutionalizing early warning mechanisms and designing fiscal rules with adaptive clauses could enhance resilience to inflationary shocks and improve overall policy effectiveness.

The multifaceted nature of public debt and inflation management warrants further analytical exploration. A natural extension of this paper would be to explore the existence of thresholds in the relationship between public debt/GDP ratios and inflation rates as well as the nonlinear effects between those variables. Both extensions are part of our future research agenda.

Use of AI tools declaration

The authors declare they have not used artificial intelligence (AI) tools in the creation of this article.

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Conflict of interest

All authors declare no conflicts of interest in this paper.

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