



Discussion Papers In Economics And Business

Examining the Fiscal Theory of the Price Level:
Evidence from developed and developing countries

Arisa Chantaraboontha

Discussion Paper 26-11

September 2026

Graduate School of Economics
The University of Osaka, Toyonaka, Osaka 560-0043, JAPAN

Examining the Fiscal Theory of the Price Level: Evidence from developed and developing countries

Arisa Chantaraboontha*

September 1, 2026

Abstract

This paper implements a panel VECM to investigate whether fiscal policy plays a significant role in price determination using an annual panel dataset covering advanced and emerging economies from 2010 to 2024. The empirical results indicate that, during normal periods, most fiscal authorities worldwide restore intertemporal budget constraints through fiscal balance adjustments rather than price adjustments, consistent with a Ricardian regime. However, following the onset of the pandemic, fiscal policy in most countries appears to shift toward a non-Ricardian regime, in which the price level adjusts to satisfy the intertemporal budget constraint, providing empirical support for the Fiscal Theory of the Price Level (FTPL). Greater budget transparency is found to moderate inflationary pressures arising from fiscal imbalances during crisis periods, although no significant effect is observed during normal times. Moreover, higher budget transparency helps slow the accumulation of public debt across countries under both normal and crisis conditions.

JEL Classification: E31, E62, E63, H63

Keywords: Fiscal Theory of the Price Level, Fiscal Policy, Inflation, Government Debt, Ricardian Regime

*Graduate Student, Graduate School of Economics, The University of Osaka,
Email: u444398i@ecs.osaka-u.ac.jp

1 Introduction

The inflationary effects of fiscal policy have attracted renewed attention following the unprecedented fiscal expansions during the pandemic. In the absence of credible commitments to future fiscal surpluses, current fiscal imbalances may be validated through adjustments in the price level. This is consistent with a non-Ricardian fiscal regime as described by the Fiscal Theory of the Price Level (FTPL), implying that price aspect is not solely a monetary phenomenon but also a fiscal one. Against this backdrop, this paper aims to investigate whether unfunded fiscal deficits played a significant role in price determination, using an annual panel of advanced and emerging economies worldwide from 2010 to 2024.

Theoretically, there are two competing views regarding the determination of the price level. The first is the traditional monetary perspective, rooted in the Quantity Theory of Money as articulated by Fisher (1911), which posits that the money supply is the primary determinant of the general price level, particularly when money growth exceeds the growth of real output. The second relevant framework is the Fiscal Theory of the Price Level (FTPL), developed by Leeper (1991), Sims (1994), Woodford (1995), and Cochrane (1998).

Under this FTPL framework, debt-financed fiscal spending is set independently of the intertemporal government budget constraint, the price level must therefore adjust endogenously to ensure fiscal solvency, following non-Ricardian regime ¹. Consequently, persistent fiscal deficits in the absence of credible commitments to future primary surpluses can generate sustained inflationary pressures (Ekinici et al., 2025). In this regard, Sims (2010) also emphasized that inflation expectations are increasingly shaped by perceptions of fiscal sustainability.

Within the framework outlined above, price stability therefore emerges from the inter-

¹An increase in the price level reduces the real value of outstanding government debt, so-called inflation-inflated debt, thereby generating an inflation tax that acts as an implicit source of government revenue for financing public expenditure.

action of both fiscal and monetary policy. Without sound fiscal conduct, maintaining price stability becomes unattainable, even in the presence of a credible and independent central bank ².

By contrast, under a Ricardian regime, fiscal authorities adjust expected future primary surpluses to stabilize the real value of outstanding government debt, thereby allowing the central bank to retain independent control over inflation ³.

For an empirical perspective, while the role of monetary factors in driving price dynamics is well established, the influence of fiscal policy on inflation remains relatively under-explored in the existing literature (Sims, 2010). This gap reflects the widespread perception of inflation as primarily a monetary phenomenon, reinforced by the prolonged period of low and stable inflation since the mid-1980s—a perception that was fundamentally altered after the extreme economic and price conditions during pandemic crisis.

Recent evidence from Barro and Bianchi (2025) showed that approximately 80 percent of pandemic-related fiscal financing among OECD countries was effectively absorbed through inflation, with only about 20 percent financed through intertemporal budget adjustments. Similar results are reported by Banerjee et al. (2022) ⁴, as well as in Bianchi et al. (2023)⁵. Related FTPL evidence is also available for emerging markets, although it is largely based

²Bianchi and Melosi (2022) argued that controlling post-pandemic inflation cannot be achieved through monetary policy alone; instead, it requires mutually consistent monetary and fiscal policies to prevent fiscal stagflation.

³From the sole perspective of optimal fiscal policy framework, Lucas and Stokey (1983) argued that distortionary taxes should be smoothed over time rather than adjusted frequently, as frequent changes in tax rates would create economic inefficiencies. Government debt therefore acts as a buffer to absorb temporary fiscal spending shocks, allowing tax rates to remain relatively stable while maintaining the intertemporal government budget constraint.

⁴Using data from 1972 onwards for 21 advanced economies, they found that higher deficits increase upside inflation risks, with these effects being more pronounced under a fiscally led regime.

⁵In the aftermath of the pandemic, unfunded fiscal shocks lead to a persistent increase in inflation while supporting economic recovery.

on outdated data, as documented by Habibullah et al. (2011)⁶ and Nguyen (2015)⁷. In addition, a number of studies provide support for the FTPL in individual countries such as Maitra and Hossain (2024) for India, and Bildirici and Ersin (2005) for Turkey. However, global-scale empirical validation of these theoretical insights using contemporary data, covering the post-pandemic period, remains limited – a gap that this paper seeks to address.

For the last aspect, the inflationary effects of fiscal imbalances also depend critically on institutional frameworks, especially fiscal transparency. It shapes how clearly governments communicate fiscal positions, financing plans, and spending with public participation; when these institutions are weak, fiscal imbalances are more likely to translate into inflationary pressures.

Empirically, Montes and da Cunha Lima (2018) showed that greater fiscal transparency is associated with lower inflation, particularly in inflation-targeting developing economies where it strengthens policy credibility. While the existing literature controls the effects of financing sources (money creation versus debt issuance) on inflation, institutional dimensions are rarely examined jointly in cross-country studies, especially during crisis periods such as the COVID-19 pandemic.

This paper contributes to the literature by utilizing recent global panel data that extend into the post-pandemic period to examine: (1) whether global fiscal imbalances—both during normal times and in the aftermath of the pandemic—are absorbed by inflation, thereby providing evidence in support of the Fiscal Theory of the Price Level (FTPL); and (2) whether institutional factors play a significant role in shaping inflation dynamics and debt accumulation.

⁶They examined fiscal deficits and inflation in 13 Asian developing economies namely Indonesia, Malaysia, the Philippines, Myanmar, Singapore, Thailand, India, South Korea, Pakistan, Sri Lanka, Taiwan, Nepal and Bangladesh over the period 1950–1999 and documented a long-run relationship between budget deficits and inflation.

⁷The author found a significant inflationary effect of fiscal imbalances in selected South and Southeast Asian economies namely Bangladesh, Cambodia, Indonesia, Malaysia, Pakistan, the Philippines, Sri Lanka, Thailand, and Vietnam during 1985–2012.

The empirical results show that during normal periods about 66% of countries worldwide follow a Ricardian fiscal regime, where fiscal authorities restore intertemporal budget constraints through fiscal balance adjustments. However, following the onset of the pandemic, fiscal policy in most countries appears to shift toward a non-Ricardian regime in which the price level contributes to fiscal rebalancing, supporting the Fiscal Theory of the Price Level (FTPL). The findings also show that greater budget transparency mitigates inflationary effects during crises and slows public debt accumulation across all conditions.

The remainder of the paper is organized as follows. Section 2 describes the data and methodology. Section 3 presents the theoretical framework and empirical results for different country groups. Section 4 concludes.

2 Data and Methodology

a) Data and Variable Measurement

This paper employs annual panel data of 130 countries worldwide for the period 2010-2024. The following price, domestic outputs and fiscal datasets are taken from the IMF World Economic Outlook (WEO) database. The price-related variables in the database comprise the price level (P_{it}) and the year-on-year headline inflation (π_{it}). The level of real domestic output ($RGDP_{it}$) and the year-on-year term ($rgdp_{it}$) are also provided.

For public policy variables, the dataset includes fiscal balance (revenue minus expenditure), measured both in levels (FB_{it}) and as a share of GDP ($fb_{GDP,it}$). With respect to public debt, the variables include general government debt in levels (B_{it}) and general government debt as a ratio to GDP ($b_{GDP,it}$).

Information on country group classifications is obtained from the IMF. The lists of countries in each group—advanced economies and emerging market economies—are provided in the Appendix. The global factor, namely energy prices ($renergy_t$), is obtained from the

World Bank and converted into real terms. Fiscal transparency is measured using the Open Budget Index (OBI_{it}), compiled by the International Budget Partnership (IBP). It evaluates national budget transparency, oversight, and public participation in the budget process across countries. All variables are expressed in real terms in the model.

b) Summary Statistics by Country Group

Table 1 reports summary statistics by country group. All refers to the full sample of 130 countries worldwide. A is an advanced economy, while E is a composite emerging market economy. EEurope refers to Emerging and Developing Europe; EAsian to Emerging and Developing Asia; EMECA to the Middle East and Central Asia; EAfrica to Sub-Saharan Africa; and ELAC to Latin America and the Caribbean

Table 1: Summary Statistics by Country Group

Group	Detail	#No.	π_{it} (CPI_YoY)				$fb_{GDP,it}$ (FiscalBalance.PercentGDP)				$b_{GDP,it}$ (GrossDebt.PercentGDP)				
			Full	2010–19	2020–21	2022–24	Full	2010–19	2020–21	2022–24	Full	2010–19	2020–21	2022–24	
Panel A: Means															
All	All samples	130	4.15	3.49	3.43	6.79	-2.70	-2.10	-5.48	-2.84	56.03	51.69	67.57	62.82	
A	Advanced economies	29	2.12	1.42	1.43	4.91	-2.07	-1.75	-5.01	-1.18	80.09	78.95	87.11	79.18	
E	Emerging economies	101	4.61	3.95	3.85	7.33	-2.72	-2.07	-5.38	-3.10	48.28	43.85	59.97	55.26	
EEurope	Emerging and Developing Europe	9	4.75	3.79	3.07	9.06	-3.31	-2.52	-4.89	-4.89	48.49	46.71	54.07	50.73	
EAsia	Emerging and Developing Asia	25	4.13	3.75	2.84	6.25	-2.06	-1.06	-5.10	-3.36	42.33	37.97	52.10	50.33	
EMECA	Middle East and Central Asia	13	4.21	3.56	4.58	6.09	-1.16	-0.89	-4.85	0.39	43.87	40.18	57.37	47.14	
EAfrica	Sub-Saharan Africa	30	6.32	5.23	6.01	10.17	-3.93	-3.15	-6.28	-4.94	49.76	41.67	66.28	65.72	
ELAC	Latin America and the Caribbean	24	3.66	3.41	2.76	5.08	-3.13	-2.74	-5.78	-2.68	56.96	52.71	70.05	62.40	
Panel B: Standard Deviations															
All	All samples	130	4.85	4.02	3.99	6.66	5.49	5.50	4.48	5.49	35.10	33.98	37.33	34.51	
A	Advanced economies	29	2.17	1.22	1.49	2.71	4.55	4.29	4.33	4.81	47.92	46.06	53.23	50.31	
E	Emerging economies	101	5.24	4.34	4.30	7.33	5.71	5.79	4.53	5.58	26.31	24.20	28.60	26.50	
EEurope	Emerging and Developing Europe	9	6.06	6.27	2.55	5.12	3.37	2.20	3.19	5.38	23.31	22.61	27.33	22.99	
EAsia	Emerging and Developing Asia	25	4.40	3.21	2.64	7.22	7.33	7.68	6.20	6.02	26.58	22.14	32.81	31.85	
EMECA	Middle East and Central Asia	13	4.22	3.12	4.75	6.07	9.58	10.12	5.27	9.52	23.98	22.27	24.64	25.88	
EAfrica	Sub-Saharan Africa	30	7.00	5.75	5.81	9.73	3.29	2.85	3.78	3.36	24.72	20.47	27.00	23.01	
ELAC	Latin America and the Caribbean	24	2.67	2.49	2.49	2.87	3.24	3.03	3.16	3.18	27.71	28.73	25.31	21.73	

Notes: 1) Full period covers 2010-2024. 2) Group definitions: All = all countries; A = Advanced economies; E = Emerging market economies; EEurope = Emerging and Developing Europe; EAsia = Emerging and Developing Asia; EMECA = Middle East and Central Asia; EAfrica = Sub-Saharan Africa; ELAC = Latin America and the Caribbean. 3) The No. column reports the number of countries in each group.
Source: Author’s calculations

Overall, all country groups experienced heightened headline inflation pressures in the post-pandemic period (2022–2024), with emerging markets exhibiting a higher standard deviation of headline inflation than advanced economies. Meanwhile, fiscal balance-to-GDP ratios deteriorated sharply during the pandemic lockdowns in 2020–2021 and improved in subsequent years. A similar pattern is observed for gross public debt-to-GDP ratios.

c) Statistical Tests and Calibration Methodology

In this section, Augmented Dickey–Fuller (ADF) unit root tests including a constant and linear time trend are performed. For the panel specification, we employ the Im–Pesaran–Shin (IPS) panel ADF test, which tests the null hypothesis that each series in the panel contains a unit root.

The panel ADF results reported in Table 2 indicate that most series are stationary I(0). However, the general price level (P_{it}), fiscal balance (FB_{it}) and government debt (B_{it}) exhibit non-stationary I(1). Meantime, inflation (π_{it}), the scaled-to-GDP variables such as fiscal balance ($fb_{GDP,it}$) and public debt ($b_{GDP,it}$), as well as exogenous variables, are also stationary I(0).

Table 2: Panel Augmented Dickey–Fuller (ADF) Tests

Variable	ADF statistic
P_{it}	−0.66
FB_{it}	−0.15
B_{it}	−0.32
π_{it}	−4.52***
$fb_{GDP,it}$	−8.28***
$b_{GDP,it}$	−6.32***
$rgdp_{it}$	−8.08***
$renergy_t$	−3.84***

Notes: 1) The table reports IPS panel ADF test statistics for the null hypothesis of a unit root. 2) The tests include both a constant and a linear time trend, with the lag length selected by the Akaike Information Criterion (AIC). 3) ***, **, * denote rejection of the null hypothesis at the 1, 5, and 10 percent

significance levels, respectively. 4) Only P_{it} (the general price level), FB_{it} (fiscal balance) and B_{it} (government debt) are not stationary, as indicated by the tests. Meantime, π_{it} (inflation), the variables scaled by GDP—namely $fb_{GDP,it}$ and $b_{GDP,it}$ —as well as the exogenous variables, $rgdp_{it}$ and $renergy_t$, are stationary in levels (i.e., $I(0)$). *Source:* Author’s calculations.

Table 3: Cointegration Tests Between Inflation and Fiscal Variables

Panel A: Johansen Cointegration Tests

System	Trace stat ($r = 0$)	Trace stat ($r \leq 1$)
P_{it}, FB_{it}	4.30	19.04*
P_{it}, B_{it}	5.37	20.87**
FB_{it}, B_{it}	5.12	19.70*

Panel B: Engle–Granger two-step Cointegration Tests

System	Long-run coefficient (β)	t -statistic	ADF statistic
P_{it}, FB_{it}	−2.11	−2.30**	−1.03
P_{it}, B_{it}	7.33	6.37***	−2.20**
FB_{it}, B_{it}	−0.28	−2.34**	−2.63***

Notes: 1) Panel A reports Johansen trace statistics for testing the null hypotheses of no cointegration ($r = 0$) and at most one cointegrating relationship ($r \leq 1$). All tests allow for a linear deterministic trend in the cointegration space and use two lags. Critical values are from Johansen (1995). The trace test results are mixed. While the null hypothesis of no cointegration ($r = 0$) cannot be rejected, the null hypothesis of at most one cointegrating relationship ($r \leq 1$) is rejected. However, this result is not informative given the failure to reject $r = 0$. Therefore, further investigation using alternative cointegration methods is warranted. 2) Panel B reports the Engle–Granger cointegration test, where long-run relationships are estimated. The long-run coefficient β is estimated from a levels regression for each pair of variables. The Augmented Dickey–Fuller (ADF) statistic is applied to the residuals from each long-run regression, with critical values based on MacKinnon (1991). 3) ***, **, and * denote the null hypothesis rejection at the 1%, 5%, and 10% levels, respectively.

Source: Author’s calculations

For Table 3, the Johansen cointegration results reported in Panel A, based on the null hypothesis of no cointegration ($r = 0$), indicate no evidence of a long-run equilibrium relationship between the general price level and the fiscal variables. Similarly, there is no evidence of a long-run cointegration relationship between gross fiscal debt and the fiscal balance. However, the null hypothesis of at most one cointegrating vector ($r \leq 1$) is re-

jected in all cases. Given these mixed results, additional robustness checks using alternative cointegration tests are warranted.

Next, I implement the Engle and Granger (1987) two-step cointegration test to further examine the existence of a long-run relationship of a pair of variables. In the first step, the price level is regressed on fiscal variables in levels, including the fiscal balance and public debt, along with a separate regression capturing the fiscal balance–debt relationship.

In the second step, augmented Dickey–Fuller (ADF) tests are applied to the residuals obtained from each estimated long-run regression, with critical values based on MacKinnon (2010). If the residuals are stationary, this provides evidence consistent with cointegration, indicating the existence of a stable long-run equilibrium relationship between the pair of variables under consideration. The validity of this interpretation depends critically on the integration properties of the underlying variables. The Engle–Granger procedure requires that the variables included in the long-run regression be integrated of the same order.

Panel B reports the Engle–Granger two-step cointegration test results. The findings show no evidence of a long-run relationship between the general price level and fiscal balances, as indicated by insignificant ADF statistics. However, in these specifications, the residual-based ADF statistics reject the null hypothesis of a unit root in the residuals for the relationships between the general price level and public debt, as well as between fiscal balances and the level of public debt, suggesting that the long-run equilibrium errors are stationary.

Taken together, the cointegration test results suggest that certain fiscal fundamentals—particularly public debt—play a role in determining the price level in the long run. In addition, the relationship between public debt and the fiscal balance exhibits strong evidence of a long-run equilibrium relationship. Overall, these findings provide preliminary support for the relevance of the Fiscal Theory of the Price Level (FTPL), warranting further

investigation in the remainder of the paper.

To examine these dynamics more formally, this paper employs a Panel Vector Error Correction Model (Panel VECM) to capture both short-run adjustments and potential long-run relationships. Country fixed effects are included to control for time-invariant heterogeneity across countries, along with time fixed effects to account for common shocks across periods.

3 Theoretical Framework and Empirical results

3.1 Fiscal Theory of the Price Level (FTPL) framework

According to the FTPL framework, the price level (P_{it}) adjusts to equate the real value of public debt $\left(\frac{B_{it-1}}{P_{it}}\right)$ to the present value of expected future real primary surpluses, or fiscal balances (FB_{it+j}), defined as government revenues minus expenditures, which serve to retire existing public debt.

$$\frac{B_{it-1}}{P_{it}} = E_t \sum_{j=0}^{\infty} \frac{FB_{it+j}}{\prod_{j=0}^{\infty} (1 + r_{it+j})} \quad (1)$$

This assumes a constant real interest rate over time such that the discount factor β^j , or $\frac{1}{\prod_{j=0}^{\infty} (1 + r_{it+j})}$, can be approximated by a constant discount rate $(1 + \bar{r}_i)^{-1}$. The equation can then be log-linearized as follows.

$$\log(P_{it}) = \log(B_{it-1}) - \sum_{j=0}^{\infty} \beta^j E_t [\log(FB_{it+j})]$$

Next, the log-linearized equation is differentiated on both sides to represent the change. The following lowercase letters denote variables expressed as year-on-year percentage changes.

$$\pi_{it} = b_{it-1} - \sum_{j=0}^{\infty} \beta^j E_t [fb_{it+j}]$$

This specification captures the dynamics of the price level given predetermined debt and expected fiscal balances. For the expectation term, the model assumes that agents form expectations about future and contemporaneous fiscal balance flows based on available past information, such that $\sum_{j=0}^{\infty} \beta^j E_t [fb_{it+j}] = fb_{it-1}$.

This assumption is appropriate for the context of this paper, which covers a broad set of emerging market economies worldwide. In many of these economies, forward-looking fiscal information is limited, as government spending plans are typically disclosed only shortly before the fiscal year begins and are often subject to revision. As a result, economic agents can primarily rely on historical fiscal information when forming expectations about future government spending.

It is worth noting that, in this paper's model specification, the endogenous real fiscal variables are expressed as ratios to GDP. Specifically, real public debt is measured as the debt-to-GDP ratio ($b_{\text{GDP},it}$), while the real fiscal balance is measured as the fiscal balance-to-GDP ratio ($fb_{\text{GDP},it}$).

$$\pi_{it} = b_{\text{GDP},it-1} - fb_{\text{GDP},it-1}$$

From this specification, given the existing public debt-to-GDP ratio, either inflation or the fiscal balance-to-GDP ratio adjusts to restore equilibrium. In light of this consideration, two alternative Panel VECM specifications are employed, comparable to Bildirici and Ersin (2005). In addition, to address potential endogeneity arising from simultaneity and reverse causality, each empirical specification is estimated using alternative lag structures for the key explanatory variables such as $b_{\text{GDP},it-2}$.

3.2 The inflationary effect of the public debt

According to the above theoretical framework and taking into account the long-run cointegration relationship, the inflationary effect of real public debt can be modeled using the following **Panel VECM specification (I)**:

$$\pi_{it} = \alpha_0 + \alpha_1\pi_{it-1} + \alpha_2b_{\text{GDP},it-1} + x_{it} + \lambda_1z_{it-1}^1 + \varepsilon_{it}^1 \quad (2)$$

$$b_{\text{GDP},it} = \beta_0 + \beta_1\pi_{it-1} + \beta_2b_{\text{GDP},it-1} + x_{it} + \lambda_2z_{it-1}^1 + \varepsilon_{it}^2 \quad (3)$$

with the long run cointegration equation: $z_{it}^1 = P_{it} - l_1B_{it} - \theta_1X_{it}$

where α_2 represents the percentage change in inflation with respect to a 1 percentage increase in public debts to GDP, and β_1 captures the impact of inflation on public debt to GDP ($b_{\text{GDP},it}$). The vector x_{it} includes control variables such as global energy prices ($renergy_t$) and real output ($rgdp_{it}$). Meanwhile, λ_1 and λ_2 denote the estimated error correction mechanism, measuring the speed of adjustment toward the long-run equilibrium relationship between the price level (P_{it}) and public debt (B_{it}). Finally, ε_{it}^1 and ε_{it}^2 are the error terms of the panel VECM.

Under a Non-Ricardian regime, it is expected that α_2 should be positive and statistically significant, where the price level adjusts to satisfy the government's intertemporal budget constraint. Meantime, it should be insignificant under a Ricardian regime. Next, β_1 is expected to be negative, as higher inflation reduces the real value of public debt in either regime.

3.3 Fiscal balance feedback rule

To further assess the empirical validity of the Ricardian versus non-Ricardian framework, the following fiscal balance feedback rule is additionally implemented as a complementary check.

Referring to Cochrane (1998), the feedback rule between real public debt, $b_{GDP,it}$, and the real fiscal balance, $fb_{GDP,it}$, can be represented by the following **Panel VECM specification (II)**:

$$fb_{GDP,it} = \delta_0 + \delta_1 fb_{GDP,it-1} + \delta_2 b_{GDP,it-1} + x_{it} + \lambda_3 z_{it-1}^2 + \varepsilon_{it}^3 \quad (4)$$

$$b_{GDP,it} = \gamma_0 + \gamma_1 fb_{GDP,it-1} + \gamma_2 b_{GDP,it-1} + x_{it} + \lambda_4 z_{it-1}^2 + \varepsilon_{it}^4 \quad (5)$$

with the long run cointegration equation: $z_{it}^2 = FB_{it} - l_2 B_{it} - \theta_2 X_{it}$

If fiscal authorities systematically respond to the prevailing level of public debt, δ_2 should be positive and statistically significant. In addition, γ_1 is expected to be negative and significant, suggesting that fiscal balances is adjusted to stabilize and gradually retire public debt. This adjustment mechanism would be consistent with the Ricardian equivalence framework.

However, under Non-Ricardian regime, δ_2 might be statistically insignificant. Even if δ_2 is positive and significant, the coefficient γ_1 may fail to be negative, as fiscal balances are not systematically employed to retire outstanding public debt. In such a setting, the fiscal authority does not ensure debt sustainability through primary surpluses. Instead, the price level adjusts to satisfy the government's intertemporal budget constraint. The feedback rule specified in this VECM empirical framework has also been adopted in previous studies, such as in Bildirici and Ersin (2005).

Given the coefficient definitions above, **the null hypothesis for testing the non-Ricardian regime**, which supports the existence of the FTPL framework, is:

$$H_0 : \alpha_2 = 0, \delta_2 \neq 0$$

If the null hypothesis is rejected, this indicates that the fiscal authorities follow a non-Ricardian regime. Conversely, if the null hypothesis is not rejected, it indicates a Ricardian regime.

3.4 Empirical Results

The empirical results in Table 4 show that, under normal circumstances during 2010–2019, inflation did not adjust to existing public debt to restore the intertemporal budget equilibrium, which can be indirectly interpreted as a Ricardian regime. This finding contrasts with some existing literature such as Habibullah et al. (2011), Nguyen (2015) and Banerjee et al. (2022) who found inflationary impact of fiscal imbalances in the periods before the onset of the pandemic.

On the contrary, during the period 2020–2024, price dynamics in all countries empirically adjusted to existing public debt, suggesting the presence of a non-Ricardian regime after the onset of the pandemic, as similarly documented in the recent literature such as Barro and Bianchi (2025). This result is consistent with the FTPL framework.

More specifically, during normal periods, approximately 66 percent of economies worldwide are inferred to satisfy the intertemporal budget constraint through fiscal balance adjustments. By contrast, during the crisis period of 2020–2024, around 68 percent of countries restore the intertemporal budget constraint through inflation, compared with the 80 percent reported for OECD countries by Barro and Bianchi (2025). This shift is consistent with the global surge in inflation observed following the fiscal expansion during the pandemic.

Table 4: The Inflationary Effect of Public Debt (Panel VECM Specification I)

Group	2010–2019			2020–2024		
	All	A	E	All	A	E
Error Correction equation: $z_{it}^1 = P_{it} - B_{it} - RGDP_{it}$						
B_{it}	0.062*** (0.0064)	0.217** (0.1088)	0.062*** (0.0064)	0.011*** (0.0017)	0.044*** (0.0106)	0.011*** (0.0017)
$RGDP_{it}$	0.045 (0.0452)	0.679* (0.3584)	0.045 (0.0452)	0.037 (0.0751)	0.025 (0.0211)	0.036 (0.0749)
$Adj. R^2$	0.324	0.469	0.325	0.261	0.263	0.263
[SR equation I] Dependent variable: π_{it}						
z_{it-1}^1	-0.059*** (0.0130)	-0.029*** (0.0092)	-0.006*** (0.0019)	-0.047** (0.0219)	-0.047** (0.0183)	-0.053** (0.0236)
π_{it-1}	0.113*** (0.0261)	0.015** (0.0064)	0.116*** (0.0342)	0.062** (0.0315)	0.433*** (0.0535)	0.074* (0.0414)
$b_{GDP,it-1}$	0.019 (0.0298)	0.012 (0.0127)	0.032 (0.0254)	0.132*** (0.0284)	0.090** (0.0410)	0.127*** (0.0304)
$rgdp_{it}$	0.713*** (0.0235)	0.302*** (0.0563)	0.736*** (0.0924)	0.669*** (0.0718)	0.922*** (0.0692)	0.668*** (0.0771)
$renergy_t$	0.002** (0.0011)	0.002** (0.0010)	0.003** (0.0014)	0.008*** (0.0024)	0.001 (0.0050)	0.009*** (0.0030)
OBI_{it}	1.078 (0.9475)	0.537 (1.2485)	1.298 (1.1564)	-7.159** (2.9688)	-2.667*** (0.8911)	-7.763** (3.9181)
$Adj. R^2$	0.660	0.588	0.674	0.686	0.718	0.687
[SR equation II] Dependent variable: $b_{GDP,it}$						
z_{it-1}^1	-0.015*** (0.0039)	-0.096** (0.0430)	-0.014*** (0.0043)	-0.019* (0.0115)	-0.064** (0.0338)	-0.017* (0.0100)
π_{it-1}	-0.145*** (0.0422)	-0.232** (0.1101)	-0.151** (0.0592)	-0.279*** (0.0766)	-0.015** (0.0091)	-0.291*** (0.0825)
$b_{GDP,it-1}$	0.914*** (0.0233)	0.814*** (0.0603)	0.954*** (0.0513)	0.407*** (0.0443)	0.675*** (0.1124)	0.365*** (0.0486)
$rgdp_{it}$	-0.279** (0.1259)	-1.266*** (0.2661)	-0.216** (0.0939)	-0.027* (0.0156)	-0.318** (0.1910)	-0.063** (0.0255)
$renergy_t$	-0.005 (0.0038)	-0.003 (0.0047)	-0.007* (0.0042)	-0.010 (0.0089)	-0.012* (0.0067)	-0.008 (0.0104)
OBI_{it}	-3.771* (2.2558)	-0.450* (0.2704)	-3.518* (2.1180)	-6.590** (3.2113)	-3.068* (1.7821)	-13.825** (6.9094)
$Adj. R^2$	0.747	0.761	0.739	0.354	0.678	0.301
Observations (n)	130	29	101	130	29	101
Total Obs. (N)	1040	232	808	390	87	303
Regime Classification: Ricardian Ricardian Ricardian Non-Ricardian Non-Ricardian Non-Ricardian						

Note: 1) *** $p < 0.01$, ** $p < 0.05$, * $p < 0.10$. 2) Numbers in parentheses are clustered standard errors.

3) All = all countries; A = Advanced economies; E = Emerging market economies.

Source: Author's calculations

The cointegration analysis provides evidence of a long-run relationship between the price level and real public debt. In contrast, no long-run relationship is found between the price level and real domestic output, which is included as an exogenous control variable.

Considering budget transparency (OBI_{it}), greater budget transparency empirically helps alleviate inflationary pressures arising from debt financing across all economies during crisis periods, with emerging market economies benefiting more than advanced economies. This finding is consistent with the study by Montes and da Cunha Lima (2018). However, no significant effects are observed during normal periods.

Another important finding is that greater transparency in the budget process can decelerate public debt accumulation in both normal and crisis periods, as indicated by the statistically significant negative coefficient of the budget transparency index across the specifications in the short-run equation II (Equation II).

To reconfirm these regime classification results, Model Specification II is employed, incorporating the fiscal balance feedback rule.

The results in Table 5 show that, during normal periods, the fiscal balance (or fiscal surplus), rather than the price level, responds to existing public debt to restore the intertemporal budget constraint, confirming consistency with a Ricardian regime. This surplus is also used to retire public debts, as reflected by the negative coefficient, γ_1 , of the fiscal balance in the short-run equation II (Equation II). Altogether, this evidence indicates that fiscal authorities worldwide follow a Ricardian regime under normal circumstances.

In part, this result supports the proposition of Lucas and Stokey (1983), whereby public debt serves as a buffer to absorb temporary fiscal balance shocks, while fiscal policy—with a relatively stable tax rate—is designed to satisfy the government’s intertemporal budget constraint.

However, during 2020–2024, the empirical results reveal contrasting findings. Fiscal

Table 5: Fiscal Balance Feedback Rule (Panel VECM Specification II)

Group	2010–2019			2020–2024		
	All	A	E	All	A	E
Error Correction equation: $z_{it}^2 = FB_{it} - B_{it} - RGDP_{it}$						
B_{it}	0.060** (0.0252)	0.124** (0.0120)	0.060** (0.0259)	0.342** (0.1619)	0.014** (0.0069)	0.342** (0.1725)
$RGDP_{it}$	6.253 (19.6000)	0.120*** (0.0205)	6.985 (23.6000)	15.908 (47.6268)	0.030 (0.0609)	16.257 (39.1693)
$Adj. R^2$	0.1003	0.2605	0.1003	0.3643	0.2291	0.3643
[SR equation I] Dependent variable: $fb_{GDP,it}$						
z_{it-1}^2	-0.060*** (0.0096)	-0.011*** (0.0037)	-0.061*** (0.0126)	-0.022*** (0.0222)	-0.003*** (0.0009)	-0.023*** (0.0025)
$fb_{GDP,it-1}$	0.426*** (0.0938)	0.489*** (0.0477)	0.419*** (0.1008)	0.235*** (0.0790)	0.198 (0.1609)	0.248*** (0.0847)
$b_{GDP,it-1}$	0.050*** (0.0130)	0.030** (0.0125)	0.052*** (0.0164)	0.042 (0.0343)	0.014 (0.0559)	0.055 (0.0363)
$rgdp_{it}$	0.034 (0.0268)	0.147*** (0.0479)	0.021 (0.0288)	0.006 (0.0660)	0.059 (0.0976)	0.004 (0.0730)
$Adj. R^2$	0.2408	0.4810	0.2254	0.1954	0.1754	0.1099
[SR equation II] Dependent variable: $b_{GDP,it}$						
z_{it-1}^2	-0.015*** (0.0004)	-0.044*** (0.0109)	-0.019*** (0.0044)	-0.041*** (0.0470)	-0.008*** (0.0016)	-0.045*** (0.0048)
$fb_{GDP,it-1}$	-0.543*** (0.1818)	-1.522*** (0.1415)	-0.453*** (0.1712)	-0.242** (0.1106)	0.082 (0.3105)	-0.233** (0.1085)
$b_{GDP,it-1}$	0.695*** (0.0481)	0.723*** (0.0371)	0.719*** (0.0573)	0.038* (0.0224)	0.372*** (0.1211)	0.015 (0.0675)
$rgdp_{it}$	-0.555*** (0.1168)	-1.142*** (0.1422)	-0.450*** (0.1252)	-0.054 (0.0800)	-0.144 (0.1554)	-0.044 (0.0840)
$Adj. R^2$	0.5359	0.7314	0.5258	0.1456	0.3152	0.1421
Observations (n)	130	29	101	130	29	101
Total Obs. (N)	1040	232	808	390	87	303
Regime Classification:	Ricardian	Ricardian	Ricardian	Non-Ricardian	Non-Ricardian	Non-Ricardian

Note: 1) *** $p < 0.01$, ** $p < 0.05$, * $p < 0.10$. 2) Numbers in parentheses are clustered standard errors.

3) All = all countries; A = Advanced economies; E = Emerging market economies.

Source: Author's calculations

balances do not respond to existing public debt, whereas the price level adjusts instead, as indicated in the previous specification. This outcome is consistent with a non-Ricardian regime. Also, in the short-run equation II (Equation II), only emerging market economies utilize the fiscal balance to retire public debt, as reflected in the significant and negative coefficient of the fiscal balance.

Regarding long-run cointegration, fiscal balances worldwide respond to existing public debt in the long run, both during normal periods and in the period since the onset of the pandemic.

Taken together, the first and second model specifications confirm that, during normal periods, fiscal authorities worldwide follow a Ricardian regime. Meanwhile, they follow a non-Ricardian regime after the onset of the pandemic.

4 Conclusion

In summary, the empirical analysis in this paper indicates that, during normal periods, fiscal authorities in approximately 66 percent of the global sample restore intertemporal budget constraints through fiscal balance adjustments, consistent with a Ricardian regime. However, in the period following the onset of the pandemic, the majority of fiscal policies worldwide appear to follow a non-Ricardian regime, in which the price contributes to rebalancing budget constraints. These findings support the existence of the Fiscal Theory of the Price Level (FTPL), suggesting that the price dimension is also a fiscal phenomenon, particularly since the onset of the pandemic.

To mitigate the inflationary effects of debt financing during crisis periods, greater budget transparency is found to have a moderating effect, although no significant impact is observed during normal periods. Furthermore, higher budget transparency helps slow the accumulation of public debt across countries under both normal and crisis conditions.

Based on these empirical findings at the global scale, a key policy implication is to enhance public participation in the budget process, which can help strengthen macroeconomic stability. Such improvements would be particularly valuable in an increasingly uncertain and unpredictable global economic environment.

Several avenues for future research remain open. First, future studies could employ more granular analyses to investigate the transmission channels through which fiscal imbalances affect inflation dynamics under the Fiscal Theory of the Price Level (FTPL), particularly by incorporating interactions with monetary policy and the alternative formation of inflation expectations. Next, future research could examine country-specific institutional characteristics—such as fiscal rules, debt maturity structures, and degree of central bank independence—to better understand why some economies remain in a Ricardian regime while others shift toward a non-Ricardian regime during crisis periods. Such analyses may help clarify the role of institutional quality in strengthening macroeconomic stability in periods of heightened global uncertainty.

Acknowledgements

I gratefully acknowledge my main supervisor, Professor Takayuki Tsuruga of the Graduate School of Economics at Nagoya University, formerly of the Institute of Social and Economic Research (ISER) at the University of Osaka, for his invaluable guidance, insightful comments, and continuous support throughout this research, which have greatly contributed to the development of this study. I also thank my sub-supervisor, Professor Hirokazu Ishise, for his support and involvement in my supervision.

References

Ascari, G., Beck-Friis, P., Florio, A. and Gobbi, A. (2023). Fiscal foresight and the effects of government spending: It's all in the monetary-fiscal mix. *Journal of Monetary Economics*, 134, pp.1-15.

Banerjee, R., Boctor, V., Mehrotra, A.N. and Zampolli, F. (2022). Fiscal deficits and inflation risks: the role of fiscal and monetary regimes. Bank for International Settlements, Monetary and Economic Department.

Bianchi, F., Faccini, R. and Melosi, L. (2023). A fiscal theory of persistent inflation. *The Quarterly Journal of Economics*, 138(4), pp.2127-2179.

Barro, R.J. and Bianchi, F. (2025). Fiscal influences on inflation in OECD countries, 2020–2023. *The Economic Journal*, p.ueaf066.

Bianchi, F. and Melosi, L. (2022). Inflation as a fiscal limit.

Bildirici, M. and Ersin, O.O. (2005). Fiscal Theory of Price Level and Economic Crises: The Case of Turkey. *Journal of Economic Social Research*, 7(2).

Chen, K. and Kim, J. (2025). Effects of supply chain bottlenecks and fiscal stimulus on inflation dynamics in the COVID-19 pandemic era: a case of South Korea. *Applied Economics*, 57(41), pp.6483-6496.

Cochrane, J.H. (1998). A frictionless view of US inflation. *NBER macroeconomics annual*, 13, pp.323-384.

Cochrane, J.H. (2021). The fiscal theory of the price level: An introduction and overview. *Journal of Economic Perspectives*.

Ekinci, M.F., Saygılı, H. and Yılmaz, H.H. (2025). Fiscal policy and long-run inflation dynamics: evidence from a major emerging market economy. *Applied Economics*, pp.1-15.

Engle, R.F. and Granger, C.W. (1987). Co-integration and error correction: representation, estimation, and testing. *Econometrica: journal of the Econometric Society*, pp.251-276.

Fisher, I. and Indices, P. (1991). QUANTITY THEORY OF MONEY. *Journal of Econometrics*, 4(2), pp.115-145.

Galí, J. and Gertler, M. (1999). Inflation dynamics: A structural econometric analysis. *Journal of monetary Economics*, 44(2), pp.195-222.

Habibullah, M.S., Cheah, C.K. and Baharom, A.H. (2011). Budget deficits and inflation in thirteen Asian developing countries. *International Journal of Business and Social Science*, 2(9).

Hale, G., Leer, J. and Nechio, F. (2025). Fiscal policy design and inflation: The COVID-19 pandemic experience. *Journal of International Money and Finance*, 150, p.103210.

Johansen, S. (1995). Likelihood-based inference in cointegrated vector autoregressive models. OUP Oxford.

Leeper, E.M. (1991). Equilibria under ‘active’ and ‘passive’ monetary and fiscal policies.

Journal of monetary Economics, 27(1), pp.129-147.

Lucas Jr, R.E. and Stokey, N.L. (1983). Optimal fiscal and monetary policy in an economy without capital. Journal of monetary Economics, 12(1), pp.55-93.

MacKinnon, J.G. (2010). Critical values for cointegration tests (No. 1227). Queen's Economics Department Working Paper.

Mahaphan, K. (2013). Fiscal policy and macroeconomic variables: The case of Thailand (Doctoral dissertation, Lincoln University).

Maitra, B. and Hossain, T. (2024). Exploring price level trajectory in India: Does it validate the fiscal theory of price level?. Journal of Asian Economics, 92, p.101740.

Mishkin, F.S. (2007). Inflation dynamics. International Finance, 10(3), pp.317-334.

Montes, G.C. and da Cunha Lima, L.L. (2018). Effects of fiscal transparency on inflation and inflation expectations: Empirical evidence from developed and developing countries. The Quarterly Review of Economics and Finance, 70, pp.26-37.

Niwa, H. (2022). Review of the Fiscal Theory of the Price Level. OSIPP Discussion Paper, (22E002).

Nguyen, V.B. (2015). Effects of fiscal deficit and money M2 supply on inflation: Evidence from selected economies of Asia. Journal of Economics, Finance and Administrative Science, 20(38), pp.49-53.

Sims, C.A. (1994). A simple model for study of the determination of the price level and the interaction of monetary and fiscal policy. Economic theory, 4(3), pp.381-399.

Sims, C.A. (2010). Modeling the influence of fiscal policy on inflation. In annual meeting of the Society for Economic Dynamics, Montreal.

Stock, J.H. and Watson, M.W. (2007). Why has US inflation become harder to forecast?. Journal of Money, Credit and banking, 39, pp.3-33.

Woodford, M. (1995, December). Price-level determinacy without control of a monetary aggregate. In Carnegie-Rochester conference series on public policy (Vol. 43, pp. 1-46). North-Holland.

Appendix: Country List by Regional Classification

A (29)	EEurope (9)	EAsia (25)	EMECA (13)	EAfrica (30)	ELAC (24)
Australia	Albania	Bangladesh	Algeria	Angola	Antigua and Barbuda
Austria	Bosnia and Herzegovina	Bhutan	Djibouti	Benin	Bahamas
Belgium	Bulgaria	Brunei	Georgia	Botswana	Barbados
Canada	Hungary	Cambodia	Iraq	Burkina Faso	Belize
Cyprus	Montenegro	China	Jordan	Burundi	Bolivia
Czech Republic	Romania	India	Kuwait	Cabo Verde	Brazil
Denmark	Russia	Indonesia	Kyrgyz Republic	Cameroon	Chile
Finland	Turkey	Kiribati	Morocco	Central African Republic	Colombia
France	Ukraine	Malaysia	Oman	Chad	Costa Rica
Germany		Maldives	Pakistan	Côte d'Ivoire	Dominica
Greece		Mongolia	Qatar	Gabon	Dominican Republic
Iceland		Myanmar	Tunisia	Gambia	Ecuador
Ireland		Nepal	Turkmenistan	Ghana	El Salvador
Israel		Papua New Guinea		Guinea-Bissau	Guatemala
Italy		Philippines		Kenya	Guyana
Japan		Samoa		Liberia	Honduras
South Korea		Saudi Arabia		Malawi	Jamaica
Luxembourg		Solomon Islands		Mali	Mexico
Malta		Sri Lanka		Mauritius	Nicaragua
New Zealand		Thailand		Namibia	Panama
Norway		Tonga		Niger	Paraguay
Portugal		Tuvalu		Nigeria	Peru
Singapore		United Arab Emirates		Rwanda	Trinidad and Tobago
Spain		Vanuatu		Senegal	Uruguay
Sweden		Vietnam		Seychelles	
Switzerland				Sierra Leone	
Taiwan				South Africa	
United Kingdom				Togo	
United States				Uganda	
				Zambia	

Note: Numbers in parentheses indicate the total number of countries in each group.

Source: Author's compilation and regional classification based on IMF data.