Fiscal Policy for Economic Recovery and Development: An Empirical Investigation of Fiscal Policy Shocks in the Sri Lankan Economy

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Abstract

This is an empirical investigation of fiscal policy transmission mechanisms in the Sri Lankan economy using a Real Business Cycle Dynamic Stochastic General Equilibrium (RBC-DSGE) model, motivated by Sri Lanka's severe economic crisis since 2022, including fiscal imbalances, rising debt, and macroeconomic instability. The RBC-DSGE model incorporates households, firms, and government fiscal policy through consumption expenditure, capital, and labor income taxation. Key findings from impulse response analysis reveal that Total Factor Productivity shocks have the strongest positive impact (1% increase generates 3% output growth), while government consumption shocks yield modest positive effects (fiscal multiplier: 1.587) but crowding-out of private investment. Capital income tax increases produce contractionary effects (multiplier: -0.16) through reduced investment, while labor income tax increases generate stronger contractionary effects (multiplier: -1.0545). Policy implications support productivity-enhancing measures, strategic government spending complementing the private sector, and careful tax policy design with minimizing distortions. This research contributes methodologically by applying RBC-DSGE techniques to Sri Lankan fiscal policy, providing empirical multiplier insights and evidence-based guidance for economic recovery.

Keywords: *RBC-DSGE Model, Fiscal Policy, Sri Lankan Economy, Fiscal Multipliers, Tax Policy*

JEL Classification: H03, E62, C32, C51, H05, H02

Introduction

The Sri Lankan economy has faced significant challenges in recent years, including fiscal imbalances, rising public debt, and macroeconomic instability. "The Government of Sri Lanka announced the suspension of payments on its external debt obligations on April 12, 2022" (Samarakoon, 2024, p.1), experiencing "the worst crisis since gaining independence in 1948" (Cassim, 2024, p.1). Gross domestic product (GDP) fell by -7.3%, inflation increased by 46.4%, basic goods shortages emerged, and poverty increased by 25% (CBS, 2025). International Monetary Fund (IMF) (2023, p.1) highlighted that "Sri Lanka fell into an unprecedented crisis as a result of a series of shocks and policy missteps. Debt rose to unsustainable levels resulting from large fiscal imbalances, and access to international capital markets was lost soon after large tax cuts and the onset of COVID-19."

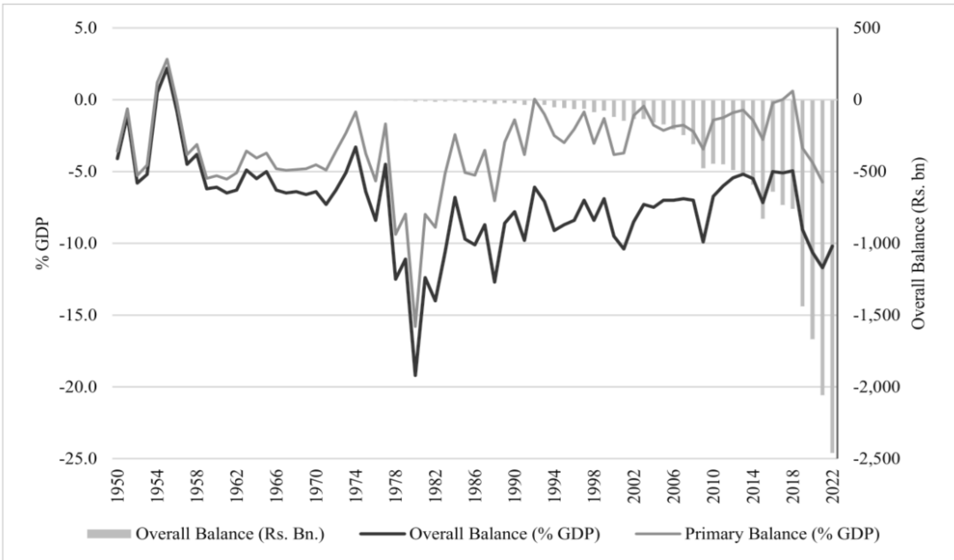

Figure 1: Sri Lankan Fiscal Balance 1950 – 2022
Source: Central Bank of Sri Lanka

Huge ongoing fiscal deficits contribute to slow economic development (Fischer, 1993; Adam & Bevan, 2005) and macroeconomic instability. Excessive governmental expenditure funded by debt affects future generations, with large ongoing deficits potentially causing fiscal crises and slower growth (Romer, 2006). Figure 1 shows that Sri Lanka's fiscal deficits were negative for 71 of 73 years (1950-2022), leading to excessive public debt and raising questions about fiscal strategies. Abudu et al. (2024) argue the crisis stems from long-term fiscal imbalances due to "fiscal deficits, tight fiscal space and a high debt burden" (Wignaraja & te Velde, 2024, p. 70).

Sri Lanka must focus on policy reforms to mitigate the crisis and regain development. With economic restructuring under IMF guidance, fiscal policy effectiveness in fostering recovery has become crucial. While Wignaraja and te Velde (2024) note Sri Lanka's recovery has progressed faster than anticipated compared to other defaulting developing nations, this capacity remains insufficient to return to pre-crisis development.

Fiscal policy plays a fundamental role in macroeconomic stabilization, influencing GDP, inflation, and employment. During recessions, governments increase expenditure and reduce taxes to control private spending decline. Traditional Keynesian approaches suggest government spending stimulates aggregate demand during downturns. However, debate exists whether such policy simulation is valid for high-debt countries (Wang, 2021). Fiscal sustainability, crowding-out effects, and long-term government intervention impact underscore the need for empirical investigation. Given the crisis and ongoing reforms, understanding fiscal policy effects on growth is vital for policymakers.

This research examines fiscal policy influence on Sri Lankan economic development using a Dynamic Stochastic General Equilibrium (DSGE) model under the Real Business Cycle (RBC) framework (Ehelepola, 2014, 2015, 2016; Jegajeevan, 2016; Amarasekara et al., 2018). The central research problem addresses the limited understanding of fiscal policy transmission mechanisms and the absence of rigorous empirical analysis using modern macroeconomic modeling techniques.

This study addresses how different fiscal policy shocks transmit through the economy and their differential effects on key macroeconomic variables, including output, consumption, investment, and employment. The primary objective is to develop and estimate an RBC-DSGE model specifically calibrated for Sri Lanka to analyze fiscal policy transmission mechanisms and effects on economic development. The research examines fiscal expansion effects through increased government consumption, evaluates fiscal consolidation effects through increased taxation with separate analysis of capital and labor income taxes, and derives policy-relevant insights for fiscal policy instrument effectiveness in promoting economic development.

Literature Review

Theoretical and Empirical Foundations

The fiscal policy-economic development relationship has evolved through several theoretical paradigms. Classical economists argued that fiscal policy has a limited long-run growth impact due to crowding-out effects (Barro, 1974). Keynes (1936) demonstrated that government expenditure and taxation positively influence aggregate demand. The neoclassical growth model by Solow (1956) and Swan (1956) emphasized capital accumulation and technological progress, suggesting that government consumption improves output and interest rates while reducing consumption and wages (Baxter & King, 1993). New Keynesian models predict that positive government spending shocks stimulate labor demand, consumption, and real wages (Devereux et al., 1996). Endogenous growth theory transformed this understanding, with Romer (1986) and Lucas (1988) demonstrating permanent growth effects through human capital and innovation. Barro (1990) showed that productive government expenditure enhances growth through infrastructure and education, predicting an inverted U-shaped relationship between government size and development.

Empirically, cross-country studies show mixed findings. While Landau (1983) and Grier and Tullock (1989) found negative government size and growth relationships supporting crowding-out hypotheses, Devarajan et al. (1996) revealed that while current government expenditure correlates negatively with growth, capital expenditure shows positive relationships. Panel data studies by Afonso and Furceri (2010) found negative government size impacts across OECD countries with varying effects, while Sanz et al. (2014) discovered non-linear effects, depending on development levels and institutional quality. Time series studies offer country-specific insights, with Perotti (2005) finding larger spending multipliers in Europe than in the United States.

For Sri Lanka, fiscal sustainability studies are critical given high debt-to-GDP ratios. Amarasekara et al. (2018) found vulnerable fiscal positions to adverse shocks, while Ekanayake and Dissanayake (2021) found long-run sustainability with periodic stress requiring corrective measures. Maheswaranathan and Jeewanthi (2021) found significant positive impacts with stronger long-run relationships. Alakumbura et al. (2021) demonstrated that health and transportation spending have positive impacts, but education expenditure may yield negative short-term effects.

DSGE Modeling in Sri Lanka

Anand et al. (2011) conducted the first empirical DSGE study for Sri Lanka on inflation targeting. Karunaratne and Pathberiya (2014) developed a Bayesian New Keynesian small open economy model incorporating external sector dynamics. Ehelepola (2014, 2015, 2016) contributed significantly through optimal monetary and fiscal analysis, developing models incorporating policy rules and welfare analysis. Jegajeevan (2016) provided insights into business cycle fluctuation sources and shock importance in macroeconomic variability

Despite these studies, critical gaps remain in Sri Lankan fiscal policy analysis, requiring comprehensive DSGE approaches for understanding fiscal transmission mechanisms in developing economies.

This study uses an extended RBC-DSGE model to analyze fiscal simulation and consolidation effects on Sri Lankan economic development based on Heer (2019). The standard RBC model focuses on productivity-driven fluctuations but is modified to incorporate government expenses and taxation, providing insights into government fiscal policy intervention effects on macroeconomic implications.

The model includes three key agents: households, firms, and government. It assumes a closed, small economy where the Cobb-Douglas production function determines output, with households and firms as optimizing agents. Households maximize lifetime utility within consumption, labor supply, and savings decisions subject to intertemporal budget constraints, while firms maximize intertemporal profits.

Households

A typical household is examined, assuming all households are identical with measure one, optimizing anticipated intertemporal utility within an infinite lifetime. Lifetime utility (u) is explained by consumption (C_t) and labor (L_t):

$$E_0 \sum_{t=0}^{\infty} \beta^t u(C_t, 1 - L_t), \qquad 0 < \beta < 1, \tag{1}$$

where E_0 is the expectation operator, and utility is discounted by factor β. The utility function uses effective consumption C_t and leisure $1\text{-}L_t$;

$$u(C_t, 1 - L_t) = \frac{(C_t^{\iota}(1 - L_t)^{1-\iota})^{1-\sigma}}{1 - \sigma} \tag{2}$$

Effective consumption is represented by a constant elasticity of substitution (CES) aggregator of private consumption C_t^p and government consumption G_t (Heer, 2019).

$$C_t = \left[\phi\left(C_t^p\right)^{1-1/\rho c} + (1 - \phi) G_t^{1-1/\rho c}\right]^{\frac{1}{1-1/\rho c}} \tag{3}$$

where ρc is "substitution elasticity of private-public consumption" and ϕ represents their weight. This research explores "the special case where $\phi = 1$, where government consumption does not influence utility, leading to $C_t = C_t^p$ considering leisure 1- L_t in the CES aggregator" (Heer, 2019, p.122) as follows;

$$u(C, 1 - L) = \frac{1}{1 - \sigma}\left[C^{1-1/\rho} + \kappa(1 - L)^{1-1/\rho}\right]^{\frac{1}{1-1/\rho}} \tag{4}$$

where "$1/\sigma$ indicates the intertemporal elasticity of substitution and ρ represents intratemporal elasticity between effective consumption C and leisure 1- L" (Heer, 2019, p.122).

In a closed economy, “households receive income from labor supply, lending capital stock (CS) to firms, and lump-sum transfer tr_t. Capital income r_tK_t is received from firms based on real interest rate r_t. After capital income tax adjustment τ_t^K, capital income is $(1-\tau_t^K)r_tK_t$. Depreciation δK is tax-deductible. Wage rate is w_t, with labor income tax τ_t^L making net labor income $(1-\tau_t^L)w_tL_t$. This model excludes indirect taxes. Households spend total income on private consumption C_t and savings S_t, with savings equal to investments ($S_t = I_t$) in a closed economy” (Heer, 2019, p.122).

$$C_t^p + I_t = (1-\tau_t^L)w_tL_t + (1-\tau_t^K)r_tK_t + \tau_t^K\delta K_t - tr_t \tag{5}$$

CS K_t depreciates at rate δ;

$$K_{t+1} = (1-\delta)K_t + I_t \tag{6}$$

Based on equation (5), the household budget constraint is;

$$C_t^p + K_{t+1} - (1-\delta)K_t = (1-\tau_t^L)w_tL_t + (1-\tau_t^K)r_tK_t + \tau_t^K\delta K_t - tr_t \tag{7}$$

Applying the Lagrangian approach to solve the consumer problem, yields first-order conditions (FOC) for private consumption C_t^p, labor L_t, and CS K_{t+1};

$$\underset{C_t^p, L_t, K_{t+1}}{\operatorname{argmax}} \mathcal{L} = \sum_{t=0}^{\infty}\beta^t\left[\frac{\left\{\left[\phi\left(C_t^p\right)^{1-1/\rho c}+(1-\phi)G_t^{1-1/\rho c}\right]^{\frac{1}{1-1/\rho c}}(1-L_t)^{1-\iota}\right\}^{1-\sigma}}{1-\sigma} - \lambda_t\{C_t^p + K_{t+1} - (1-\delta)K_t - (1-\tau_t^L)w_tL_t - (1-\tau_t^K)r_tK_t\tau_t^K\delta K_t + tr_t\}\right] \tag{8}$$

FOC of private consumption:

$$\lambda_t = \iota\phi C_t^{\iota(1-\sigma)-1}(1-L_t)^{(1-\iota)(1-\sigma)}\left[\phi\left(C_t^p\right)^{1-1/\rho c} + (1-\phi)G_t^{1-1/\rho c}\right]^{\frac{1}{1-1/\rho c}-1}\left(C_t^p\right)^{-1/\rho c} \tag{9}$$

FOC of labor:

$$\lambda_t(1-\tau_t^L)w_t = (1-\iota)C_t^{\iota(1-\sigma)}(1-L_t)^{(1-\iota)(1-\sigma)-1} \tag{10}$$

Solving for labor supply

$$(1-\tau_t^L)w_t = \frac{(1-\iota)C_t^{\iota(1-\sigma)}(1-L_t)^{(1-\iota)(1-\sigma)-1}}{\iota\phi C_t^{\iota(1-\sigma)-1}(1-L_t)^{(1-\iota)(1-\sigma)}\left[\phi\left(C_t^p\right)^{1-1/\rho c} + (1-\phi)G_t^{1-1/\rho c}\right]^{\frac{1}{1-1/\rho c}-1}\left(C_t^p\right)^{-1/\rho c}} \tag{11}$$

FOC of CS:

$$\lambda_t = \beta\lambda_{t+1}\left[1 + (1-\tau_{t+1}^K)(r_{t+1}-\delta)\right] \tag{12}$$

substituting equation 9 into equation 12,

$$\begin{aligned}
&\iota\phi C_t^{\iota(1-\sigma)-1}(1-L_t)^{(1-\iota)(1-\sigma)}\left[\phi\left(C_t^p\right)^{1-1/\rho c} + (1-\phi)G_t^{1-1/\rho c}\right]^{\frac{1}{1-1/\rho c}-1}\left(C_t^p\right)^{-1/\rho c} \\
&\quad = \iota\phi C_{t+1}^{\iota(1-\sigma)-1}(1-L_{t+1})^{(1-\iota)(1-\sigma)}\left[\phi\left(C_{t+1}^p\right)^{1-1/\rho c}\right. \\
&\quad \left. + (1-\phi)G_{t+1}^{1-1/\rho c}\right]^{\frac{1}{1-1/\rho c}-1}\left(C_{t+1}^p\right)^{-1/\rho c}.\beta[1 + (1-\tau_{t+1}^K)(r_{t+1} \\
&\quad - \delta)] \qquad (13
\end{aligned}$$

Firm

The representative firm produces goods and services for household consumption or savings. Perfect competition characterizes factors and good markets. Firms maximize “profits regarding labor and capital demand. Cobb-Douglas technology describes production with constant returns to scale” (Heer, 2019, p.123);

$$Y_t = Z_t K_t^{\alpha} L_t^{1-\alpha} \quad (14)$$

where Z_t represents productivity, α is capital elasticity, and $(1-\alpha)$ is labor elasticity. "Production is subject to productivity shock Z_t governed by AR (1) process" (Heer, 2019, p.123);

$$lnZ_t = \rho^Z lnZ_{t-1} + \epsilon_t^Z, \qquad \epsilon_t^Z \sim N(0, \sigma^Z), \quad (15)$$

Firms maximize profit subject to budget constraints of labor wages and capital returns.

$$\max_{L_t, K_t} \prod = Z_t K_t^{\alpha} L_t^{1-\alpha} - w_t L_t - r_t K_t \quad (16)$$

The following shows the firm's FOC of labor and capital, respectively;

$$\frac{\partial \Pi}{\partial L_t} = (1-\alpha) Z_t K_t^{\alpha} L_t^{-\alpha} - w_t = 0 \quad (17)$$

$$\frac{\partial \Pi}{\partial K_t} = \alpha Z_t K_t^{\alpha-1} L_t^{1-\alpha} - r_t = 0 \quad (18)$$

"In factor market equilibrium, factors are compensated by their marginal products" (Heer, 2019, p. 123).

$$w_t = (1-\alpha)\frac{Y_t}{L_t} \quad (19)$$

$$r_t = \alpha \frac{Y_t}{K_t} \quad (20)$$

Government

"The government purchases an amount G_t of the final goods in each period t" (Heer, 2019, p.123). Government expenditure follows first-order autoregressive process;

$$lnG_t = (1-\rho^G) lnG + \rho^G G_{t-1} + \epsilon_t^G, \qquad \epsilon_t^G \sim N(0, \sigma^G), \quad (21)$$

where G denotes steady-state government consumption.

"The focus is on aggregate government spending effect rather than financing government budget balances" (Gali & Monacelli, 2008, as cited in Jegajeevan, 2016, p. 22). The model assumes that only labor and capital income taxes finance the total government expenditure, with depreciation is tax-deductible. Following Gomme et al. (2011), "labor and capital income taxes follow stochastic processes. The capital income tax rate follows AR (1)" (Heer, 2019, p.124);

$$ln\tau_t^K = (1-\rho^K)\ln\tau^K + \rho^K ln\,\tau_{t-1}^K + \epsilon_t^K, \qquad \epsilon_t^K \sim N(0, \sigma^K), \quad (22)$$

"Labor income tax rate follows AR (2) process, accounting for delayed legislative adjustments" (Heer, 2019, p.124);

$$ln\tau_t^L = (1-\rho^{L1}-\rho^{L2})\ln\tau^L + \rho^{L1} ln\,\tau_{t-1}^L + \rho^{L2} ln\tau_{t-2}^L + \epsilon_t^L, \qquad \epsilon_t^L \sim N(0, \sigma^L), \quad (23)$$

Assuming balanced government budget, total government income consists of "labor and capital income tax only. The government transferred residual tax revenues as lump sum to households (Tr_t), balancing the budget each period t" (Heer, 2019, p.124).

$$Tr_t = \tau_t^L w_t L_t + \tau_t^K (r_t - \delta) K_t - G_t \quad (24)$$

This model analyzes how government expenditure and simple tax policy affect economic development based on business cycles in Sri Lanka. Detailed Sri Lankan fiscal policy modeling is left for future research.

Competitive Equilibrium

In competitive equilibrium, all economic agents optimize their objectives. Households maximize intertemporal utility, firms maximize profits, government balances budget, and product market clears (Heer, 2019).

Firms' factor production is based on labor and capital costs with constant returns to scale:

$$Y_t = w_t L_t + r_t K_t \tag{25}$$

The following equation can be derived by inserting the government budget equation (23) into the households' budget constraint (6) with the above equation (24).

$$Y_t = C_t^p + I_t + G_t \tag{26}$$

Finally, the following nine system equations summarize economic equilibrium. Endogenous variables are GDP (Y_t), CS (K_t), labor (L_t) productivity (Z_t), total consumption (C_t), private consumption (C_t^p), government consumption (G_t), investment (I_t), wage (w_t), and interest rate (r_t).

$$\begin{aligned}\iota\phi C_t^{\iota(1-\sigma)-1}(1-L_t)^{(1-\iota)(1-\sigma)}\left[\phi\left(C_t^p\right)^{1-1/\rho c}+(1-\phi)G_t^{1-1/\rho c}\right]^{\frac{1}{1-1/\rho c}-1}\left(C_t^p\right)^{-1/\rho c}\\ = \iota\phi C_{t+1}^{\iota(1-\sigma)-1}(1-L_{t+1})^{(1-\iota)(1-\sigma)}\left[\phi\left(C_{t+1}^p\right)^{1-1/\rho c}\right.\\ \left.+(1-\phi)G_{t+1}^{1-1/\rho c}\right]^{\frac{1}{1-1/\rho c}-1}\left(C_{t+1}^p\right)^{-1/\rho c}.\beta[1+(1-\tau_{t+1}^K)(r_{t+1}\\ -\delta)]\end{aligned} \tag{27a}$$

$$(1-\tau_t^L)w_t = \frac{(1-\iota)C_t^{\iota(1-\sigma)}(1-L_t)^{(1-\iota)(1-\sigma)-1}}{\iota\phi C_t^{\iota(1-\sigma)-1}(1-L_t)^{(1-\iota)(1-\sigma)}\left[\phi\left(C_t^p\right)^{1-1/\rho c}+(1-\phi)G_t^{1-1/\rho c}\right]^{\frac{1}{1-1/\rho c}-1}\left(C_t^p\right)^{-1/\rho c}} \tag{27b}$$

$$C_t = \left[\phi\left(C_t^p\right)^{1-\frac{1}{\rho c}}+(1-\phi)G_t^{1-\frac{1}{\rho c}}\right]^{\frac{1}{1-\frac{1}{\rho c}}} \tag{27c}$$

$$Y_t = C_t^p + I_t + G_t \tag{27d}$$

$$K_{t+1} = (1-\delta)K_t + I_t \tag{27e}$$

$$Y_t = Z_t K_t^{\alpha} L_t^{1-\alpha} \tag{27f}$$

$$w_t = (1-\alpha)Z_t K_t^{\alpha} L_t^{-\alpha} = (1-\alpha)\frac{Y_t}{L_t} \tag{27g}$$

$$r_t = \alpha Z_t K_t^{\alpha-1} L_t^{1-\alpha} = \alpha\frac{Y_t}{K_t} \tag{27h}$$

Four exogenous variables $Z_t, G_t, \tau_t^L, \tau_t^K$ follow AR processes;

$$lnZ_t = \rho^Z lnZ_{t-1} + \epsilon_t^Z, \qquad \epsilon_t^Z \sim N(0, \sigma^Z), \tag{27i}$$

$$lnG_t = (1-\rho^G)lnG + \rho^G G_{t-1} + \epsilon_t^G, \qquad \epsilon_t^G \sim N(0,\sigma^G), \qquad (27j)$$
$$ln\tau_t^L = (1-\rho^{L1}-\rho^{L2})\ln\tau^L + \rho^{L1} ln\,\tau_{t-1}^L + \rho^{L2} ln\tau_{t-2}^L + \epsilon_t^L, \ \epsilon_t^L \sim N(0,\sigma^L), \qquad (27k)$$
$$ln\tau_t^K = (1-\rho^K)\ln\tau^K + \rho^K ln\,\tau_{t-1}^K + \epsilon_t^K, \qquad \epsilon_t^K \sim N(0,\sigma^K), \qquad (27l)$$

Model Analysis

Calibration

The DSGE model parameters are calibrated to capture the structural features of the Sri Lankan economy based on empirical observations, theoretical consistency, and the literature (Table 1). Following the Sri Lanka Shop and Office Employees Act No. 19 of 1954, which limits working hours to eight hours daily and 45 hours per week, steady state (L) is 1/3, confirmed by the household's first-order condition ensuring consistent consumption-leisure trade-off.

Table 1: Calibrated Parameters

Description	Parameter	Value	Note
Discount factor	β	0.99	Standard in RBC literature.
Inverse intertemporal elasticity of substitution (risk aversion)	σ	2.0	Matches moderate risk aversion (Cooley & Prescott, 1995; Heer, 2019; Ehelepola, 2014).
Relative weight of consumption in utility	ι	0.564	Calibrated to steady-state labor supply (L=1/3) based on equation 12
Elasticity of substitution (private/public consumption)	ρc	0.5	Low substitutability (Baxter & King, 1993).
Relative weight of private consumption in effective consumption	ϕ	0.85	Bayesian estimation (Appendix A).
Steady-state labor supply	L	1/3	8 hours per day
Capital share in output	α	0.48	Guerriero (2019) calculation for Sri Lanka.
Depreciation rate	δ	0.0375	Annual rate of 15%; based on Sri Lankan literature (Ehelepola, 2014).

Share of government spending in steady-state production	gy	0.10	Matches Sri Lanka's average (CBS, 2025).
Capital income tax rate	τ^K	0.24	Statutory rates according to the Sri Lankan Inland Revenue (Amendment) Act, No. 02 of 2025.
Labor income tax rate	τ^L	0.14	
Autocorrelation of TFP shock	ρ^Z	0.95	Cooley and Prescott (1995)
Standard deviation of innovations in a TFP shock	σ^Z	0.01	Cooley and Prescott (1995)
Autocorrelation parameter in a government spending shock	ρ^G	0.90	Captures fiscal policy inertia (Heer, 2019).
Standard deviation of government spending shock	σ^G	0.01	The process of (log) government consumption
Autocorrelation parameter in a capital income tax shock	ρ^K	0.97	Reflects policy implementation lags (Heer, 2019).
Standard deviation of capital income tax shock	σ^K	0.01	The process of (log) capital tax
Autocorrelation parameter in a labor income tax shock	ρ^{L1}	0.78	Accounts for delayed legislative adjustments (Heer, 2019).
	ρ^{L2}	0.20	
Standard deviation of labor income tax shock	σ^L	0.01	The process of (log) labor tax

Source: Author estimated some parameters by using historical data from the World Bank Development Indicators (WDI), and some parameters are sourced from previous literature as listed in the Note column.

The discount factor (β) is 0.99, consistent with long-term saving behavior in emerging economies. Intertemporal elasticity of substitution ($\sigma = 2$) is 0.5, consistent with the standard RBC models (Cooley & Prescott, 1995; Ehelepola, 2014). The consumption leisure weight (ι) is calibrated to correspond with steady state labor supply based on equation 12.

Since public services, i.e. healthcare, education, transport, and sanitation, are often inadequate in developing countries, households rely on private spending for full utility. Hence, private-public consumption elasticity of substitution (ρc) is 0.5 (Baxter and King, 1993). Bayesian estimation illustrates that private consumption relative weight (ϕ) is 0.85 (Appendix A), consistent with its dominance in effective consumption.

Capital share in output (α) is 0.48 based on Guerriero's (2019) calculations for Sri Lanka, consistent with empirical studies showing most economies' capital share between 0.3-0.4 (Gollin, 2002) and similar developing economies (Ahmed et al., 2012; Ehelepola, 2014).

The depreciation rate (δ) is calibrated at 0.15 annually (0.0375 quarterly), higher than typical RBC literature (0.04-0.08) due to fixed asset destruction from Sri Lanka's civil war (Hevia and Loayza, 2013; Ehelepola, 2014), consistent with developing economies like Mexico (12.55%) and Pakistan (15%) (Garcia-Cicco et al., 2006; Ahmed et al., 2012).

Public spending to GDP ratio (gy) is 10%, simulating Sri Lankan averages from 1961-2024. Steady-state labor (τ^L) and capital (τ^K) income tax rates are 0.14 and 0.24, respectively, based on statutory rates from the Sri Lankan Inland Revenue (Amendment) Act, No. 02 of 2025.

Following prominent RBC literature, autoregressive process parameters are ρ^Z = 0.95 and σ^Z=0.01 for TFP (Cooley and Prescott, 1995); ρ^G = 0.90 and σ^G=0.01 for government consumption (Heer, 2019); and ρ^K = 0.97, ρ^{L1} = 0.78, and ρ^{L2} = 0.20 for tax rates (Gomme et al., 2011), with highly persistent autoregressive processes (Heer, 2019).

Estimation of Steady State

This study assumes output (y) equal to one and establishes initial values using the Sri Lankan macro data from the World Bank Development Indicators (WBDI) and the Central Bank. Steady-state investment and government consumption are estimated based on the real gross fixed capital formation and general government final consumption expenditure data from 1961 to 2023, yielding government consumption and investment at 10% and 23% of GDP, respectively. Following market equilibrium (Equation 25), private consumption is $C^P = Y - G - I = 0.67$. Given ρc and ϕ values, effective consumption *C = 0.364* is computed using equation (03).

Quarterly real interest rate is 2.4% based on the average 91-day Treasury Bill rates from CBS (2015-2021). Steady state labor supply is L = 1/3 per the employment law. Equilibrium wage is calculated using equation (18) $w_t = (1-\alpha)\frac{Y_t}{L_t} = 1.56$. Based on the estimated values, the consumption utility weight (ι) is solved via the labor supply equation (12): ι =0.564.

Table 2: Initial Values of the DSGE Model

Variable	**Value**	**Source**
y (Output)	1	Assumed
c^p (Private Consumption)	0.67	Based on market equilibrium $C^P = Y - G - I$
i (Investment)	0.23	Average value of investment to GDP ratio from WDI (1961-2023)
k (Capital)	2.0	Estimated based on equation (30) of steady-state investment
l (Labor)	1/3	Standard working hours per day
w (Wages)	0.3	Estimated based on labor demand equation 21
r (Real Interest Rate)	0.024	Average 91 days Treasury Bills real interest rate in quarterly
z (Productivity)	1	Assumed for normalization
G (Government Consumption)	0.1	Average value of government consumption to GDP ratio from WDI (1961-2023)

Source: Author's estimates by using historical data from the World Bank Development Indicators (WDI)

Following RBC literature, steady-state TFP $Z_t = Z_{t+1} = Z = 1.0$, using the steady-state investment equation $I = \delta K$ (equation 28), capital stock is estimated. The total capital stock to output ratio is estimated using equation (29), yielding capital stock of 2.0. Table 2 summarizes initial DSGE model values.

$$k = \frac{\sum_{t=1960}^{t=2023} \quad I(1-\delta)^{2023-t}}{Y_{2023}} \tag{29}$$

Results and Discussion

Impulse Responses to Productivity Shock

The model's productivity shock response provides insights into how technological progress affects the economy. Figure 2 illustrates percentage deviations of macroeconomic variables from steady state values. The economy is in a steady state at t=0. With autoregressive parameter $\rho^z = 0.95$, TFP level Z_t progressively decreases after increasing by one standard deviation ($\varepsilon^z = 0.01$) at t = 1 (Heer, 2019), traces over 40 periods.

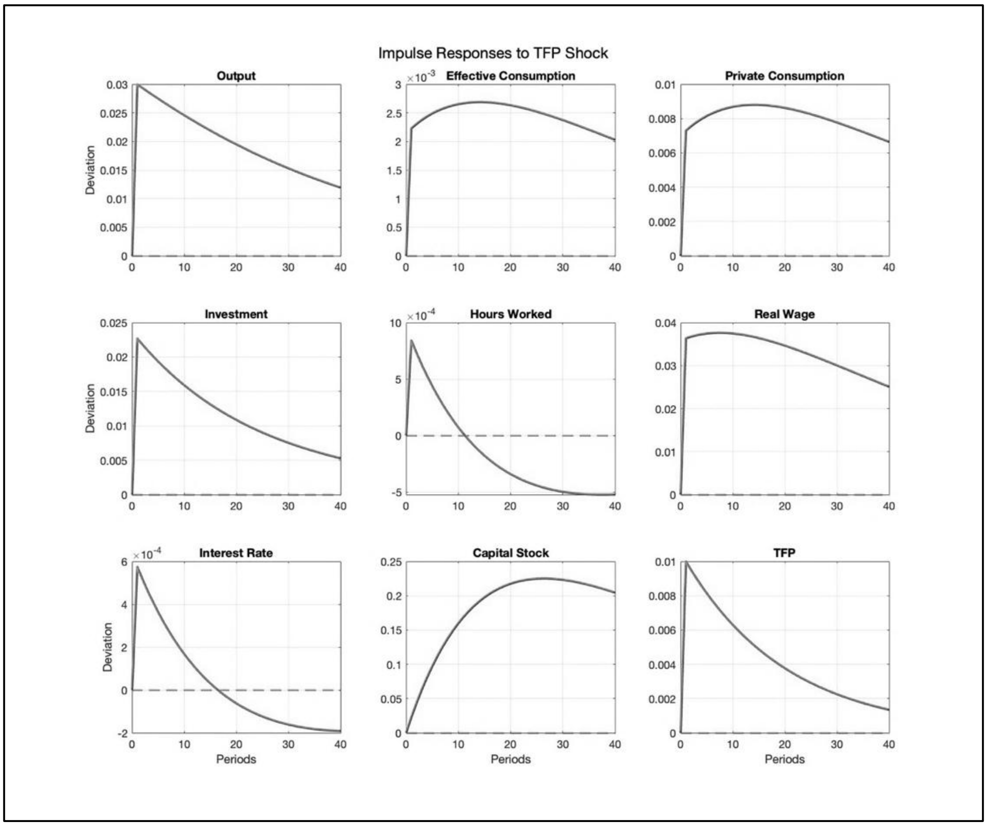

Figure 2: Impulse responses: Total Factor Productivity (TFP) shock
Source: Author's results from RBC-DSGE Model

When positive TFP shock rises, inputs of both capital and labor immediately become more productive, increasing the marginal productivity of both production factors. Real wage rate increases by 4%, representing additional worker value from technological improvement. Households provide more labor hours (0.08% increase) as the greater income effect dominates the substitution effect. Additional household income drives higher private consumption and investment, with investment decisions (+2%) dominating consumption decisions (+0.7%).

This investment boom increases capital accumulation. CS maximizes at approximately period 25, around 22% above the steady state. These interconnected responses positively affect output dynamics. Output jumps approximately 3% following a 1% TFP shock, demonstrating how productive efficiency improvements generate disproportionately large economic benefits.

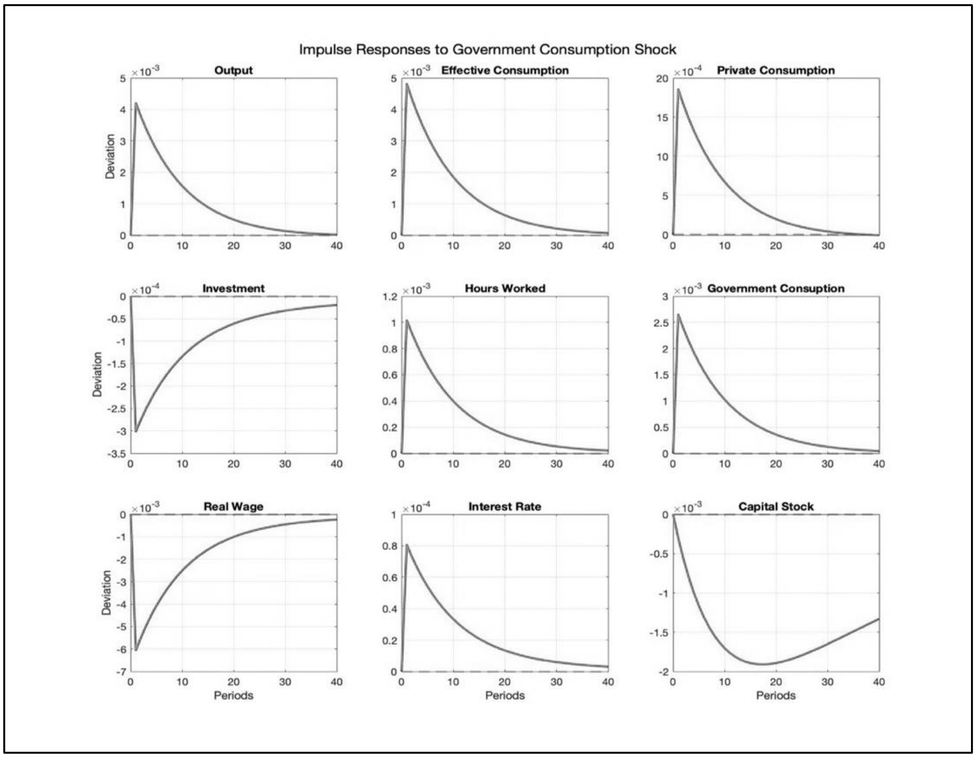

Figure 3: Impulse responses: Government consumption shock, ρc = 0.5 and ϕ = 0.85
Source: Author's results from RBC-DSGE Model

Impulse Responses to Government Consumption Shock

Figure 3 illustrates impulse responses to a 1% positive government consumption shock ($\epsilon_1^G = 0.01$), with impact at *t*=1 gradually declining according to an autoregressive process (Equation 23).

Higher taxes financing additional government budget creates negative household wealth effects. Higher government consumption affects the marginal utility of private consumption through complementarity. For ρc = 0.5 and ϕ = 0.85, the wealth effect dominates the substitution effect, increasing labor supply by 0.1%. Despite the negative wealth effect, private consumption rises 0.2%, suggesting complementarity between public-private consumption outweighs the wealth effect through higher labor supply and income. Higher labor supply reduces the marginal product of labor, declining the real wage by 0.6%. Investment declines 0.3%, highlighting government consumption crowding out private investment through resource reallocation. Interest rate increases approximately 0.01%, capital stock decreases, and output increases by 0.4%.

Impulse Responses to Government Tax Shock

Capital Income Tax Shock

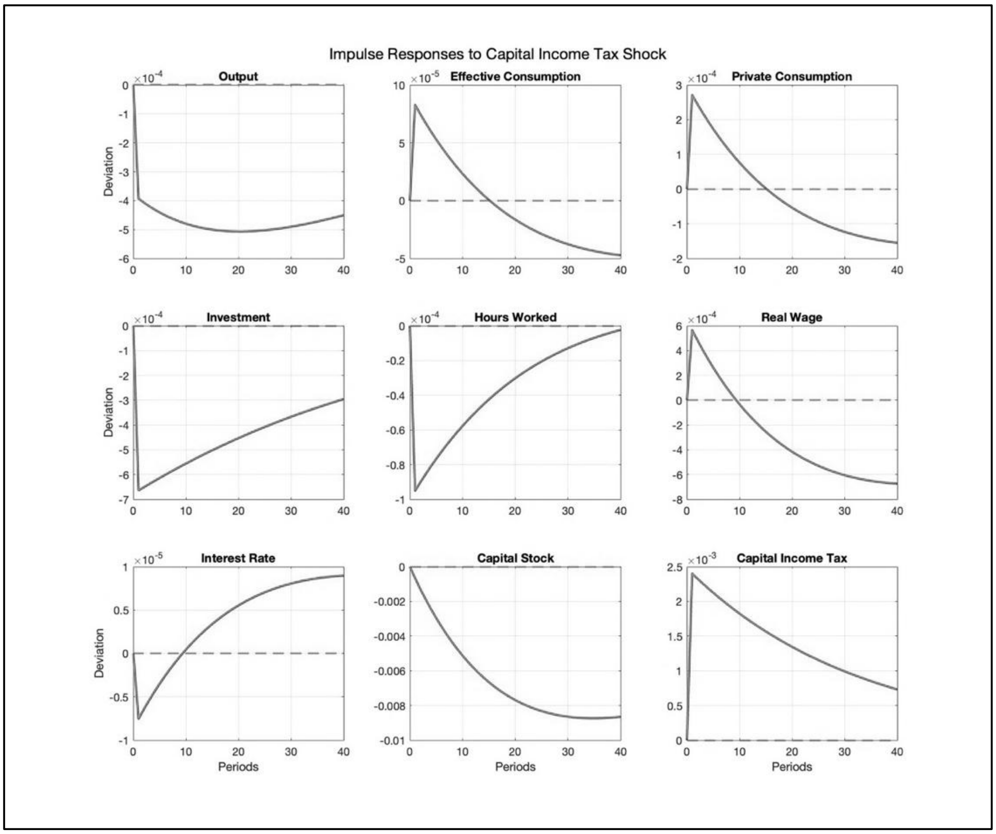

Figure 4: Impulse responses: Capital income tax shock
Source: Author's results from RBC-DSGE Model

Figure 4 illustrates equilibrium variable impulse responses to one-standard-deviation shock (1%) to capital income tax rate τ_t^K (Heer, 2019), increasing from 24.00% to 24.24%. This directly affects investment returns, causing substantial investment decline of approximately 0.7%. Capital stock gradually decreases, reaching maximum decline of 0.9% after 30 periods.

Output responds negatively, falling 0.4% and declining to 0.5% below the steady state before recovering after period 20, highlighting capital taxation's distortionary nature on economic activity. Private consumption initially increases 0.03% as households reallocate resources from investment to consumption with diminished capital returns. However, this is temporary; consumption eventually falls below the steady state after 15 periods as the negative wealth effect dominates.

Labor hours decrease approximately 0.01%, indicating the income effect is dominated by the substitution effect. Real wage increases initially 0.06% but subsequently declines, turning negative after period 10, reflecting the marginal product of labor adjustments. Interest rate initially falls but gradually increases as capital stock diminishes, eventually exceeding the steady state after period 10.

These findings highlight capital income taxation's distortionary effects, particularly through investment channels. While consumption may temporarily increase, long-term consequences include lower output, reduced capital stock, and eventually lower consumption, suggesting significant efficiency costs.

Labor Income Tax Shock

Figure 5 presents equilibrium variable impulse responses to one-standard-deviation shock (1%) to labor income tax rate τtL, rising from 14.00% to 14.14%. Decreased opportunity cost of leisure reduces work hours by 0.04%. This labor supply contraction directly affects output, falling approximately 0.15% initially, recovering 0.04% due to delayed legislative adjustments. Reduced output and income force households to reduce consumption and savings.

Contrasting the capital tax shock, real wages increase 0.2% as reduced labor supply increases the marginal product of labor. This wage premium gradually dissipates, turning negative after 31 periods. Private consumption decreases immediately by 0.06%, reflecting the direct income effect and the indirect reduced economic activity effect. Effective consumption falls roughly 0.02%, indicating negative wealth effect dominates.

Investment contracts 0.09%, primarily from reduced output and resources for capital formation, leading to gradual capital stock decline reaching 1.2% below the steady state by period 40. Interest rate exhibits substantial initial decrease of 0.28×10^{-4} units, reflecting reduced capital return. Over time, interest rate gradually increases, turning positive after 30 periods.

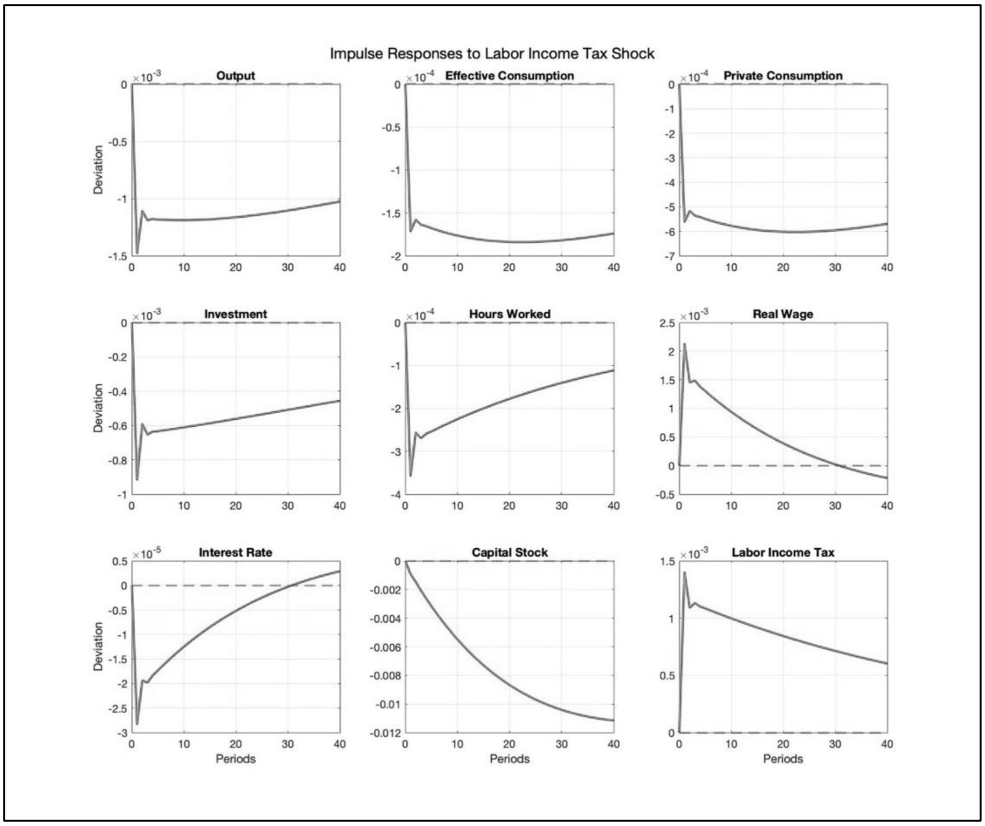

Figure 5: Impulse responses: Labor income tax shock
Source: Author's results from RBC-DSGE Model

These outcomes align with the traditional AS-AD framework. Both tax scenarios reduce overall output, capital investment, and employment. Consumer spending patterns differ: rising with capital taxation but falling with labor taxation. In both scenarios, proportional labor availability impact outweighs capital stock changes, resulting in wage increases alongside declining real interest rates.

Fiscal Multiplier

Based on impulse response functions, fiscal multipliers are computed for ϕ = 0.85 and ρc = 0.5. The fiscal multiplier measures how fiscal instruments change ΔFt (government spending or tax) affects output: $\Delta Y_t/\Delta F_t$.

$$\frac{\Delta Y}{\Delta F} \approx \frac{dY}{dF} = \frac{\frac{dY}{Y}}{\frac{dF}{F}} \times \frac{Y}{F}$$

Government spending multiplier measures output change from government consumption spending change. Tax multipliers measure output change from tax revenue changes from distortionary taxes.

Table 3 shows the fiscal multipliers in the 1st quarter, 1st year, 3rd year, and 5th year in the simulated economy with G/Y = 0.1, τ^K= 0.24, and τ^L=0.14 at steady state. Government spending multiplier demonstrates substantial fiscal stimulus at 1.5870 in the first quarter. Tax-based interventions show fiscal consolidation with negative multipliers. This empirical study calculates government spending, capital income tax, and labor income tax multipliers of 1.5, -0.16, and -1.05 with calibration $\{\phi, \rho c\}$ = {0.85, 0.5}.

Table 3: Fiscal Multipliers for Output

Period	1st quarter	4th quarter (1st year)	12th quarter (3rd year)	20th quarter (5th year)
Government spending multiplier $\frac{\Delta Y}{\Delta G} \approx \frac{dY}{dG} = \frac{dY}{Y} \Big/ \frac{dG}{G} \times Y/G$	1.5870	1.5247	1.3486	1.1438
Capital income tax multiplier $\frac{\Delta Y}{\Delta \tau^K} \approx \frac{dY}{d\tau^K} = \frac{dY}{Y} \Big/ \frac{d\tau^K}{\tau^K} \times Y/\tau^K$	-0.1637	-0.1906	-0.2554	-0.3111
Labor income tax multiplier $\frac{\Delta Y}{\Delta \tau^L} \approx \frac{dY}{d\tau^L} = \frac{dY}{Y} \Big/ \frac{d\tau^L}{\tau^L} \times Y/\tau^L$	-1.0545	-1.0366	-1.1010	-1.1384

Source: Author's calculations by using MATLAB software with the model's simulated data

Conclusion and Policy Recommendations

This study provides a comprehensive empirical analysis of fiscal policy transmission mechanisms in Sri Lanka through the RBC-DSGE model, addressing critical gaps in understanding fiscal policy effectiveness. Total Factor Productivity (TFP) shocks demonstrate the strongest positive impact, with 1% TFP increase generating 3% immediate output increase through enhanced capital and labor productivity. Government consumption shocks produce positive but modest output effects, with partial private investment crowding-out (0.3% initial decline). Multiplier effects are temporary, returning to the steady state within five years. Tax policy analysis reveals significant contractionary effects. Capital income tax increases produce substantial negative impacts (0.04% initial output decline, -0.26 medium-term multipliers) through reduced investment incentives. Labor income tax increases generate stronger contractionary effects through labor supply reduction (0.15% initial output decline), proving more contractionary in the short run.

Findings strongly support prioritizing productivity-enhancing policies as the most effective growth strategy, including education and skills development investments, increased R&D funding, and strategic infrastructure investments. Government spending should target areas complementing private sector activity. Priority should be public investments in infrastructure, education, and healthcare, generating positive spillovers, improving spending efficiency through performance-based budgeting, and strengthening procurement systems.

Given the contractionary effects of both taxes, tax policy should minimize distortions while achieving revenue objectives. Sri Lanka should reduce capital income taxation reliance to encourage investment, implement carefully calibrated progressive labor income taxes, broaden tax base rather than increasing rates, and improve tax administration for long-term growth through gradual shift toward balanced tax systems. Key limitations include the closed economy assumption, representative agent framework, and flexible price assumptions not fully capture Sri Lankan economic rigidities. Future research should incorporate financial frictions, open economy features, sectoral analysis, and policy regime variations for more comprehensive policy guidance.

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Appendix

Appendix A: Parameter Estimation

Bayesian Estimation of the Relative weight of private consumption in effective consumption (ϕ)

$$C_t = \phi C_t^P + (1 - \phi) G_t$$

Table 4: Bayesian estimation of the weight of private and public consumption

Variable Effective consumption	Mean	Std. Dev.	MCSE	Median	95% Cred. Interval (Lower)	95% Cred. Interval (Upper)
ϕ	0.8463	0.1442	0.0053	0.8454	0.5707	1.1402
$1 - \phi$	0.1376	0.2010	0.0072	0.1371	-0.2513	0.5393
_cons	0.6354	4.2114	0.1502	0.6991	-8.1767	9.1583
sigma2	0.0017	0.0007	0.0000	0.0015	0.0008	0.0035

Source: Author's calculations by using STATA software with the World Development Indicators (WDI) data