The Underground Economy in Sri Lanka: Implications for Fiscal Policy and Economic Performance

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International Research Conference - Central Bank of Sri Lanka
13 December 2024

Summary

The Underground Economy in Sri Lanka: Implications for Fiscal Policy and Economic Performance

- This paper tries to understand the underground economy, tax evasion, and fiscal policy in Sri Lanka.
- The size of the underground economy in Sri Lanka is substantial: 42 per cent of GDP, on average.
- Implied tax evasion is 1/3 of the total taxes due in Sri Lanka.
- Imperfect tax enforcement significantly reduces the effectiveness of tax-based consolidation plans in fostering fiscal revenues.

Summary

The Underground Economy in Sri Lanka: Implications for Fiscal Policy and Economic Performance

Policy Recommendation:

- Fighting against tax evasion and the formalisation of firms are more effective alternatives for stimulating fiscal revenue generation than just imposing higher income tax rates, and this should be a key policy priority for the Sri Lankan government.

Plan

Background

A perspective on reality: Understand the context of the underground economy

" *There are two aspects to reality: the manifest and the unmanifest. To know reality is to know these two together. In the same way, there are two aspects to an economy, the recorded and the 'hidden economy'. In order to understand an economy, you need to know the hidden as well as the recorded.*"

— **Huw Dixon, 1999**

Controversy: On the use of the hidden economy estimates

Background

A theoretical necessity: Incorporate the underground economy into macroeconomic analysis

"*Analysts ignore the impact of the black economy on the macro-economy either because they have not developed the required analytical framework and/or because they argue that the data are not available. The need to incorporate the black economy is not simply an empirical matter but a theoretical necessity.*"

— **Arun Kumar, 1999**

The black economy: Missing dimension of macro policymaking in India

Background

The erosion of dutiful taxpayers: Challenges in maintaining a fair tax system

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"*Some dutiful people will undoubtedly pay what they owe, but many others will not. Over time, the ranks of the dutiful will shrink as they see how they are being taken advantage of by the others. Thus, paying taxes must be made a legal responsibility of citizens, with penalties attendant on noncompliance.*"

— **Joel Slemrod, 2007**

Cheating ourselves: The economics of tax evasion

Definition of the underground economy

Unobserved economic activities (OECD, 2002);

- Underground activities
- Informal activities
- Illegal activities
- Household activities for own final use

Underground economy activities are defined as operations that are **legal** and **economically productive** but are **purposely** unreported in the formal GDP estimates.

- The opportunity cost and the level of exposure to the risk are the primary factors that influence an individual's or a company's decision to go underground.

Estimating unobserved economy size

- Direct, indirect and model-based techniques.
- Comparison to DGE (Elgin and Oztunali, 2012; Elgin, Kose, et al., 2021), MIMIC (Schneider and Enste, 2000; Medina and Schneider, 2018)and Hybrid-CDA MIMIC (Dybka et al., 2022).
- We chose the dynamic stochastic general equilibrium (DSGE) approach to estimate the model while considering underground sector variables as latent variables (Busato and Chiarini, 2004; Ihrig and Moe, 2004; Orsi, Raggi, and Turino, 2014; Meroño Herranz and Turino, 2023).

Contribution

This paper makes the following contributions to the existing body of literature:
Firstly,

- Our paper contributes to the huge literature that relies on estimated DSGE models for fiscal policy analysis (e.g. Forni, Monteforte, and Sessa, 2009, Cogan et al., 2010, Leeper, Plante, and Traum, 2010, Sims and Wolff, 2018 and Meroño Herranz and Turino, 2023).

Secondly,

- Two significant and timely contributions to the existing literature on Sri Lanka's underground economy and tax policy.

Contribution

1. Generate Sri Lanka's underground economy estimates for the period from 1982 to 2019 using the estimated model.
2. Provide an assessment of the effects of merely increasing tax rates as opposed to focusing on a long-term, sustainable solution to enhance fiscal revenue generation.
   - ✓ increase the income tax rates
   - ✓ increase enforcement
   - ✓ a comparison of the performance of the economy with and without an underground economy.

Model

The model is a closed economy DSGE model, defined by the presence of three agents:

1. Firms
   - The official (formal) sector and the unofficial (underground) sector.
   - Within the unofficial sector, both firms and households conduct underground transactions without reporting them to fiscal authorities.
2. Household (consumer-investor-worker)
3. Government
   - To deter tax evasion, the government employs monitoring procedures, conducting random inspections of firms.

Firms

Firms have access to two different Cobb-Douglas technologies: the formal production function and the underground production function.

A firm i combines formal labor, $H_{i,t}^m$, with formal capital, $K_{i,t}^m$, to produce formal output, $Y_{i,t}^m$, according to the following technology,

$$Y_{i,t}^m = A_t (K_{i,t}^m)^{\alpha} (H_{i,t}^m)^{(1-\alpha)}$$

where $\alpha \in (0, 1)$.
A_t denotes a stochastic productivity component that is specific to the formal sector.

Firms

A firm i combines underground labor, $H^u_{i,t}$, and underground capital, $K^u_{i,t}$, to produce underground output, $Y^u_{i,t}$, according to the following Cobb-Douglas technology,

$$Y^u_{i,t} = B_t \left(K^u_{i,t}\right)^{\alpha_u} \left(H^u_{i,t}\right)^{(1-\alpha_u)}$$

where $\alpha_u \in (0, 1)$.
B_t is a sector-specific stochastic technological component.

Firms

- As in Busato and Chiarini (2004), the goods produced underground are assumed to be identical to the formal ones.
- Total output produced by a firm i, namely $Y_{i,t}$, can then be simply defined as,

$$Y_{i,t} = Y_{i,t}^{m} + Y_{i,t}^{u}$$

- Firms may avoid tax and social security payment obligations by hiding part of their productions from tax authorities.

Government

- In line with Allingham and Sandmo (1972), we assume that the government attempts to deter tax evasion through random inspections of firms, compelling fraudulent entities to pay,
  - ✓ taxes on undeclared corporate income
  - ✓ social security contributions for underground workers

Government

Two government authorities oversee this process: the Labour Department (LD) and the Inland Revenue Department (IRD). Each department carries out independent random inspections and employers found by failing to pay taxes or social security payments should pay surcharges to each department.

In each period, t, a firm faces two different probabilities of being discovered by government authorities.

- p_t^e: the probability of being inspected by the LD
  $s^e \geq 1$: surcharge rate for employers failing to pay social security contributions
- p_t^x: the probability of being inspected by the IRD
  $s^x \geq 1$: surcharge rate for firms evading corporate taxes

Firms

- For a firm i revenues net of taxes on corporate income, $NR_{i,t}$,

$$NR_{i,t} = \begin{cases} Y_{i,t} - \tau_t^c \left[Y_{i,t}^m - \Omega W_t^m H_{i,t}^m + s^x (Y_{i,t}^u - \Omega W_t^u H_{i,t}^u) \right], & \text{with probability } p_t^x \\ Y_{i,t} - \tau_t^c \left[Y_{i,t}^m - \Omega W_t^m H_{i,t}^m \right], & \text{with prob. } (1 - p_t^x) \end{cases}$$

- The total cost for social security contributions, $CS_{i,t}$,

$$CS_{i,t} = \begin{cases} (\tau_1^s + \tau_2^s) W_t^m H_{i,t}^m + \left[s^e (\tau_1^s + \tau_2^s + \tau_3^s) - \tau_3^s \right] W_t^u H_{i,t}^u, & \text{with probability } p_t^e \\ (\tau_1^s + \tau_2^s) W_t^m H_{i,t}^m - \tau_3^s W_t^u H_{i,t}^u, & \text{with prob. } (1 - p_t^e) \end{cases}$$

where $\Omega = (1 + \tau_1^s + \tau_2^s)$.

Representative Household

As in Orsi, Raggi, and Turino (2014), we consider that preferences of the representative household in period 0 are determined based on,

$$U^h(C_t) = \sum_{t=0}^{\infty} \beta^t E_0 \left[\frac{C_t^{1-\eta_C} - 1}{1-\eta_C} - \xi_t^N B_0 \frac{(H_t^m + H_t^u)^{1+\eta_L}}{1+\eta_L} - B_1 \frac{(H_t^u)^{1+\eta_{LS}}}{1+\eta_{LS}} \right]$$

$\eta_C > 0$	Inverse of the inter-temporal elasticity of substitution
$\eta_L > 0$	Inverse labour supply (aggregate) elasticity
$\eta_{LS} > 0$	Inverse labour supply (underground) elasticity
$B_0, B_1 \geq 0$	Preference parameters controlling for the disutility of working
ξ_t^N	Shock to labour supply that affects the marginal rate of substitution between consumption and leisure, $\ln(\xi_t^N) = \rho_N ln(\xi_{t-1}^N) + \epsilon_t^N$ where, $\epsilon_t^N \sim N(0, \sigma_N^2)$ and $\lvert\rho_N\rvert < 1$.

- The total capital stock belonging to the households,

$$K_t = K_t^m + K_t^u$$

- Capital depreciates over time according to the law of motion of capital,

$$K_{t+1} = \xi_t^I I_t + (1 - \delta) K_t$$

δ Depreciation of capital; $\delta \in [0, 1]$
ξ_t^I Investment shock to account for the transitory exogenous effects of the ultimate final goods-to-capital transformation (Orsi, Raggi, and Turino, 2014).

Government

We assume that the government cannot issue bonds, and therefore public expenditures need to be financed on a balanced budget basis.

The Budget constraint of government, G_t is given by;

$$G_t = g_t^c + g_t^h + g_t^s$$

where;

- Corporate tax income,

$$g_t^c = \tau_t^c \int_0^1 \left[Y_{i,t}^m - \Omega W_t^m H_{i,t}^m + p_t^x s^x (Y_{i,t}^u - \Omega W_t^u H_{i,t}^u) \right] di$$

- Personal tax income,

$$g_t^h = \tau_t^h \left(W_t^m H_t^m + R_t^m K_t^m \right)$$

- Social security contribution,

$$g_t^s = \int_0^1 \left\{ (\tau_1^s + \tau_2^s) W_t^m H_{i,t}^m + p_t^e \left[s^e (\tau_1^s + \tau_2^s + \tau_3^s) - \tau_3^s \right] W_t^u H_{i,t}^u \right\} di$$

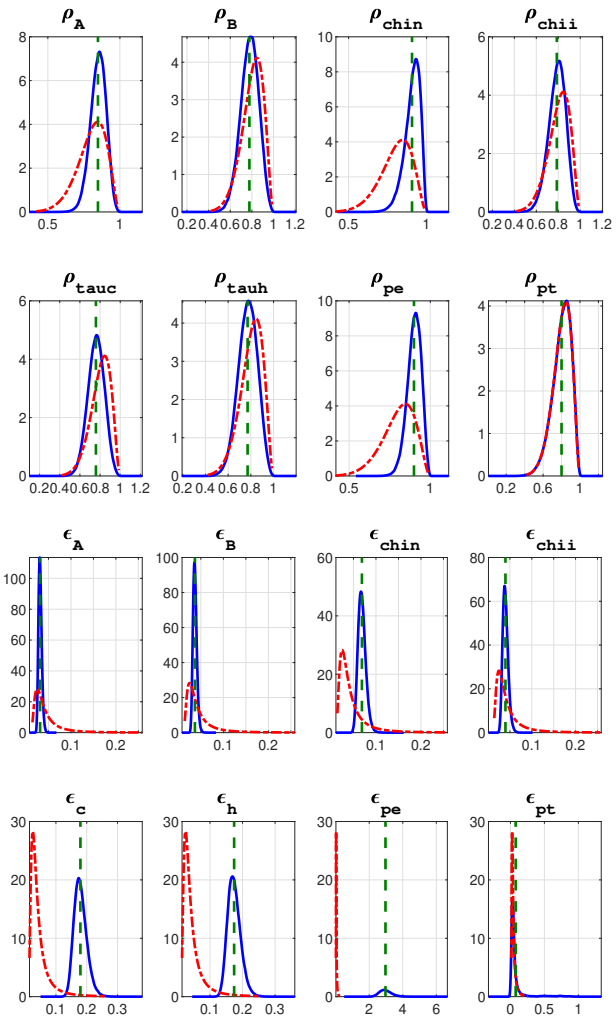
Estimation

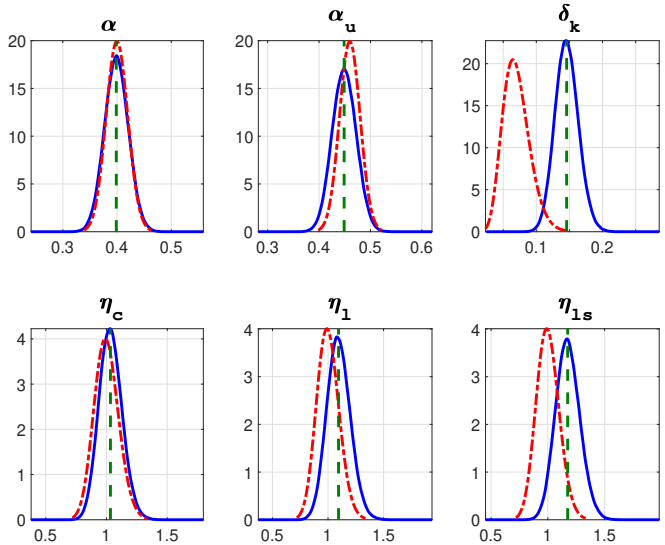
- Bayesian techniques are utilized in order to derive posterior estimations of the model.
- 7 observables are included.
- We do this by running multi-chain MCMC of 5 parallel chains of 500,000 replications.
- The language of choice in the model is Dynare in MATLAB.

Parameters

- There are 26 structural parameters in the model,
  - ✓ 12 parameters are fixed.
  - ✓ The rest of the parameters and the standard deviations relating to the eight stochastic processes are estimated using Bayesian techniques.

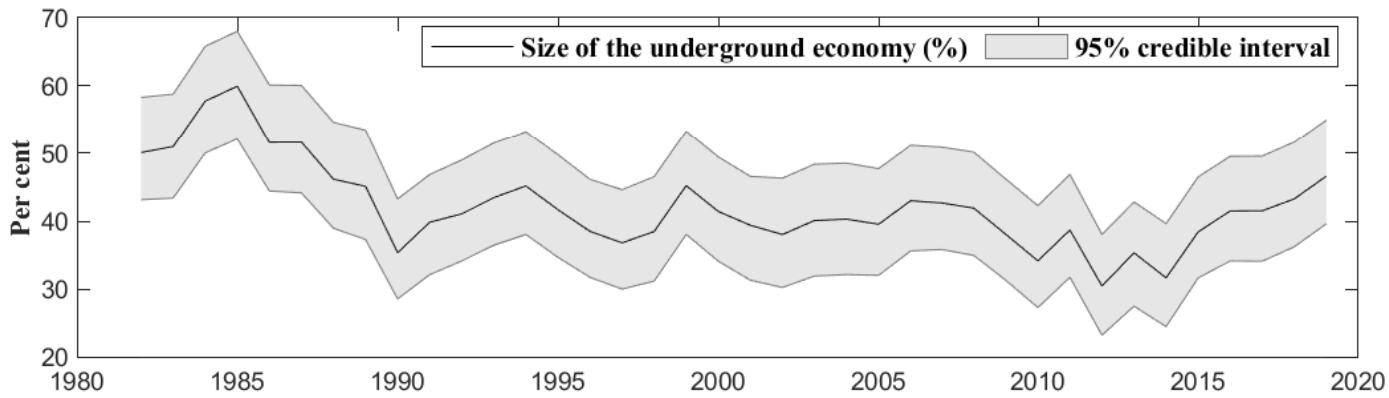
Priors and posteriors of the estimated model





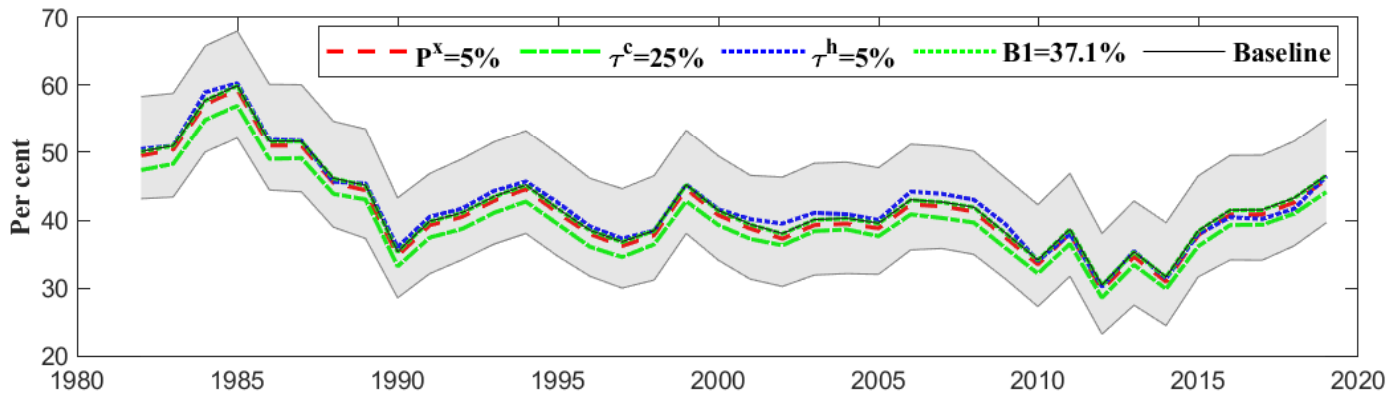
- Most of the parameters are well-defined according to the prior-posterior analysis.

Underground economy size in Sri Lanka



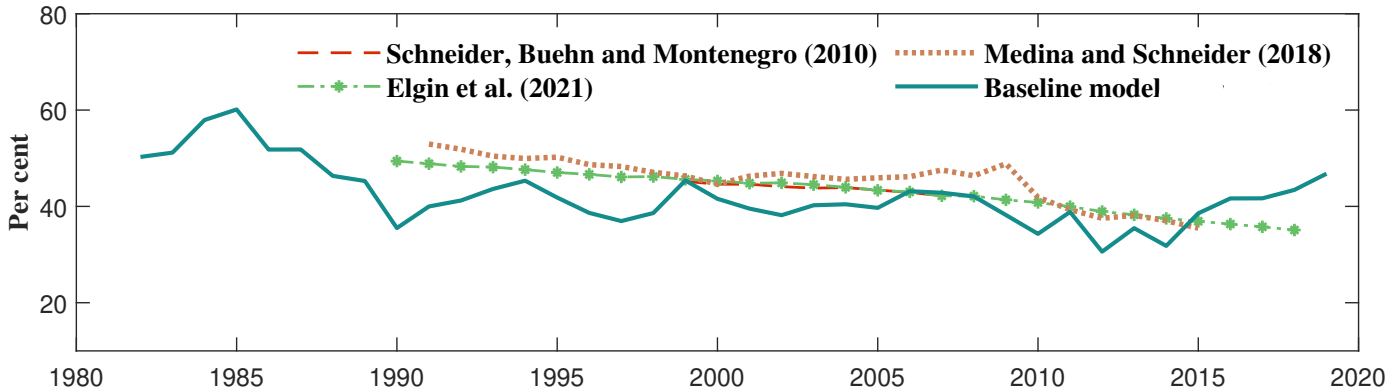
- The average size of the underground economy over the sample period is 42 per cent.
- It follows a declining pattern, with the highest level of 59 per cent in 1985 and the lowest level of 30 per cent of the GDP in 2012.
- Since 2012, the size of the underground economy has been trending upward, reaching over 46 per cent by the end of the sample period.

Robustness



- A robustness analysis to see the performance of the model for alternative calibrations of the model.
- Results confirm that the size and behaviour of the underground economy are almost similar in each case.

Comparison of results

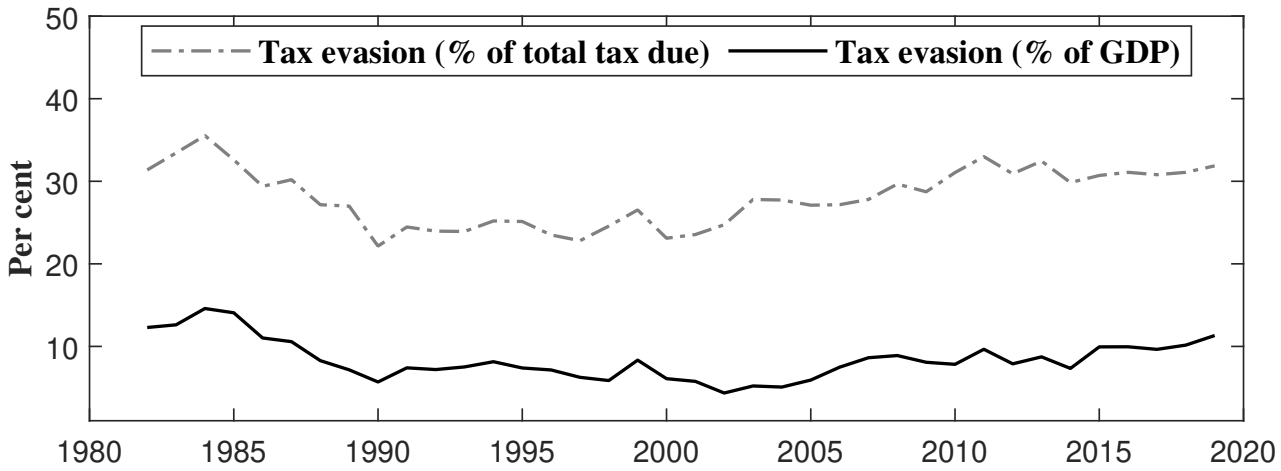


Medina and Schneider (2018)- MIMIC approach with night light intensity**
Elgin, Kose, et al. (2021)- DGE approach
Schneider, Buehn, and Montenegro (2010)- MIMIC approach

- The DSGE results are volatile compared to the other methods and lean to produce a somewhat lower estimate.
- Other studies have not uncovered any information about the ongoing expansion of the underground economy.

*DGE: Dynamic General Equilibrium Model
**MIMIC: Multiple Indicators Multiple Causes Model

Tax evasion

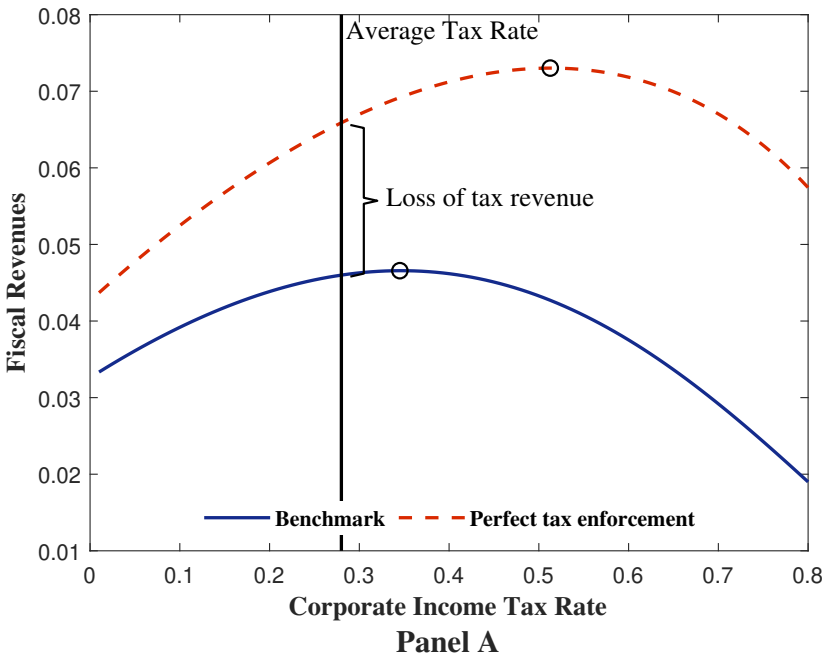


$$\text{Tax evasion(\% of the total tax due)} = \frac{evasion}{evasion\ +\ government\ \ revenue} * 100\%,$$

$$\text{Tax evasion (\% of formal GDP)} = \frac{evasion}{GDP} * 100\%$$

- Tax evasion as a percentage of the formal GDP has been increasing steadily over time since 1990.
- Accordingly, in 2019, the government lost 12 per cent of formal GDP due to tax evasion, which is, as a percentage of total tax evasion, around 32 per cent.

Laffer Curve: Corporate taxation

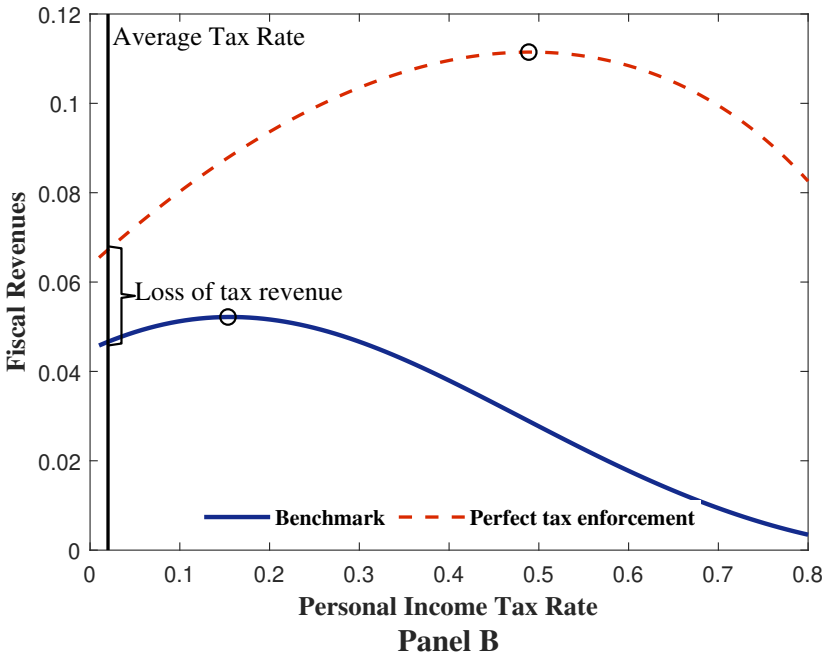


Panel A

- The blue line demonstrates the benchmark case.
- The red line represents the Laffer curve with no underground.

- It is possible to increase fiscal revenue by large by keeping the tax rates at the current level and with perfect tax enforcement.

Laffer Curve: Personal income taxation



- There is a space to increase personal income tax rates.
- This also leads to the same conclusions as corporate taxation.

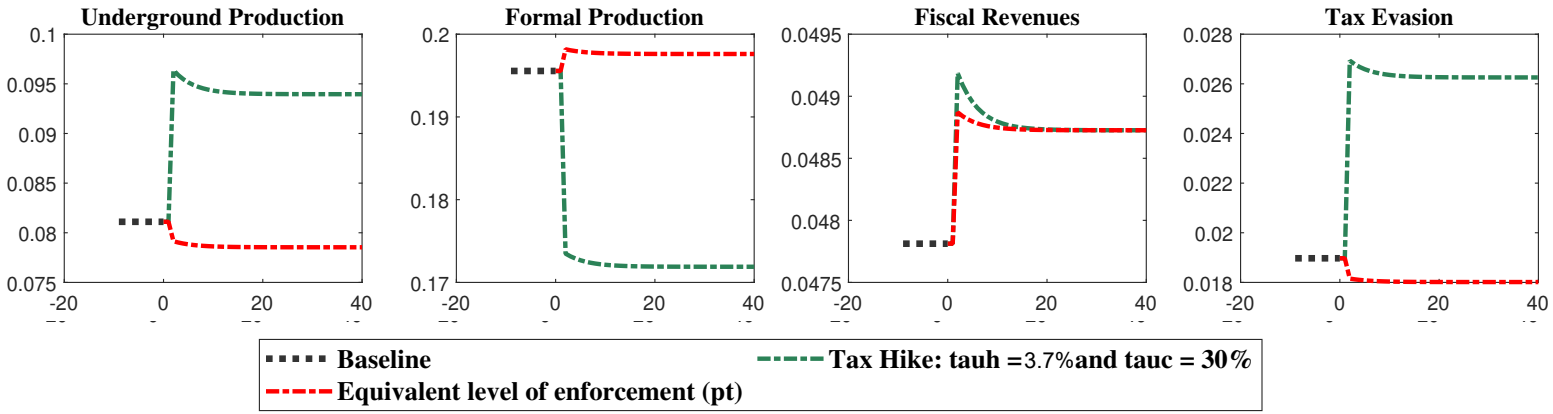
- **It is possible to significantly increase fiscal revenue while maintaining current tax rates**, thereby avoiding additional burdens on an already struggling populace.

Policy implications

- Examine the economic costs associated with selected policy alternatives.
- Maintain all the parameters remaining at their posterior mean values and evaluate an increase in the corporate income tax rate to 30 per cent and an increase in the personal income tax rate to 3.7 per cent (Policy I: tax hike).*
- Compare the outcome if the probability of detection of tax evasion is enhanced to reach an equivalent level of fiscal revenue as generated by policy I (Policy II: equivalent level of enforcement).

*IMF-mediated fiscal consolidation plan: Revenue to GDP is 15 per cent by 2026.

Policy implications



	$\Delta Frev$	ΔY^m	ΔEvs	ΔY^u	Δund
Tax Hike *(Policy I)*	1.5	-9.1	27.0	11.6	15.1
Increase p^x *(Policy II)*	1.5	0.8	-4.0	-2.4	-2.1
Tax Hike *(Perfect tax enforcement)*	18.0	-3.1	-	-	-

- Table represents the percentage change in fiscal revenue generation ($\Delta Frev$), tax evasion (ΔEvs), underground, formal and total production (ΔY^u,ΔY^m) and size of the underground economy (Δund), compared to the steady state baseline value.

Policy implications

- Increasing income tax rates is effective in terms of immediately raising fiscal revenue in the short run.
- Formal production of the country increases in the case of increasing the probability of detection of tax evasion, whereas it declines when only the income tax rates are increased.
- It is feasible to raise fiscal revenue to the same level as the increase in taxes through a 5.5 per cent increase in the probability of detection of tax evasion.

Conclusion

- This paper employs a DSGE model that considers underground transactions and tax evasion to quantitatively analyse the macroeconomic implications of tax policies.
- The findings show that Sri Lanka's underground economy is substantially large.
- Tax evasion is prevalent and increasing.
- The quantitative assessment of imperfect tax enforcement is carried out.
- Results indicate that the effectiveness of tax hikes is reduced when tax enforcement is imperfect, which complements the findings of Pappa, Sajedi, and Vella (2015) and Meroño Herranz and Turino (2023).

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Thank you

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