



Optimal Sales Taxation in India

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Introduction

- India has very recently seen a major economic reform through implementation of GST, Goods and Services Tax across the whole nation
- Why GST is important?** The tax reform through GST scheme removes multiple taxes like central taxes, state taxes, duties like excise duty, counter vailing duty, etc.

Research Question

- Are the tax rates under the current GST scheme optimal? If not, can we find the optimal tax rates based on the categorization of goods under the current scheme?

Data

- IHDS (India Human Development Society) Survey II
- Nationally-representative survey of 41,554 households collected from 1503 villages and 971 urban neighborhoods across India
- GST tax slabs: Nil, 3%, 5%, 12%, 18% and 28%

Model

- The policy maker's problem is:

$$\max_c \int_{\eta} \int_w f(\eta) f(w) u(c(\eta, w, \tau)) d\eta dw$$

$$s.t. \int_{\eta} \int_w f(\eta) f(w) \sum_{i=1}^6 \tau_i c_i(\eta, w, \tau) d\eta dw \geq \bar{R}$$

where \bar{R} is the fixed revenue and w is wage

Model (contd.)

- The household's optimization problem is:
- $$\max_c u(c; \eta, w, \tau) \text{ s.t. } w \geq \sum_{i=1}^6 (1 + \tau_i) c_i \text{ and } c_i \geq \bar{c}_i \forall i$$
- where w is wage, c is the consumption bundle (c_1, c_2, \dots, c_6) and τ is bundle of tax rates $(\tau_1, \tau_2, \dots, \tau_6)$

Computational Methods

- Estimate income distribution and find minimum consumption using constrained regression
- Large Data Approach:** Compute societal utility and total revenue for each tax policy. Remove dominated policies. Iterate to create a FRONTIER!

Estimation
(GMM)

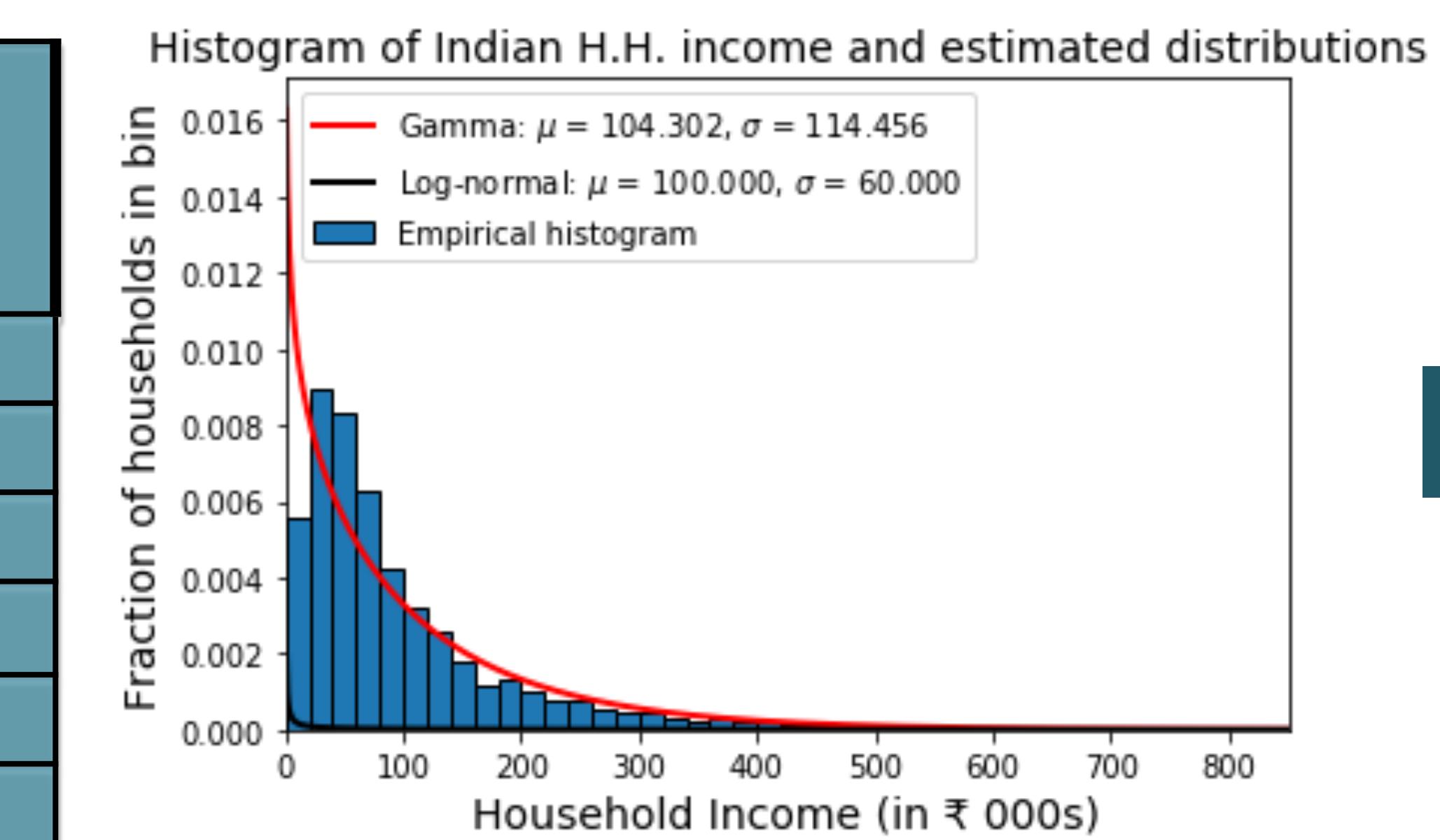
Regression*
(NNLS)

Minimization*
(SLSQP)

- GMM** - Generalized Method of Moments
- NNLS** – Non-negative least squares solver
- SLSQP** – Sequential Least Squares Programming

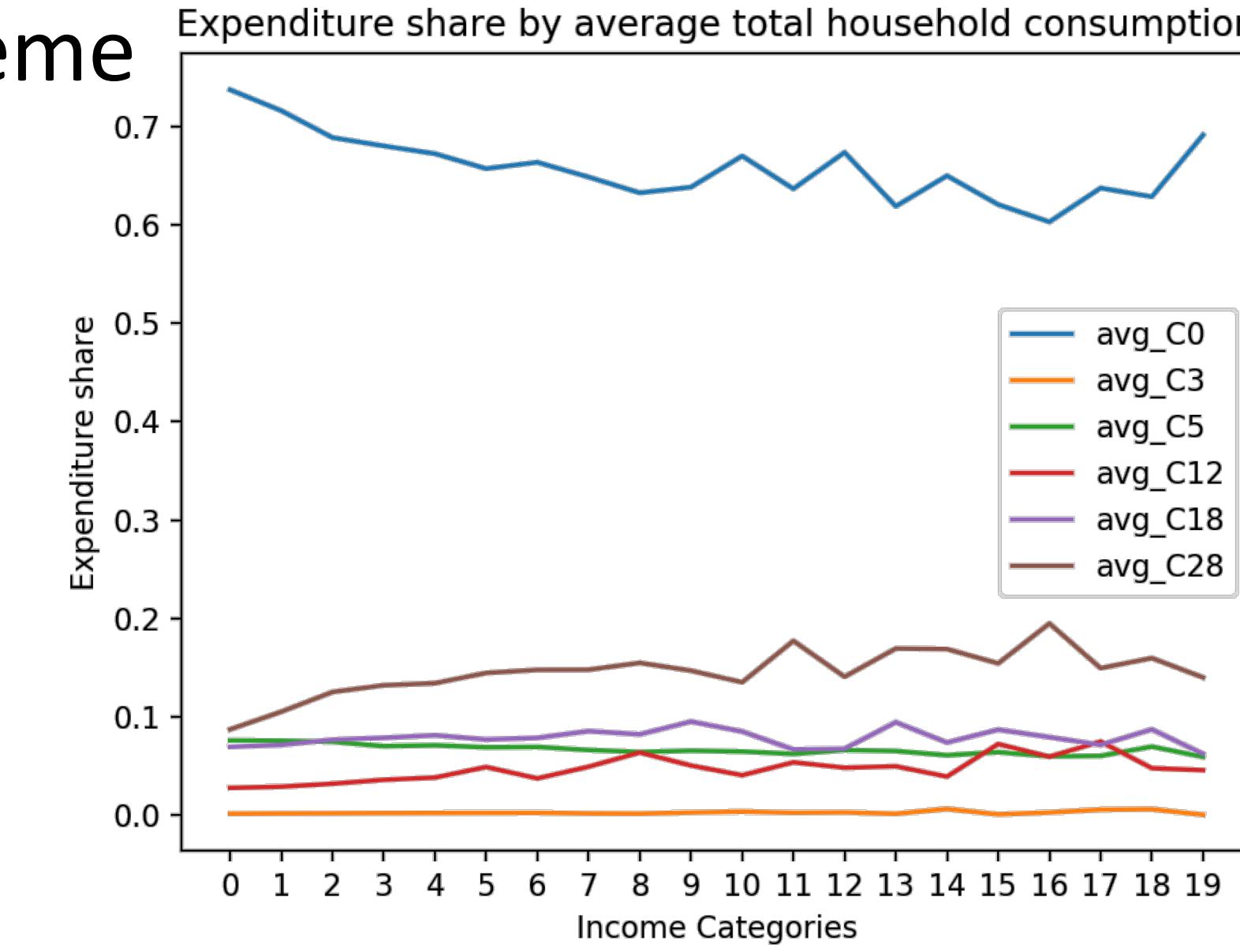
Results

Goods Categories (tax rate)	\bar{c}_i	α_i
C0 (Nil)	7024	0.6154
C3 (3%)	0	0.0048
C5 (5%)	1550	0.0578
C12 (12%)	0	0.0663
C18 (18%)	385	0.0772
C28 (28%)	0	0.1785

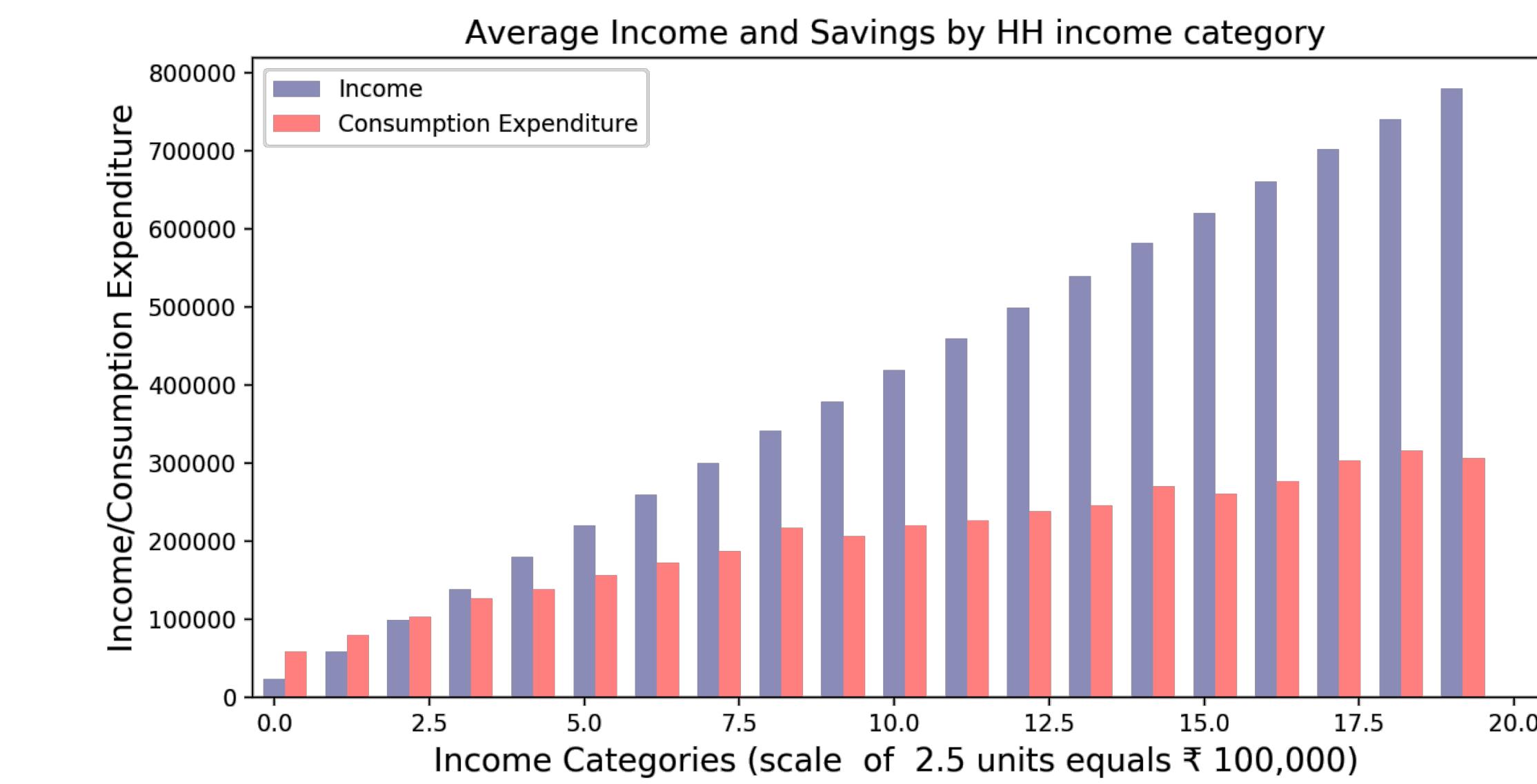


Results (contd.)

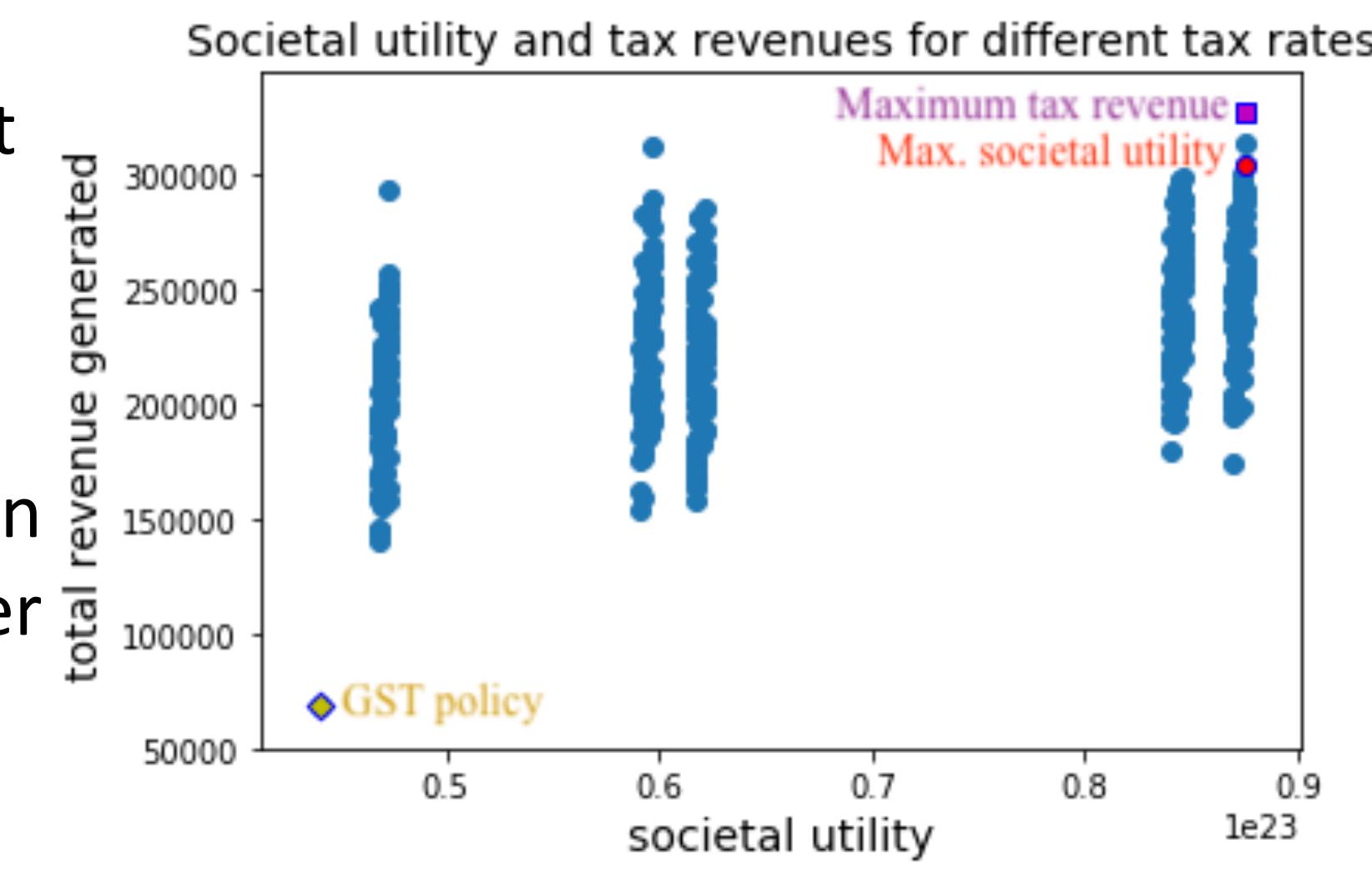
Six consumption categories mapped to six tax rates under GST scheme



- Note: 'avg_Cx' denotes average consumption expenditure in goods category with 'x%' tax rate
- Each income unit on x-axis equals ₹ 40,000



- Evaluation of different tax schemes based on total revenue and societal welfare level
- Optimal Frontier can be traced with higher computational power



Conclusion

- A higher tax revenue with a higher level of societal utility can be achieved!
- Policy Impact: There exists an optimal τ^* which benefits the society as well as the Government



Goods Category: C0

Rice, Wheat, Sugar, Kerosene, Pulses, etc.

Goods Category: C5

Paan/Tobacco, Coffee, Eating out, etc.

Goods Category: C12

Telephone, crockery, Household items, etc.

Goods Category: C18

Personal care, soap, furniture/fixtures, etc.

Goods Category: C28

Transport equipments, Diesel/Petrol/CNG, etc.