Impact of GST on Indian Economy : A CGE Modelling Exercise

Sanjib Pohit

Email: spohit@ncaer.org

Co-authors: Sacchidananda Mukherjee (NIPFP)

Devender Pratap & Somya Mathur (NCAER)

Conference on Impact of GST on Indian Economy
NIPFP Auditorium, 28-29 November 2022, NIPFP, New Delhi

Tax Collection in 2020-21- Rs Crores

	By Union Govt. (A)	By State Govt. (B)	Total (A+B)
0020 - Corporation Tax (Gross)*	457,718.97		457,718.97
0021- Taxes on Income other than Corporation Tax (Gross)*	470,633.32		470,633.32
0037-Customs (Gross)*	134,750.39		134,750.39
0038 - Union Excise Duties (Gross)*	389,667.08		389,667.08
0044- Service Tax (Gross)*	3,624.62		3,624.62
0023-Hotel Receipts Tax	0.30	1.29	1.59
0039-State Excise	874.19	134,921.37	135,795.56
0040-Taxes on Sales, Trade etc. (includes CST)	988.54	252,441.25	253,429.79
0042-106-Tax on entry of goods into Local Areas	-	629.90	629.90
0043-Taxes and Duties on Electricity	23.64	34,591.34	34,614.98
0045-Other Taxes and Duties on Commodities**	1,644.12	3,478.59	5,122.71
Central GST (CGST)			209,916.00
State GST (SGST)			272,827.00
Integrated GST (IGST) - Total (a+b)			565,720.00
IGST from Domestic Transactions (a)			303,946.00
IGST from Imports/ Exports (b)			261,773.00
GST Compensation Cess (GSTCC) - Total (c+d)			88,337.00
GSTCC from Domestic Transactions (c)			79,152.00
GSTCC from Imports/ Exports (d)			9,185.00
Total - GST			1,136,800.00

Overview of National CGE

- 56 sectors
  - 12 agricultural sectors , 4 mining sectors , 19 manufacturing sectors, 7 Electricity by sources, 4 modes of transport, wholesale * retail trade, and 9 service sectors
- Factors of production: Labour (unskilled/skilled), land, capital
- 3 Economic agents: consumers, producers, government
- 5 rural & 5 urban household expenditure classes Accounting relationship underlying the model ensures receipts & expenditures of all agents are balanced
- Behavioral equation in the model ensures that the economic agents are optimizers
- Product differentiation modeled through Armington assumption
- Market Structure -- Perfect competition
- Household behavior governed by Linear Expenditure System
- Base year 2020-21
- Short run Model Closure: Capital stock fixed, & real wage is fixed

Model Flow Chart
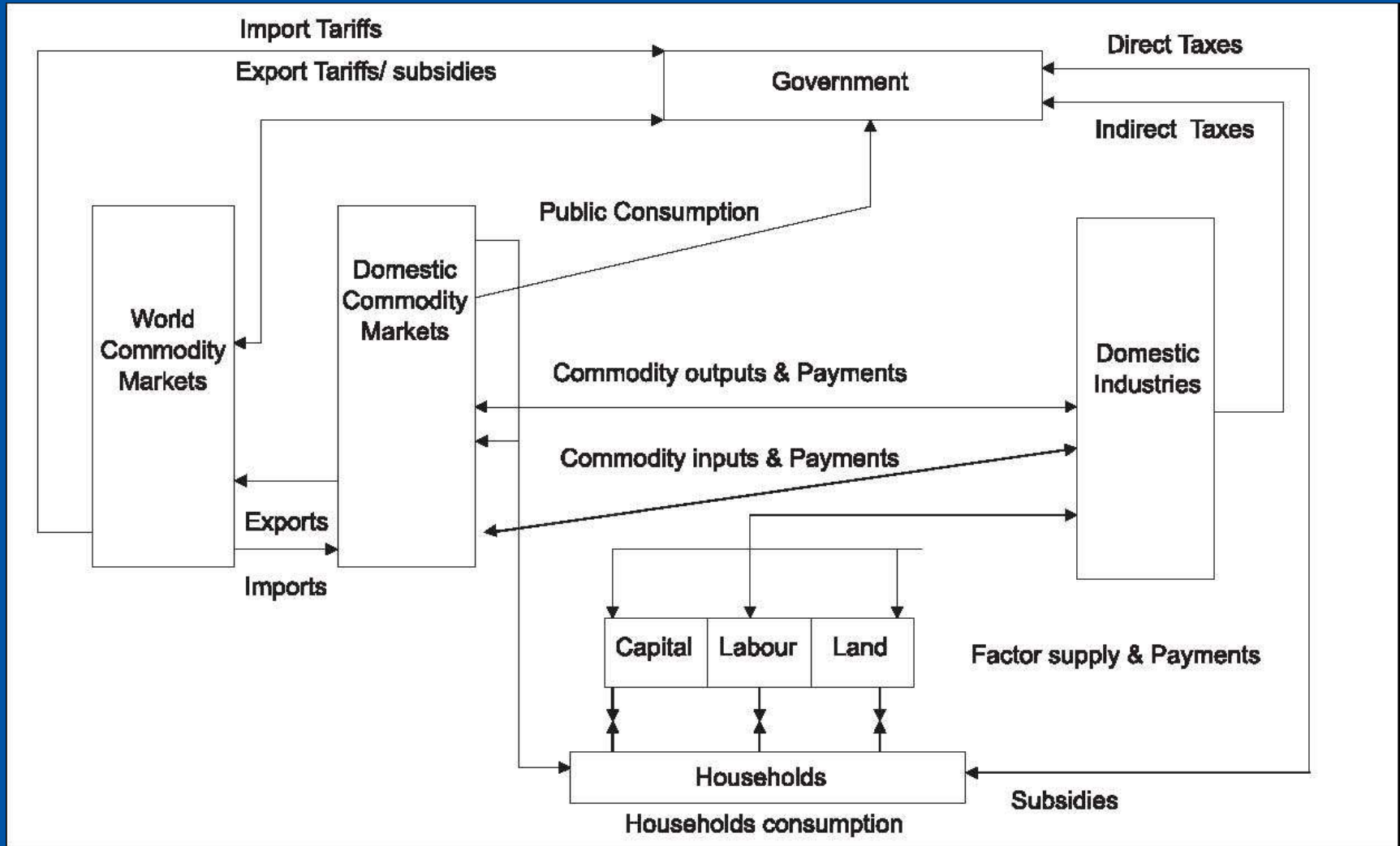
Sectors of India model

1.	Paddy	29.	Non-Ferrous Base Metals
2.	Wheat	30.	Machinery and Equipment
3.	Other Cereals	31.	Batteries
4.	Pulses	32.	Electronic and Electrical equipment
5.	Cash crops	33.	Electric Vehicles
6.	Oilseeds	34.	Vehicles
7.	Vegetables and fruits	35.	Other Manufacturing
8.	Other crops	36.	Construction
9.	Livestock	37.	Nuclear electricity
10.	Forestry	38.	Solar electricity
11.	Fishing	39.	Wind electricity
12.	Biomass	40.	Hydro electricity
13.	Coal	41.	Gas electricity
14.	Crude Petroleum	42.	Coal electricity
15.	Natural Gas	43.	Rest of renewable electricity
16.	Mining	44.	Water Distribution
17.	Food, Beverage & Tobacco	45.	Railway Transport
18.	Textiles	46.	Land Transport
19.	Wood, Wood Products, Furniture	47.	Water transport
20.	Paper products	48.	Air transport
21.	Printing Publication	49.	Trade
22.	Petroleum Products	50.	Storage Warehouse
23.	Fertilizers	51.	Communication
24.	Pharma	52.	Hotels & Restaurants
25.	Other Chemicals	53.	Finance & Insurance Services
26.	Cement	54.	Dwelling
27.	Ferrous Metals	55.	Other Services
28.	Aluminum	56.	Public Administration

Price Formation & Database

	Size	Absorption Matrix					
		1	2	3	4	5	6
		Producers	Investors	Household	Export	Govt	Δ Stock
	Size	← I →	← I →	← 10 →	← 1 →	← 1 →	← 1 →
Basic flows	↑ CxS ↓	V1BAS	V2BAS	V3BAS	V4VAS	V5BAS	V6BAS
Margin	↑ CxSxM ↓	V1MAR	V2MAR	V3MAR	V4VAS	V5MAR	V6MAR
Taxes	↑ CxS ↓	V1TAX	V2TAX	V3TAX	V4VAS	V5TAX	V6TAX
Labour	↑ O ↓	V1LAB					
Capital	↑ 1 ↓	V1CAP					
Land	↑ 1 ↓	V1LND					
Production Tax	↑ 1 ↓	V1PTX					
Other Costs	↑ 1 ↓	V1OCT					

C = Number of commoditites (56)
I = Number of Industries
S = 2: Domestic, Imported
O = 2, skilled, unskilled labour

M= No. of commodites as margin service (transport, trade)

	Import Duty
Size	← 1 →
↑ C ↓	V0TAR

Size	← I →
↑ C ↓	MAKE

Shows the value of output of each commodity by each industry

GST equation -domestic users

Value of transaction base		Indirect tax (excluding GST)	Transaction base = basic value + non-GST indirect taxes + margins
$TRBASE_{c,s,u} =$	$VBAS_{c,s,u}$ Transaction at basic price	$+ VTAX_{c,s,u}$	$+ \sum VMAR_{c,s,u,m}$ Margin (transport, trade)
	Effective GST Rate		
$GST_{c,s,u} =$ GST Revenue	$ER_{c,s,u}$ X	$TRBASE_{c,s,u}$ Value of transaction base	Transaction specific GST collection
	Legal GST Rate	Refund Share	
$ER_{c,s,u} =$	$LR_{c,s,u}$ X	$[1-EEX_{c,s,u}]$ x $[1-REF_u]$ X $CR_{c,s,u}$	Effective rate of GST depends on legal rate, effective exemptions, refund factors & compliance rates (CR)
Effective GST Rate		GST exempt sales share	

Simulation 1

Reduction in sales tax on petroleum products by 20% and introduction of revenue neutral GST on same. Presently, sales and excise taxes are levied on same. So, we are interested to study the impact of GST separately on same.

Simulation 2

Reduction in excise tax on petroleum products by 20% and introduction of revenue neutral GST on same.

Simulation 3

Reduction in sales tax on crude oil and natural gas by 20% and introduction of revenue neutral GST on same.

Simulation 4

Reduction in sales tax on electricity by 20% and introduction of revenue neutral GST on same.

Results: Percentage change over Base year

Indicator	Sim 1 Sales tax (-) + GST on Petrol Prod	Sim 2 Excise s tax (-), + GST on Petrol Prod	Sim 3 Sales tax (-), + GST on Crude Petrol, gas	Sim 4 Sales tax (-), + GST on Electricity
Real GDP	1.442	0.054	0.075	0.020
Real wage	0.020	0.002	0.002	0.001
GDP Deflator	1.145	-0.073	0.035	-0.022
Real household consumption	1.156	0.033	0.055	0.005
Import volume index	4.8369	0.0946	0.2118	0.0174
Export volume index	5.7122	0.1155	0.2501	0.0447
CPI	1.145	-0.073	0.035	-0.022
Industry Output Broad sectors				
Agriculture	0.495	0.011	0.030	0.001
Manufacturing	3.173	0.118	0.189	0.044
Services	0.227	0.031	0.016	0.014
Mining	8.379	0.183	0.377	0.046
Electricity	0.907	0.065	0.056	0.103
Transport	1.392	0.132	0.093	0.034
Gini inequality	0.509	0.509	0.509	0.509

Results: Percentage change over Base year

Sectoral Labour Demand	Sim 1		Sim 2		Sim 3		Sim 4	
	Labour-Unskilled	Labour Skilled	Labour-Unskilled	Labour Skilled	Labour-Unskilled	Labour Skilled	Labour-Unskilled	Labour Skilled
Agriculture	0.341	0.341	-0.005	-0.005	0.019	0.019	-0.006	-0.006
Manufac.	0.025	0.524	0.061	0.066	0.045	0.063	0.035	0.035
Services	0.430	-0.636	0.014	-0.030	0.021	-0.042	0.006	-0.013
Mining	8.062	8.062	0.155	0.155	0.355	0.355	0.034	0.034
Electricity	0.073	0.073	-0.009	-0.009	-0.004	-0.004	0.072	0.072
Transport	0.848	0.848	0.072	0.072	0.051	0.051	0.008	0.008

Policy Implications

- The initial policy implication of the analysis is that the production responses of businesses to changes in the tax regime have the potential to yield efficiency gains in the long term.

- Our analysis shows the tax regime change does not lead increase in income equality.

- Revenue tax regime change leads to economic expansion and allows real wage increases, fuelling further demand and rises in consumption and imports

Thank You