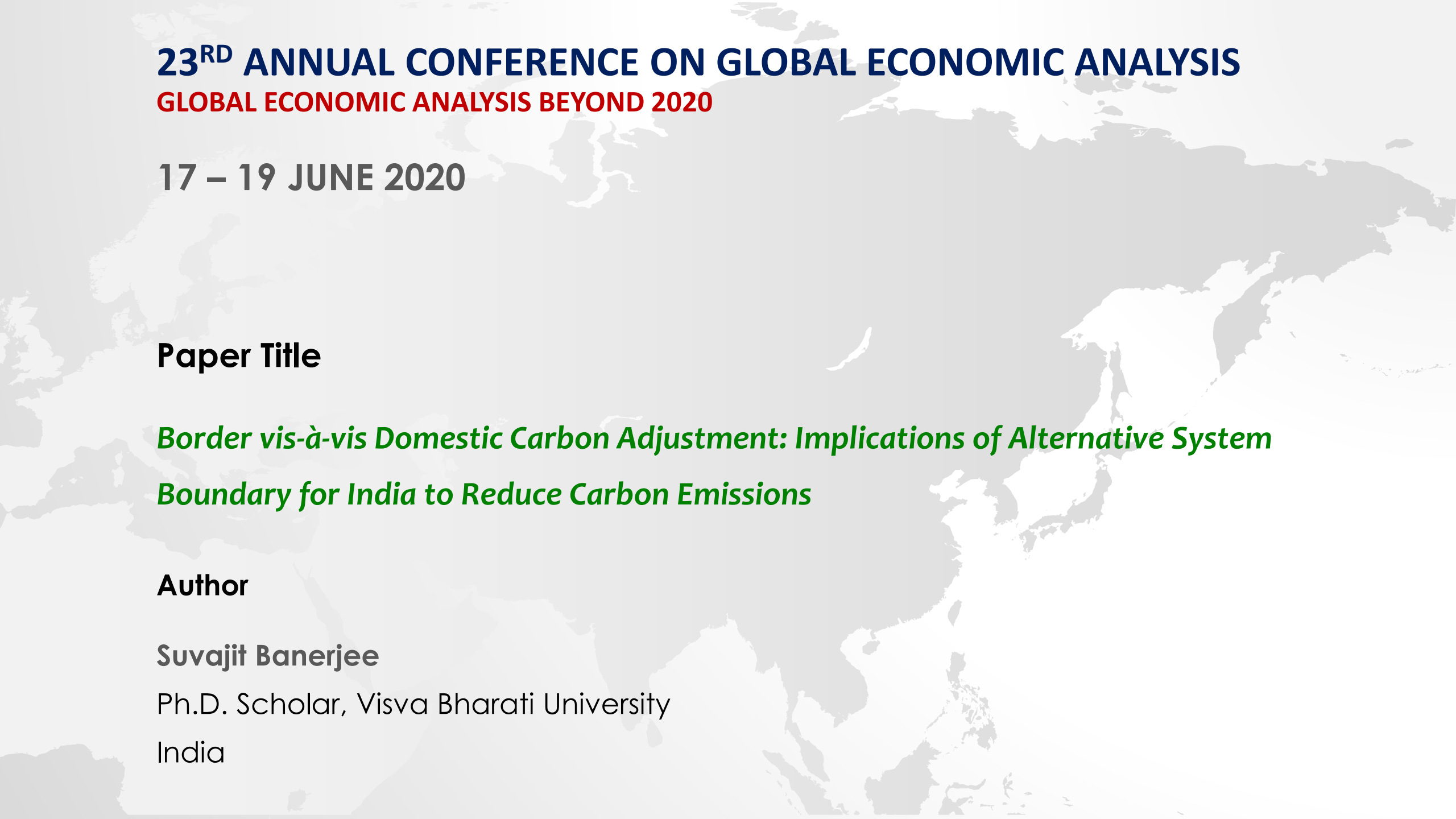




23RD ANNUAL CONFERENCE ON GLOBAL ECONOMIC ANALYSIS

GLOBAL ECONOMIC ANALYSIS BEYOND 2020

17 – 19 JUNE 2020

Paper Title

*Border vis-à-vis Domestic Carbon Adjustment: Implications of Alternative System
Boundary for India to Reduce Carbon Emissions*

Author

Suvajit Banerjee

Ph.D. Scholar, Visva Bharati University

India

THE CONTEXT OF BORDER CARBON ADJUSTMENT (BCA)

- **Argument on Carbon Leakage:** *When mitigation efforts from the developed countries due to their stricter unilateral environmental regulations are offset by the excessive emissions generated from the non-binding developing countries (**Bohringer et al., 2017**).*
- **Argument on Competitiveness:** *When developed countries with stricter climate policy are found at a competitive disadvantage as against those developing countries with softer climate policy (**Monjon and Quirion, 2011**).*

BACKDROP OF THE STUDY

- **Motivation**

- **According to Zhou et al. (2013):**

“BCA on the one hand can level up the playing field for foreign producers to the same level of domestic producers; but on the other hand it will cause a new inequity for the exporting country because the BCA-implementing country charges on the carbon costs of imports but does not issue any emission credits to offset the emissions from the exporting country.”

- **Zhou et al. (2013) suggested for an inventory adjustment for the calculation of national emissions,** where an equal amount of emission credits would be transferred to the exporting country if the exporters already charged with BCA for the production of exportable commodities according to the emission reduction standards set by their BCA implementing partner countries.

Research Gap...

Clear violation of the 'system boundary' on emission reduction responsibility even with this 'inventory adjustment'.

- '**Production-based system boundary**' cannot distinguish between domestic consumption and the foreign consumption of the domestically produced commodities.
- **Implementation of BCA, only on foreign consumption part by the importers leads to violation of 'production-based accounting' of emission responsibility.**
- Exporters pay BCAs to the importing countries, this necessarily implies that the **exporting country actually bearing the burden of emissions generated due to foreign consumption.**

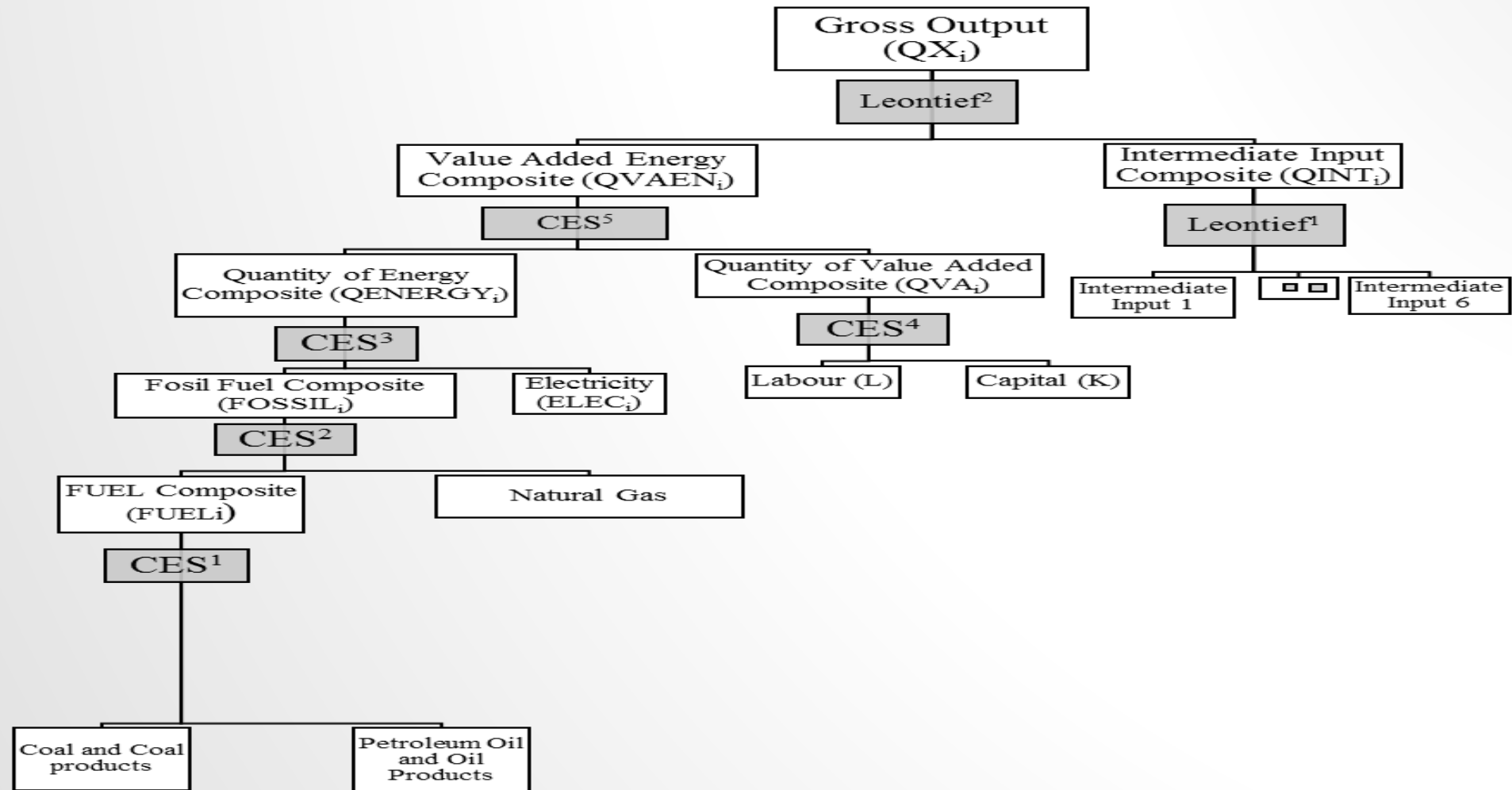
OUTLINE OF THE PAPER

- This study investigates the **implications of BCA imposition** on India's exports under an alternative system boundary, based on the territorial **consumption-based framework**.
- This paper considers a **single country case with India** which would be one of the biggest affected countries if BCA is implemented by its importers.
- A **static computable general equilibrium** (CGE) following Decaluwe et al. (2009) on PEP 1-1 model.

THE MODEL (BUSINESS AS USUAL)

- Production Block
- International Trade Block
- Institutional Block
- Macro-economic Closure Block

PRODUCTION BLOCK: THE NESTED PRODUCTION STRUCTURE



INTERNATIONAL TRADE BLOCK

- **Armington assumption of Imperfect substitution** between domestic and foreign goods.
- **Constant Elasticity of Transformation (CET)** function is assumed to allow the substitution possibilities between the sales of domestic goods for domestic and foreign markets.
- **India is a big importer** and has some influence in the pricing decision of its imported items, however considered a small country as an exporter.

INSTITUTIONAL BLOCK

Name of the Institution	Revenue	Expenditure	Savings
Household	- Factor Incomes from Labor and Capital. - Transfer Incomes from Govt. and RoW	- Pay Income Tax - Spends for Public Debt - Consumption of Commodities	Rest of the Income is Saved
Enterprises	- Factor Incomes from Capital. - Transfer Incomes from Govt.	Pay Corporate Tax	Rest of the Income is Saved
Government	- Factor Incomes from Capital. - Direct taxes on other institutions. - Indirect taxes on commodities. - Transfer incomes from households and from rest of the world.	- Govt. consumption. - transfer of income to households and enterprises	Budget Deficit is residually determined

MACROECONOMIC CLOSURE BLOCK

	Exogenous	Endogenous
Government Balance	All Tax Rates and Consumptions	Government Savings
Saving-Investment Balance	Investments	Savings
External Balance	Foreign Savings or Current Account Deficit	Exchange Rate

DATA AND CALIBRATION

- India's Latest **Social Accounting Matrix: By Pradhan et al. (2013)** with Base Year 2007 – 2008... Aggregated into 10 sectors only.
- Values of CES, CET and Armington elasticity: **DART97** (Klepper et al., 2003) and **EMPAX-CGE** (RTI International, 2008).
- Calculation of emission intensities of coal and coal products, petroleum oil and oil products, and natural gas this study followed the **IPCC (2006)** directions.

COUNTERFACTUAL SCENARIOS

Scenarios	Instruments	Feature
1-(a)	Softer BCA and Softer DCA	Proceeds from the DCA added as additional Government revenue of India.
1-(b)	Softer BCA and Softer DCA	Proceeds from the DCA recycled to Households as additional transfer incomes from the Government.
2-(a)	Stricter BCA And Softer DCA	Proceeds from the DCA added as additional Government revenue of India.
2-(a)	Stricter BCA And Softer DCA	Proceeds from the DCA added as additional Government revenue of India.
3-(a)	Stricter BCA And Semi-Strict DCA	Proceeds from the DCA added as additional Government revenue of India.
3-(b)	Stricter BCA And Semi-Strict DCA	Proceeds from the DCA recycled to Households as additional transfer incomes from the Government.

SIMULATIONS

$$PEX_c \left(1 + \frac{(bca_c EMINT_c)}{PX_c} \right) = \overline{PWEX}_c \cdot EXR \quad (1)$$

Where

PEX = Supply price of Indian export

$\overline{PWEX}$ = Exogenous world price of Indian export

EXR = Exchange rate

bca = Border Carbon Adjustment

$$PIM_c \left(1 - \frac{(rbca_c emm_c)}{PWIM_c} \right) = PWIM_c \cdot EXR \quad (2)$$

Where

PIM = Domestic price of Indian import

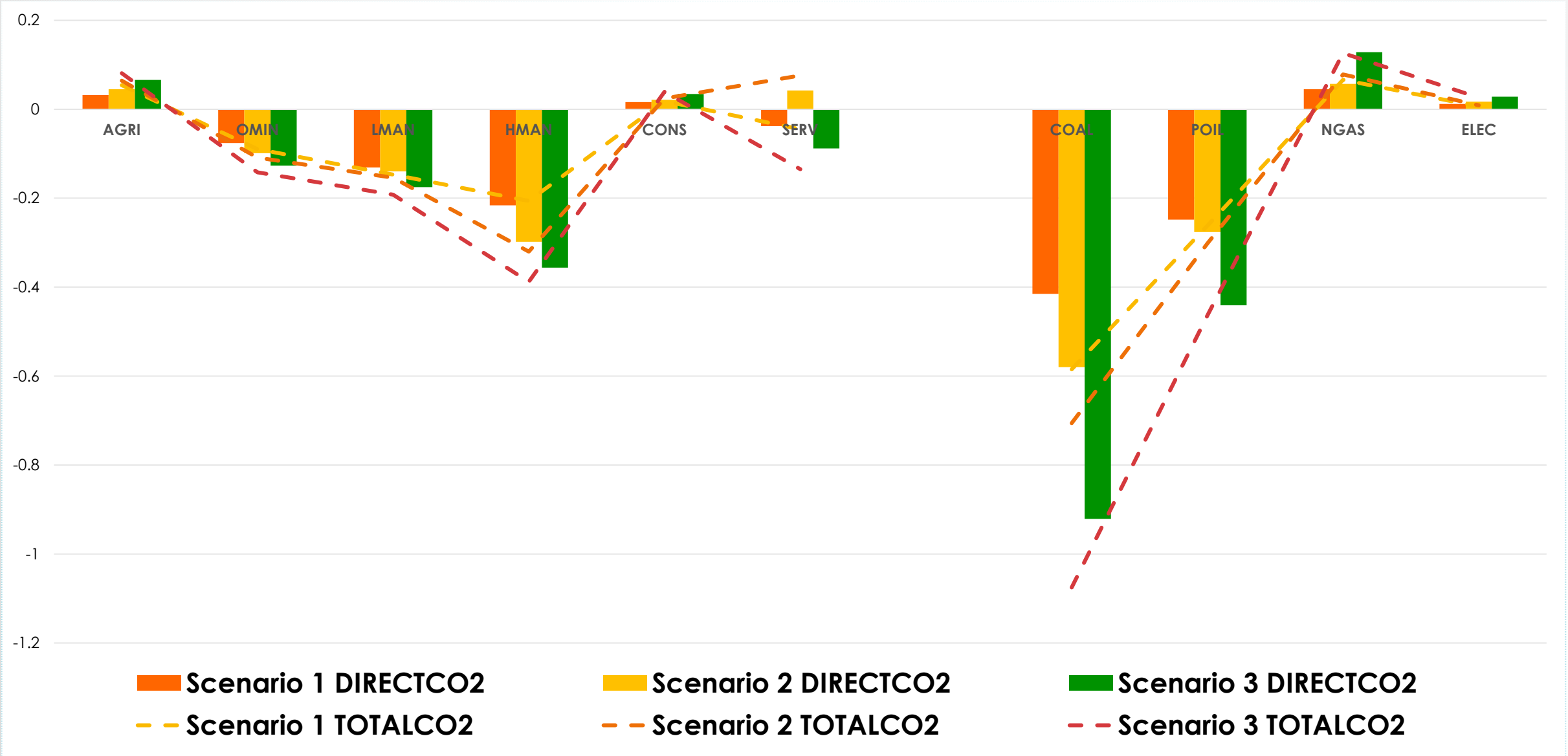
$PWIM$ = Endogenous world price of Indian import

$rbca$ = Retaliatory Border Carbon Adjustment

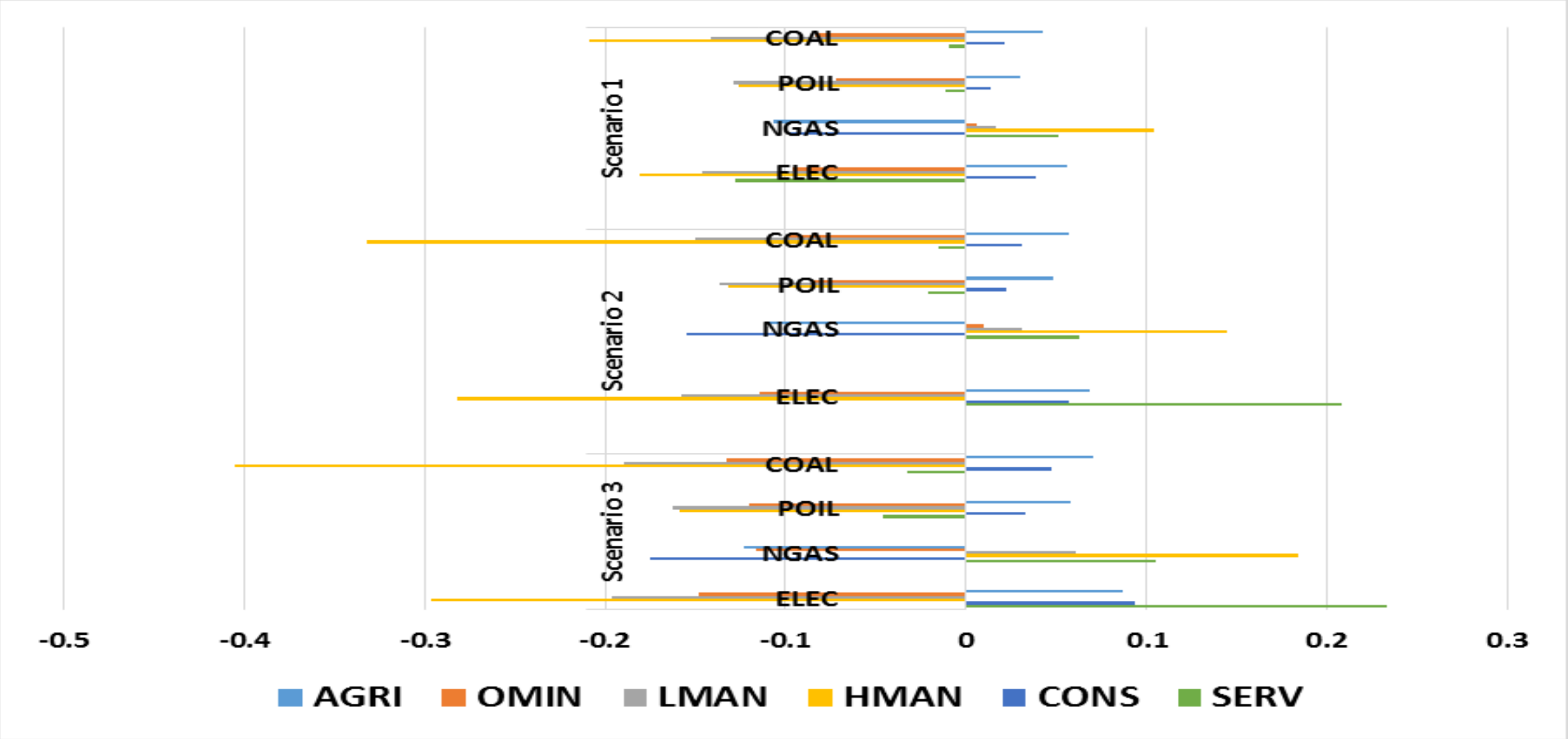
RESULT 1. IMPACT ON EMISSION AND ENERGY (% CHANGE)

Scenarios		Total Emissions (t-CO2)	Emission Intensity of Energy (t-CO2 per TJ)	Average Abatement Cost (INR Cores per t-CO2)
1-(a)	DIRECTCO2	-0.069	-0.553	1.059
	TOTALCO2	-0.062	-0.545	1.062
1-(b)	DIRECTCO2	-0.069	-0.553	0.962
	TOTALCO2	-0.062	-0.545	0.965
2-(a)	DIRECTCO2	-0.084	0.075	0.845
	TOTALCO2	-0.083	0.068	0.849
2-(b)	DIRECTCO2	-0.084	0.075	0.820
	TOTALCO2	-0.083	0.068	0.824
3-(a)	DIRECTCO2	-0.112	-0.207	1.339
	TOTALCO2	-0.123	-0.158	1.344
3-(b)	DIRECTCO2	-0.112	-0.207	1.276
	TOTALCO2	-0.123	-0.158	1.280

RESULT 2. IMPACT ON SECTORAL EMISSIONS (% CHANGE)



RESULT 3. IMPACT ON SECTORAL ENERGY DEMANDS (% CHANGE)



RESULT 4. MACRO IMPACTS OF BCA (% CHANGE)

Scenarios	Real GDP at Market Price	Total Exports	Total Imports	Household Consumption	Exchange Rate	Tax-GDP Ratio
1-(a)	-0.142	-0.342	-0.483	-0.404	0.300	3.925
1-(b)	-0.118	-0.329	-0.472	-0.203	0.300	0.000
2-(a)	-0.266	-0.551	-0.512	-0.824	0.700	3.925
2-(b)	-0.248	-0.522	-0.503	-0.580	0.700	0.000
3-(a)	-0.337	-0.575	-0.683	-1.111	0.200	7.605
3-(b)	-0.313	-0.539	-0.672	-0.280	0.200	0.000

RECOMMENDATIONS

- A 'consumption-based accounting' is recommended, to be made fully operational.
- Implementation of DCA measures as stricter as compared to the foreign standard.
- Recycling the additional government revenue generated from the DCA to the household sector to control the distortions due to the DCA implementation.



THANK YOU