The impact of financial mechanisms to reduce CO$_2$ emissions in Costa Rica: an application of the IEEM platform

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Integrated Environmental Economic Modeling for Costa Rica (IEEM-CR)

- BCCR-IDB

- Recursive, dynamic GEM that incorporates the environmental accounts.

- Forward-looking analysis of public policies and understanding of the impact of decisions before their implementation.

- Risk scenarios that consider environmental factors for macroeconomic projections.
Three different shocks

S1) A tax on economic activities with the largest contribution to total emissions

S2) A tax on imports of the highest polluting products

S3) Energy substitution in the transport sector: less consumption of fossil fuels and more consumption of electricity, with a higher energy efficiency.
S1 and S2: Tax on economic activities and on imports of polluting products

Transmission mechanism:

- ↑Activity tax ➔ ↓Income activity ➔ ↓Private consumption ➔ ↓Emissions
- ↑Government receipts ➔ ↑Government consumption and investment ➔ ↑Emissions
S3: Increase in energy efficiency in transport

Transmission mechanism

↓ Petroleum products consumption in transport → ↓ Transport costs → ↓ Price of goods → ↑ Households income → ↑ Households savings and consumption

↓ Emissions

↑ Electricity consumption in transport → ↑ Transport costs → ↑ Price of goods → ↓ Households income → ↓ Households savings and consumption

↓ Emissions
Scenarios

Taxation

- **Economic activity**
  - EA-tax 20%
  - EA-tax 50%
  - EA-tax 100%
  - EA-tax 200%

- **Products**
  - M-tax 50%
  - M-tax 100%
  - M-tax 200%
  - M-tax 400%

Efficiency

- **Fuels use in transport**
  - Eff-fuels-trns 20%
  - Eff-fuels-trns 30%
  - Eff-fuels-trns 40%
  - Eff-fuels-trns 50%

- **Electricity use in transport**
  - Increse-elec-trns 20%
  - Increse-elec-trns 20%
  - Increse-elec-trns 20%
  - Increse-elec-trns 20%
Results: Emissions

**Figure 7.** Average growth rate of emissions for the period 2013-2030 by scenario

![Graph showing average growth rate for different scenarios from 2018 to 2030.](image)

**Figure 8.** Total emissions percentage deviation w.r.t. base scenario from 2018 to 2030

![Graph showing total emissions percentage deviation for different scenarios from 2018 to 2030.](image)
Results: selected macroeconomic indicators

Figure 9. Percentage growth of private consumption, government consumption and GDP from 2013 to 2030
Results: Unemployment

Figure 10. Percentage growth of the unemployment rate from 2013 to 2030
Main conclusions

- By integrating information from the environmental accounts with national accounts, the IEEM-CR platform allows to observe the effects of environmental policies over economic and social variables.

- Taking into account the different variables at stake, the most effective way to reduce CO$_2$ emissions is by means of an energy substitution in the transport sector together with an increase in energy efficiency.

- Results are potential scenarios that exemplify how NCA by means of the IEEM-CR platform can assist policy analysis in Costa Rica.

- This is relevant due to the international environmental commitments acquired by Costa Rica that must be supported and implemented with evidence.
Thank you