

Towards a low-emissions economy: the role of abatement targets and carbon taxes

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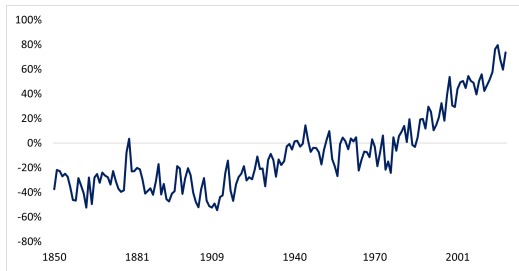
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Agenda

- ▶ Introduction
- ▶ GHG emissions in Colombia
- ▶ Literature review
- ▶ Description of the model
- ▶ Result
- ▶ Conclusion

Introduction

Figure: Variation of world average temperature



Source: Our World in Data (2020)

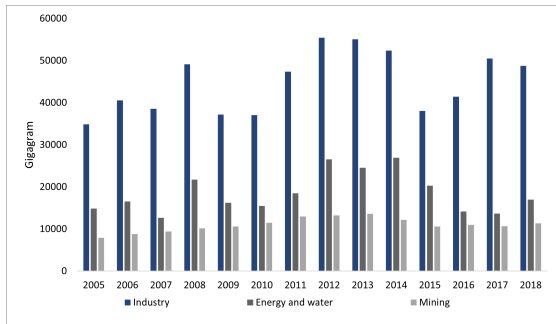
- ▶ Greenhouse Gas (GHG) and global warming.
- ▶ Environmental consequences (IPCC, 2014)).
- ▶ 192 countries signed the Paris Agreement.

Introduction

- ▶ We use a CGE model with emission to analyze the impact of carbon taxes and abatement targets in the Colombian economy.
- ▶ SAM with 12 economic sectors

GHG emissions in Colombia

Figure: Main sectors GHG emission



Data source: DANE (2020)

- ▶ Colombia commits to reduce its GHG by 21% of emission projection for 2030.
- ▶ in 2018, the emissions of the economic sectors were 116,769 gigagrams (Gg) of GHG (CO₂-eq).
- ▶ The AFOLU sector has made the most GHG emissions.

Literature review

- ▶ Wang et al. (2009) develop a CGE model that integrates economic balance with energy, environmental and technological changes modules endogenously.
- ▶ Pradhan and Ghosh (2019) analyzed the impact of climate change in the agricultural sector of India through a CGE mode
- ▶ Roh and Kim (2018) built a CGE model using the Armington and Melitz models to analyze the impact of reducing carbon emissions by 37% in 2030.

Literature review

- ▶ Sousa et al. (2018) analyzed the economic implications of an ETS in Colombia by designing an emissions module in the MEG4C model.
- ▶ Calderón et al. (2014) analyzed the implementation of a carbon tax and emission reduction targets in Colombia, using the partial equilibrium models TIAM-ECN and GCAM, and two CGE models; Phoenix and MEG4C.

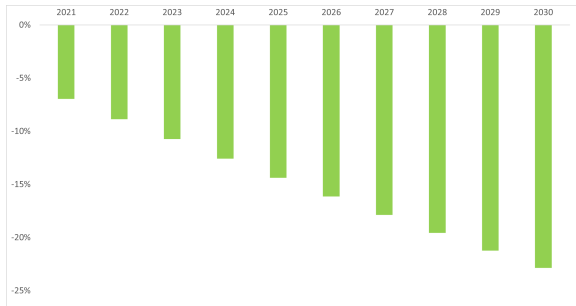
Description of the model

- ▶ We employ combinations of Constant Transformation Elasticity (CET) functions which represent the technology for producers and consumer preferences.
- ▶ The model has 12 products and economic sectors
- ▶ The model also has companies in monopolistic competition and using three types of resources: capital, unskilled and qualified labor

Description of the model

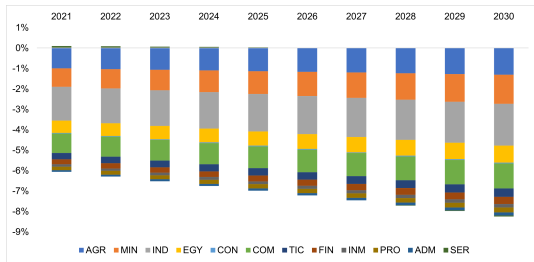
- ▶ The public policy instrument that we figure out to reduce carbon emissions conforms to a carbon tax and abatement targets.
- ▶ The carbon tax appears in 2021 with \$US 50 per thousand gigagrams GHG emission, increasing by 4% per year until the year 2030.
- ▶ Therefore, we set up an abatement target which is a gradual GHG emission reduction of 2% per year until 2030.

Figure: Changes in GHG emissions



Result

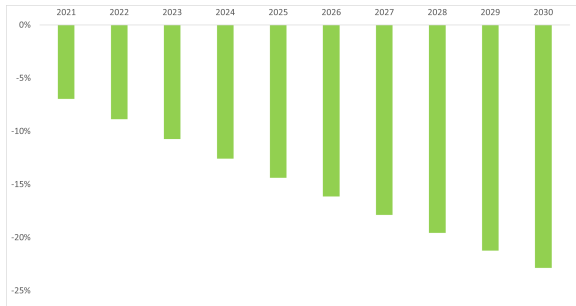
Figure: Production change per sectors



- ▶ Cost equivalent to 0.8% of annual GDP.
- ▶ it would accumulate about 80 trillion COP (about 20 billion dollars) in the period considered, which represents just over 7% of GDP in 2019
- ▶ The unemployment rate would raise about 2%

Result

Figure: Changes in GHG emissions



conclusions

- ▶ Carbon taxes are a good instrument to reduce emissions. However, it has a minimal effect and cause negative economic impact.
- ▶ We consider important to carry out an analysis of the AFOLU emission
- ▶ The technological progress of new efficient carbon technologies
- ▶ Energy transition