Economic Evaluation of Public Policies Aiming the Reduction of Greenhouse Gas Emissions in Brazil

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Abstract

In this paper a static, inter-regional and bottom-up general equilibrium model of greenhouse gas emissions in Brazil is used to analyze the impact of different types of carbon taxes on the economy. The core database is calibrated with Brazilian economic data from 1996, while the emissions module is based on the Brazilian Initial National Communication to the United Nations Convention about Global Climate Change for the 1994 reference year. The gas module in the model comprises all known sources of greenhouse gases emissions except emissions from land use change (deforestation). The simulations comprise scenarios with carbon taxes on emissions, either on fuel use or on the activity level of industries. Results show that taxing activities is more relevant for greenhouse gases emissions reductions in Brazil than just taxing fuel use, due to the importance of activity related emissions in the Brazilian emissions matrix. Livestock is found to be one of the most important emission sectors in Brazil. Carbon tax on activities, however, generates the higher increase in food prices, with negative implications for poverty alleviation. Different carbon tax schemes would also have different

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regional impacts inside Brazil, with taxation on fuels harming more the Southeast and Northeast regions, and taxation on activity levels affecting negatively more the South and Center west regions.

- **JEL classification:** Q52, Q58, C68

- **Key words:** greenhouse gas emissions, carbon tax, general equilibrium models, Brazil

## I. Introduction

According to the International Panel on Climate Change (IPCC 2001a) the change in the concentration of greenhouse gases in the atmosphere can cause an increase in the average temperature of the Earth of 1.4 to 5.8º Celsius in the next one hundred years. The United Nations, through the Framework Convention on Climate Change is aiming for the “stabilization of concentration of greenhouse gases in the atmosphere at a level that avoid a dangerous human interference in the climate system”. In the Conference of the Parties meetings (COP) international agreements between countries are discussed, in order to meet the targets established in the Convention. Among these agreements is the Kyoto Protocol (UNFCCC, 2001b), which establishes reductions targets for emissions for countries in the Annex I, for the first period of commitment, from the year 2008 to 2012.

Although Brazil is not included in the Annex I countries, and so does not have mandatory reduction targets for emissions in the first period, the country has formulated and implemented national programs with the aim of meeting its compromises in the context of the Convention which include actions to mitigate the climate change and reduce the human emissions of greenhouse gases (GHG).\(^1\)

However, the present state of negotiations in the Climate Conventions brought to the discussions the need for some developing countries, like Brazil, China and India to have some kind of emissions reductions targets in the future, which could come from different sources.

The share of renewable energy in the Brazilian energy supply matrix is relatively high, as it can be seen in Figure 1. Biomass and other renewable energy sources account for about 46 per cent of total energy supply in the country in the year 2002 (Balanço Energético de Emissões, Ministério da Ciência e Tecnologia). Petroleum,

\(^1\)Among the most important of these programs is the Programa Nacional do Álcool – PROALCOOL (National Ethanol Program).