

Climate Change Mitigation Policies: Aggregate and Distributional Effects

EPRG Working Paper 2104

Cambridge Working Paper in Economics 2122

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The economic effects of climate change mitigation policies have been at the core of the policy debate for many years. Now that the US is rejoining the Paris Accord, it is important to investigate what achieving the Paris target in emission reduction actually means for the United States economy and how these economic effects compare across and within countries. In this paper, we investigate the aggregate and distributional effects of climate change mitigation policies for the United States, as well as five other emerging and advanced economies: Brazil, Canada, China, India and Mexico.

We build a multi-sectoral model that integrates the workers' skill distribution with the economy's sectoral composition. Our model features endogenous occupational choice and human capital accumulation: Individuals take into account relative wages and their sector-specific productivities to choose their sector of work and their investment in schooling.

On the production side, the model economy consists of various sectors, including four energy-producing activities: oil, coal, natural gas and green. A carbon tax is introduced to the "dirty" energy producers (e.g., oil, coal and gas), which in turn affects their prices. Given the intersectoral linkages in the economy, these changes in relative prices lead to reallocation of inputs, including labor, across sectors.

As economies differ in their production structures and labor force characteristics, the impact of carbon taxes is likely to vary across countries. We therefore calibrate the model parameters for Brazil, Canada, China, India, Mexico and the United States. Our calibration matches quite well a number of macro and micro moments observed in the data for these six economies, including: sectoral value-added shares, returns to education, relative wages, wage inequality and labor shares.

We find that the carbon tax is an effective instrument for countries to reduce emissions and achieve the climate targets laid out in the Paris Agreement. We also show that the overall economic impacts of carbon taxes depend on the magnitude of the tax, the economy's production structure and on how the revenue from carbon tax is rebated back to the economy.

We estimate that a carbon tax of 32.3% is needed for the US economy to achieve its original Paris pledge of 26% emission reduction. This carbon tax (32.3%) costs the United States at most a 0.6% drop in output, which is the worst-case scenario when the government does not rebate its tax revenue back to the economy.

The effects of the carbon tax are heterogeneous across countries, given differences in their production structures and labor force compositions. Our analysis shows that applying the same climate policy of a 32.3% carbon tax yields, at most, output losses ranging from 0.5% in Brazil to 2.1% in China. Nevertheless, the adverse effects of carbon taxes on output and welfare can be partially, or even entirely, offset by rebating tax revenues back to the economy.

Despite the small impact on aggregate output and welfare, carbon taxes have non-trivial distributional effects at the sectoral and individual levels. In the US, workers with a comparative advantage in dirty energy sectors who do not reallocate suffer a welfare loss 12 times higher than workers in non-dirty sectors, but constitute less than 1% of the labor force.

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Publication March 2021
Financial Support Keynes Fund at University of Cambridge, the Coordenação de Aperfeiçoamento de Pessoal de Nível Superior—Brasil (CAPES)—Finance Code 001 and Faperj