

Economic Implications of the Paris Agreement on Taiwan: A Global Economy-wide Analysis

Cheng-Da Yuan, Wei-Hong Hong, Y.-H. Henry Chen

Abstract

This paper aims to evaluate the economic impacts and long-term electricity structure on Taiwan by implementing the Intended Nationally Determined Contribution (known as INDC), while the Bureau of Energy (BOE) has announced and ambitiously adopted several energy conservation policies to meet the Post-Paris Agreement mitigation target of cutting 50% CO₂ emissions based on Business as Usual (BAU) by 2030.

To understand what of the extend to adopt INDC policy in Taiwan, a series of scenarios are designed and simulated by EPPA-Taiwan model (Economic Projection and Policy Analysis mode for Taiwan, EPPA-Taiwan) which is a global recursive-dynamic computable general equilibrium (CGE) model and covers 19 regions and 24 sectors. The EPPA-Taiwan model is based on the latest version of GTAP-Power data (2011 as reference year) and featured with detailed fossil and renewable electricity generating sectors. Furthermore, the advanced (back-stop) technologies are also characterized in our model to response the potential emissions reduction for different policy scenarios in the future. These scenarios including 1) a unilateral INDC policy is only adopted by Taiwan, and 2) the global INDCs are implemented worldwide.

According to the simulation results, the negative shock on Taiwan's GDP is approximately -6.5% in the unilateral INDC scenario which is greater when compared to the global INDCs policy (-4.8%). The main reason is that our model moderates the economic shock due to the international trade effect (Böhringer and Rutherford, 2002), therefore the negative effect on GDP could be systematically overestimated in the single region model which ignores the interactions from international trade.

In addition, we find that carbon leakage, which is the central to the discussion on climate policy, could be another issue when unilateral INDC is only implemented by Taiwan. The carbon leakage is the result of asymmetrical carbon policies, especially carbon price and the resulting carbon cost, which affects the international competitive position of Taiwan's industry and could displace production activities, net export, and the CO₂ emissions. These simulation results could provide insights and application for government authorities to formulate and evaluate the energy policy in the future.