

Title: A General Equilibrium Perspective on Energy and Environmental Policies in ASEAN

Abstract

The argument that environmental degradation will reduce future benefits from economic activities has been widely accepted, so much so that integrated energy-environmental strategies and policies are required which need to take into account the complex interactions between climate, economic, and social systems. As such, the first goal of this thesis is to develop methodologies to model economic activities in six selected member countries of the Association of Southeast Asian Nations (ASEAN) and link these activities to the environment. The second goal is to identify and understand the impact of energy and environmental reforms in these countries. The success of each reform implementation largely depends on its effect on economic growth and welfare distribution.

In order to achieve the first goal, the thesis develops an integrated social accounting matrix (SAM) for six member countries of ASEAN, namely Indonesia, Malaysia, Philippines, Singapore, Thailand, and Vietnam, called the ASEAN-SAM. The thesis then uses the ASEAN-SAM to construct a unique static multi-country computable general equilibrium (CGE) model, called the Inter-Regional System of Analysis for ASEAN (IRSA-ASEAN) model.

The thesis fulfils the second goal by applying the IRSA-ASEAN model to look at the impact of an energy subsidy reduction and a carbon tax implementation. In the case of an energy subsidy reduction, the model eliminates existing energy subsidies, namely fuel subsidies in Indonesia and Malaysia as well as electricity subsidy in Indonesia. The thesis finds that the elimination of energy subsidies is an effective measure to reduce pollution in the form of carbon dioxide (CO₂) emissions, generates economic expansion in these countries, and is progressive in nature.

In the second case, the thesis finds that implementing a USD 10 per ton of CO₂ emissions sales tax on coal, petroleum products, and manufactured gas is also an effective measure to improve the environment in terms of CO₂ emissions reduction. However, this environmental improvement comes at a cost as gross domestic product (GDP) contracts in some countries if a carbon tax is uniformly applied. Vietnam stands to lose the most, while Philippines, Singapore, and Thailand are slightly adversely affected. Indonesia's and Malaysia's

economies, on the other, actually expand. In terms of distributional impact, a carbon tax is strictly progressive in Vietnam and strictly regressive in Singapore. For Indonesia, Malaysia, Philippines, and Thailand a carbon tax is progressive for those in the lower income groups and regressive for those in the higher income groups.

In summary, the thesis finds that both an energy subsidy reduction and a carbon tax implementation are both effective measures to improve the environment. However, in terms of economic development, a carbon tax implementation appears to be a second-best policy alternative to an energy subsidy reduction. The thesis also finds that recycling mechanisms do not affect the overall GDP and CO₂ reduction differently, but they do affect greatly the distributional impact of these policies. As such, energy and environmental reforms do not necessarily conflict with development and equity objectives. Nevertheless, a policy in these areas must be carefully designed to account for acceptability, feasibility, and utility.