Book Review

Global Warming and the Asian Pacific

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Reviewer: Axel Michaelowa

Up to now, analyses of climate policy have mainly focused on Europe and the United States. So in principle it is welcome that Chang et al. address a region that will be increasingly important for climate change issues—East Asia. Unfortunately, the book has several shortcomings that limit its usefulness. It is a collection of papers from a conference that took place in December 2000. Anyone active in climate policy knows that this three-year lag severely reduces the relevance of any policy suggestions made. The editors’ claim that the information is the “most up to date” is thus rather dubious, especially as some papers date back to 1999.

The modeling background of the editors leads to an overemphasis on modeling studies, while policy issues are neglected. The entire first part of the book tries to make emission forecasts for several countries in the region: Vietnam, Taiwan, and Japan, using Computable General Equilibrium (CGE) and input-output models. This would have benefited from an introductory chapter comparing the different methods. In chapter 2, “Forecasting carbon dioxide emissions in Vietnam” (pp. 13–34), Vu Xuan Quang’s model is essentially an extrapolation of past trends and unsurprisingly forecasts a quadrupling of CO₂ emissions between 1990 and 2010. It would have been interesting to compare this forecast to the actual development between 1990 and 2000. In chapter 3, “Baseline forecasting for greenhouse gas reductions in Taiwan: a dynamic CGE analysis” (pp. 35–59), Ping-Cheng Li, Shih-Hsun Hsu, Chung-Huang Huang, and Hsing-Hua Li use an elaborate CGE model to forecast Taiwan’s emissions based on the high assumption of a 2 percent annual productivity growth rate. On the other hand, the rate of autonomous energy efficiency improvement is set very low at 0.5 percent per annum. Thus it is no wonder that they forecast that emissions will double between 2000 and 2020. Comparison with the bottom-up Market Allocation (MARKAL) model for Taiwan gives a 5 percent difference, but the emission share of industry is estimated 50 percent lower in the MARKAL case. In chapter 4, “Forecasting baseline CO₂ emissions in Japan” (pp. 60–74), Masahiro Kuroda and Kojida Nomura present a CGE model for Japan. This model suffers from specification of parameters from the growth period 1962–1992, which makes it less relevant for stagnation periods like the 1990s. Assumptions are clearly stated but unrealistic, such as expansion of nuclear power by 50 percent between 2000 and 2010 as well as a 25 percent increase in hydropower. Economic growth is estimated optimistically at more

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than 2.5 percent between 2000 and 2010, while emissions increase by 15 percent. The modeling section is concluded by an analysis of the emissions impacts of trade based on an input-output model. The data used are from 1990 and thus not up to date. Emissions attributed to exports are minuscule, less than 0.5 million t CO\textsubscript{2} for Japan.

The second part of the book consists of—equally stylized—analyses of the effects of energy/carbon taxes in China, Taiwan, and Japan, with an outlier on abatement costs of energy crops in the United States. In chapter 6, “Effect of energy tax on CO\textsubscript{2} emissions and economic development in Taiwan 1999–2020” (pp. 105–130), Chi-Yuan Liang and Dale Jorgensen use a dynamic Taiwanese CGE model to apply a carbon tax of US$ 22/t CO\textsubscript{2}. They calculate a GDP loss of 1 percent for immediate introduction of the tax and 0.8 percent if the tax is introduced gradually until 2020. In chapter 7, “Impact of carbon tax and reduced CO\textsubscript{2} emissions on the Chinese economy” (pp. 131–152), Yuxin Zheng and Gang Ma perform a static CGE analysis for China, but their base data are for 1992 only. The GDP loss for a non-revenue-recycling case and a tax level of US$8/t CO\textsubscript{2} is 1 percent; for full recycling, 0.3 percent. The analysis includes sectoral and regional differentiation. In chapter 8, “Cost of reducing CO\textsubscript{2} emissions in Japan” (pp. 153–168), Kuroda and Nomura use the same model as in Part One. They now suddenly use a more realistic scenario concerning nuclear power but limit the effects of the tax to two years only, making the whole exercise extremely unrealistic.

In chapter 9, “Greenhouse gas mitigation through energy crops in the US with implications for Asian Pacific countries” (pp. 168–186), Uwe Schneider and Bruce McCarl model abatement and sinks options in the US agricultural sector depending on greenhouse gas prices. While the relevance for East Asia is unclear, apart from some sensitivity analysis of energy crop yields, the results are interesting; due to its low costs sequestration in soils is one of the most attractive options for low prices, but is superseded by biofuels if prices increase above US$20/t CO\textsubscript{2}. Afforestation also becomes relatively attractive at this price level. While also quite interesting, the argument on impacts of climate change merely scratches the surface. In chapter 10, “Climate change and crop yield distribution in Taiwan” (pp. 187–204), Ching-Cheng Chang and Chi-Chung Chen try to analyze impacts of expected warming on crop yields in Taiwan on the basis of yield variations in the past two decades. The only robust result is that increasing variability in temperature and rainfall will lead to increased variability in yields. In a digression in chapter 11, “Will global warming cause heat stress?” (pp. 205–216), Mendelsohn and Shaw analyze the effect of increasing temperatures on mortality. Using US data, they argue that people adapt to higher temperatures and that only unpredicted extreme deviations from the normal temperature lead to mortality increases. Given conditions in the United States, adaptation is fairly easily done by installing air conditioning. However, this is not possible for low-income people in developing countries. Moreover, the emissions impact of increased use of air conditioning should not be underestimated, as is currently illustrated by developments in China. In chapter 12 “The impact of climate change on Asian Pacific countries” (pp. 217–230), Mendelsohn uses an outdated climate model with a coarse resolution to calculate impacts of climate change on East Asia. His response functions have been calibrated for the United States and are extrapolated by using very simple transfer functions. In particular, the assumption that level of development does not influence vulnerability to climate change is unrealistic, as most studies on adaptation show that low development increases vulnerability. There is a very large
difference between the results of cross-sectional and experimental models, sometimes changing the sign of impacts from minus to plus. In addition, the effect of water stress seems to be underestimated.

The policy part of the book, looking at the countries in the region, could really have broken new ground but instead is a collection of very general ideas about alternatives to the Kyoto Protocol, the Kyoto mechanisms, and domestic emissions trading, with a strong US bias. In chapter 13, “Reducing cost uncertainty and encouraging ratification of the Kyoto Protocol” (pp. 231–246), Raymond Kopp, Richard Morgenstern, William Pizer, and Frédéric Ghersi present their well-known idea of a price cap (for a criticism, see Müller et al. 2001) and have clearly not taken the Marrakech Accords into account in their paper. Their simulation of a price cap of US$7 to US$28/t CO2 shows that the low cap leads to a substantial emissions increase of 1 billion t CO2. In chapter 14, “A better alternative to the Kyoto Protocol” (pp. 247–257), Warwick McKibbin sets out his equally well-known Kyoto alternative, which is definitely the most inefficient suggestion currently in the debate, given that it is as rigid as an autarkic carbon tax in the short term and makes governments pay to emitters for any future strengthening of emissions targets (Michaelowa 2003). In chapter 15, “Joint Implementation, the Clean Development Mechanism and the baseline: an economic analysis” (pp. 258–277), Ekko Van Ierland, Rianne de Leeuw, and Joram Krozer discuss baseline issues of the Clean Development Mechanism (CDM) that have become obsolete since the policy decisions taken by the CDM Executive Board during 2003. Nevertheless, this chapter is instructive in showing the differences between baseline approaches. In chapter 16, “Economic issues related to design of a domestic permit trading system” (pp. 278–294), Carolyn Fischer concludes the book with a superficial description of a domestic emissions trading system; this paper would have benefited immensely from looking at the European Union’s experiences in actually introducing such a system.

Overall, this book is interesting for those who enjoy looking at the details of modeling approaches. For those interested in a contribution to the policy debate concerning climate mitigation and adaptation in East Asia, it is a disappointment.

References
