

Economics of environmental policy in Turkey: A general equilibrium investigation of the economic evaluation of sectoral emission reduction policies for climate change[☆]

Çağatay Telli^a, Ebru Voyvoda^{b,*}, Erinç Yeldan^{c,d}

^a State Planning Organization, Turkey

^b Department of Economics, Middle East Technical University, Turkey

^c Bilkent University, Turkey

^d University of Massachusetts, Amherst, United States

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Abstract

Research on climate change has intensified on a global scale as evidence on the costs of global warming continues to accumulate. Confronted with such evidence, the European Union set in late 2006 an ambitious target to reduce its greenhouse gas emissions, by 2020, to 20% below the level of 1990; and invited the rest of the developed economies and the developing world to take part with the Kyoto Protocol. Turkey is the only country that appears in the Annex-I list of the United Nations' Rio Summit and yet an official target for CO₂ emission reductions has still not been established. Thus, as part of its accession negotiations with the EU, Turkey will likely to face significant pressures to introduce its national plan on climate change along with specific emission targets and the associated abatement policies.

Given this motivation, we utilize a computable general equilibrium model for Turkey to study the economic impacts of the intended policy scenarios of compliance with the Kyoto Protocol and we report on the general equilibrium effects of various possible environmental abatement policies in Turkey over the period 2006–2020. The model is in the Walrasian tradition with 10 production sectors and a government operating within an open macroeconomy environment. It accommodates flexible production functions, imperfect substitution in trade and open unemployment. We focus on CO₂ emissions and distinguish various basic sources of gaseous pollution in the model. Our results suggest that the burden of imposing emission control

[☆] The views and policy recommendations expressed in the paper are solely those of the authors' and by no means reflect the institutions and the governing bodies stated above. All usual caveats apply.

* Corresponding author. Tel.: +90 312 210 2056.

E-mail addresses: ctelli@dpt.gov.tr (Ç. Telli), voyvoda@metu.edu.tr (E. Voyvoda), yeldane@bilkent.edu.tr, yeldan@peri.umass.edu (E. Yeldan).

targets and the implied abatement costs could be quite high, and that there is a need to finance the expanded abatement investments from scarce domestic resources. Policies for environmental abatement via carbon and/or increased energy taxes further suffer from very adverse employment effects. This suggests that a first-best policy would necessarily call for a simultaneous reduction on the existing tax burden on producers elsewhere together with introduction of environmental taxes.

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Research on climate change has intensified on a global scale as evidence on the costs of global warming continues to accumulate. A special report that appeared in the *Financial Times* (31 October 2006), for instance, underlines that “releasing 550 parts per million (ppm) of CO₂ in the earth’s atmosphere would incur a high probability of raising global temperatures by more than 2 °C above the pre-industrial levels”, an upper limit which is regarded as the safety zone for our planet’s climate. The analytics of costs and benefits of possible effective action to curb climate change have been tackled, in turn, in a recent well-celebrated report by Sir Nicholas Stern.¹ The Stern report argued that efforts to stabilize greenhouse concentrations at between 450 and 550 ppm by 2050 would incur a *one-off* cost of only 1% of global economic output (equivalent to 2006 US\$ 651 billion). It also warned that, failure to take immediate action would risk the future of the global economy by shrinking the world output by as much as 5–20 percent over the next two centuries. This cost would be due to the likely disruptions to the working people’s productivity, due to widespread of new forms of bacteria and loss of amenities.

It was mainly in response to this evidence that in late 2006 the European Union set, what can be called as the most ambitious goal for impeding climate change, cutting its greenhouse gas emissions, by 2020, to 20% below the level of 1990. The EU further announced plans to go further and declared that it would raise its targets to 30% below the 1990 levels by 2020 to encourage the rest of the developed economies and the developing world to take part with the Kyoto Protocol.

Against this background, Turkish environmental policy is at a crossroad. As part of its bid for full membership in the European Union, Turkey is under significant pressure to comply with the Kyoto Protocol, and to constrain its CO₂ emissions and other gaseous pollutants over the next 6 years. Yet, as a newly emerging, developing market economy, Turkey has not yet achieved stability in its energy utilization and gaseous emissions either as a ratio to its GDP or in per capita terms. Turkey is among the *25 countries with the fastest rate of growth in industrial use of energy sources* (OECD, 2004). Turkish Statistical Institute (TURKSTAT) data indicate, for instance, that on a per capita basis, consumption of electrical power in Turkey has increased by 6-fold from 1980 to 2005. TURKSTAT estimates that aggregate CO₂ emissions from fossil fuel at 223.4 Gg as of 2004, and will reach 343 Gg by 2010 and to 615 Gg by 2020. This suggests a secular rise of the ratio of the total CO₂ emissions to GDP from 0.632 million tonnes/billion TRY in 2005 to 0.689 million tonnes/billion TRY in 2020.

Under these uncertainties, Turkey’s global standing in terms of its international abatement requirements is also a matter of controversy, as it is the only country that appears in the so-called Annex-I list of the Rio Summit of the United Nations and yet an official target for CO₂ emission

¹ “*The Economics of Climate Change*” available on line at: <http://www.hm-treasury.gov.uk>.

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