NORTH-HOLLAND

Journal of Policy Modeling
25 (2003) 795–810

Journal of Policy Modeling

Environmental taxation and economic effects: a computable general equilibrium analysis for Turkey

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Abstract

This study explores economic effects of environmental taxation using an energy–economy–environment computable general equilibrium model of the Turkish economy. The model disaggregates the Turkish economy into seven sectors and describes production within a nested CES representation. Results, which are obtained under a Business-As-Usual as well as various environmental tax scenarios, provide insight into energy–economy–environment interactions in Turkey and indicate opportunities for an ecologically and economically sustainable development of the country. Besides general policy implications, it is found that a second dividend of environmental taxation, that is economic benefits in addition to environmental improvements, is possible when imported fuels are the primary source of pollutant emissions. This result has been obtained under tax revenue recycling that assumes public consumption of tax revenues instead of the common practice of using tax revenues for reducing existing tax distortions in order to obtain a second dividend.

JEL classification: C68; O21; O52

Keywords: Environmental policy modeling; CGE analysis; Double dividend; Emission taxation; Energy–economy–environment interactions

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0161-8938/$ – see front matter © 2003 Society for Policy Modeling.
doi:10.1016/S0161-8938(03)00076-0

1. Introduction

Parallel to ongoing industrialization, Turkey's primary energy needs have increased rapidly at an average annual growth rate of 5.1% over the last 50 years. The per capita energy use still ranks below the world's average and only 35% of the primary energy consumption in 2001 (78 MTOE) is provided from domestic sources. The energy imports amount to US$ 8.3 billion, some 20% of Turkey's total imports in 2001. The bill can be expected to increase significantly in the coming years as the Ministry of Energy and Natural Resources forecasts a doubling of the primary energy consumption by 2010, with the domestic share falling to 27%. Increasing energy imports might become an essential burden to the Turkish economy as the country has a persistent current account deficit and relies on foreign exchange inflows to finance her outstanding external debt (which has reached some US$ 114 billion — nearly 78% of GDP — in 2001). Naturally, such implications are vitally important for the success of the IMF-supported structural reform package.[1]

The Turkish energy sector is undergoing severe structural changes in a restructuring process to establish competitive energy markets, for which the legal and regulatory framework has been established in late 2001. The market opening underway is triggered by the hope to achieve efficiency gains and improve welfare. The prospect for a rapidly developing energy market is attracting private investors, who are naturally primarily concerned about maximizing profits rather than reducing harmful environmental impacts. Clean energy technologies and emission reduction measures are therefore to be promoted by policy-makers if ecological sustainability is desired. This study explores the economic impacts of environmental taxation as a policy instrument to steer the country into a path of sustainable development.

Sustainability is likely to be an issue on Turkey's roadway to the EU where more stringent emission standards are present. The EU has ratified the Kyoto Protocol on Climate Change committing member countries to reduce their greenhouse gas emissions. Turkey's compliance with the Kyoto requirements will most probably be on the agenda of her accession talks which can be expected to begin by 2005.[2] This puts additional emphasis on the importance of the present study highlighting energy–economy–environment interactions in Turkey.

[1] Since 1961, there have been 18 loan arrangements with the IMF to support the Turkish economy. Turkey's latest stand-by arrangement, a comprehensive program of macroeconomic and fiscal adjustment, covers the period 2002–2004 with a total Fund financing of some US$ 17 billion.

[2] The EU has agreed to decide upon Turkey's progress in fulfilling the Copenhagen political criteria in December 2004, and then begin accession talks without delay should the country pass the review. It should be noted that there is a wide consensus and strong political will in Turkey to undertake the necessary reforms. On the other hand, Turkey's joining the EU might yield significant economic benefits for the Union as indicated by Goldberg and Levi (2000). But, more importantly, Turkey's evolution as a secular modern democratic state would be confirmed under a EU membership (that's why Turkey's aspirations to EU accession are also being strongly supported by the US).