



On environmental impacts of market-based reforms: Evidence from the European and Central Asian transition economies



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ABSTRACT

Global warming and other adverse climate change impacts induced by anthropogenic carbon dioxide emissions are a major public policy concern around the world including transitional economies. This paper, therefore, examines the impacts of market-based economic reforms on per capita CO₂ emissions in the European and Central Asian transition economies where environmental degradation was pervasive prior to these reforms. A dynamic panel data model is employed for this purpose for 28 countries covering 22 years from 1990 to 2012. Our overall results suggest that economic openness may not necessarily result in sustainable development although reforms in competition policy and corporate governance were the significant drivers of emissions reductions in the region. Hence, advances in competition policy and governance reforms are desirable given the available scope to extend these reforms. The structural shift to and emergence of light industries also contributed to declining CO₂ emissions in the transition process. The *direct* impact of the Kyoto Protocol in reducing emissions is debatable which also raises doubts on the effectiveness of the Paris agreements.

1. Introduction

The early 1990s marked the end of command-based policies in former member nations of the Soviet Union. They become transitional economies (TECs) and embarked on an era of market-based economic reforms (both Type I and Type II) consisting of pervasive political, social and economic changes.¹ Type I reforms included economic liberalization, macroeconomic stabilization, restructuring and privatisation and institutional reforms [50]. Type II reforms included the design and enforcement of laws, regulation and supportive institutions to buttress and facilitate the functioning of the market-based reforms in this transformation process [46].

The transitional process exposed the broad-scale environmental degradation that took place during the command-based regime in these countries [43]. High levels of airborne particulates from industrial and household sources; widespread contamination of soil and water from toxic chemicals and nitrates; and a persistent negligence of nuclear safety and waste management issues were some of the common and urgent environmental problems identified in the fifth European Community Environmental Action Programme (EAP) for Central and Eastern Europe in 1993. The legacy of industrial inefficiency, obsolete

and polluting technologies coupled with weak environmental management and regulation had exacerbated the ecological woes in the region.

The fifth EAP was a powerful forum because the meeting identified the long-term European environmental agenda for the decades to follow. A central principle of the EAP was that the process of economic reforms and restructuring associated with the transition were expected to eliminate the perverse incentives that underlay many of the ecological problems of the centrally planned economies [27]. The importance of effective environmental policies; institutions and investments in supporting the market-based reforms improving the environmental performance of developed economies was also recognised. Now, more than 20 years after the commencement of economic reforms by European and Central Asian TECs, it is possible to use available data to examine the effect of market-based reforms on environmental quality such as air pollution. Has the prediction of the fifth EAP been vindicated? This paper investigates empirically the extent to which this is the case for reductions in carbon dioxide (CO₂) emissions in this group of countries. We focus on CO₂ because these emissions are viewed as the primary greenhouse gases responsible for climate change and regulating and monitoring CO₂ remains a central issue in the ongoing international negotiations on climate change [28,29]. The

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¹ The transitional economies, in this study, comprise the countries of Central Europe and Baltic States (CEB), South East Europe (SEE) and Eastern Europe and the Commonwealth of Independent States (CIS) belonging to the former Soviet Union (FSU).

scope of its spatial impact also makes CO₂ pollution appropriate for a country-level aggregate study in the light of data unavailability for other sources of pollutants even though climate change agreements have extended beyond limiting CO₂ emissions since the Vienna Conference in 1985.

Improving air quality by reducing the amount of air pollutants such as carbon dioxide (CO₂) in the atmosphere has also been an actively pursued global agenda since the 1992 United Nations Framework Convention on Climate Change (UNFCCC) came into force. The Kyoto Protocol, which extended the UNFCCC, was adopted in Kyoto on 11 December 1997 and entered into force on 16 February 2005 while the first commitment period expired in 2012. All the TECs in the group considered here had agreed to cap and eventually reduce their emissions of CO₂ considering the international importance of combating global warming. However, the extent to which international climate change agreements like Kyoto Protocol (a post Kyoto analysis) reduced the CO₂ emissions of these countries remains an important empirical question especially in the aftermath of the 2015 United Nations Climate Change Conference (COP 21). This is because COP 21 signalled a global agreement on the reduction of climate change impacts but with no detailed timetable or country-specific goals for emissions reductions incorporated into the agreement as opposed to the Kyoto Protocol.

The European and Central Asian (ECA) TECs still contribute about 15% of the global greenhouse gas emissions (GHGs) even though their carbon emissions have fallen substantially since 1990. Furthermore, this is the only major region in the world where per capita carbon emissions fell substantially by about 28% between 1990 and 2008 despite an average increase in real GDP in this region by about 22 per cent over the same period [14]. This fall in CO₂ emissions can be attributed to the combined effects of economic reform and other underlying factors such as economic growth, investments in clean energy, changed composition of energy use, environmental policies and compliance with the EU directives that could potentially affect the trends in total emissions and environmental quality. However, the extent of impacts of economic reforms and other underlying factors on the falling levels of CO₂ emissions in the TECs is unknown in the existing literature.

The purpose of this study is to evaluate the impacts of the transitional process on environmental quality concentrating on comparisons of changes in CO₂ emissions among fast and slow reformers in the ECA TECs by capturing the combined effects of their economic reforms, growth, environmental interventions and studying trends. This study aims to achieve two main objectives. First, there is a paucity of published econometric studies gauging the impacts of market-oriented economic reforms on environmental quality in TECs. This is particularly the case for ECA TECs. This study helps to fill this gap and identifies the main drivers of CO₂ reductions in ECA TECs. Secondly, identifying the drivers of CO₂ emissions reductions will guide policy-making on combating climate change in the TECs, as the TECs will have to further reduce emissions over the coming decades to achieve the required scale of global emissions reductions. For example, the region still includes some of the most carbon-intensive countries in the world such as Russia, Turkmenistan, Uzbekistan, Kazakhstan and Ukraine implying that there is much scope for improvement in environmental quality.

The remainder of the paper is structured as follows. Section 2 reviews the relevant literature on the relationship between economic reforms, environmental regulations and environmental quality. Section 3 presents the econometric methodology and data used. The illustration and discussions of results with relevant policy implications are undertaken in Section 4. Section 5 concludes the paper and highlights future area of research.

2. Review of relevant literature

The empirical literature on the relationship between CO₂ emissions

and economic growth is large and beyond the scope of this paper to review extensively. In general, the relationship between several indicators of environmental degradation and income can be typified by an inverted U-shaped relationship. This relationship is referred to as the Environmental Kuznets Curve (EKC) originally proposed by Seldon and Song [41] implying that pollution is a diminishing problem as per capita income rises. In 1995, Grossman and Krueger [19] studied the EKC following cross-country studies on urban air pollution (sulphur dioxide emissions and smoke) and several indicators of water pollution as measures of environmental degradation. The EKC, hence, hypothesizes that the intensity of different indicators of environmental degradation tends to increase as economic growth occurs until average income reaches a certain point. Several empirical studies such as Shafik, Hilton and Levinson, Harbaugh, Levinson and Wilson, Dinda [10,23,26,42] have confirmed this relationship although the functional form and data properties can influence findings on the existence of an EKC curve. Other studies such as Tisdell, Stern, Perman and Stern [39,44,45,49] underscore the limitations of EKC and outline the conditions under which the EKC relationship may not exist such as heterogeneity, spurious regressions, endogeneity, heteroscedasticity, omitted variables and spatial dependence.

Another strand of literature focusses on the relationship between economic openness and environmental quality. Economic globalisation and trade openness is viewed as a possible positive force for environmental improvement and as a major factor increasing the likelihood of sustainable development through its likely boost to global investment [49]. Earlier empirical studies such as Dean, Copeland and Taylor and Frankel and Rose [9,7,16] have confirmed a positive relation between trade openness and environmental quality. Tamazian et al. [47] show that higher degree of economic and financial openness led to CO₂ reduction among the BRIC (Brazil, Russia, India and China). The impact of environmental regulation and policy such as the ratification of the Kyoto Protocol on environmental degradation has also been captured by several studies. Martinez-Zarzoso [21] found in testing the theory of the EKC while taking account of environmental regulations that Kyoto obligations had a reducing effect on CO₂ emissions in both developed and developing countries. Iwata and Okada [30] found that the effects of commitment to the Kyoto Protocol significantly reduced the CO₂ emissions among 119 countries from 1990 to 2005. Similarly, Jalil and Habibullah [31] estimated that Kyoto commitment and Kyoto Clean Development Mechanism produced a statistically significant effect in reducing CO₂ emissions in Asia and the Pacific region for the period 1971–2009. Aichele and Felbermayr [1] conducted the first ex-post empirical evaluation of Kyoto Protocol to analyse the carbon content of bilateral trade. The results showed that Kyoto has led to carbon leakage among countries. Carbon leakage implies that environmental regulation and restrictions in some countries could change relative goods prices and hence shift production of CO₂ intensive goods to countries that are exempt from such restrictions [8]. For example, it is possible for higher income countries to reduce their pollution intensities by shipping polluting industries offshore (e.g. in China and India) as environmental restrictions add to the private costs of locating eco-unfriendly businesses in higher income countries.

Aspects of governance such as corruption and absence of democracy can also result in socially sub-optimal environmental policy and regulation. Lopez and Mitra, Damania et al. and Pelligrini and Gerlagh [53] [12,33] show that corruption has a negative effect on reducing environmental degradation. Moreover, Cole et al. [6] found that foreign direct investments (FDI) were associated with less stringent environmental policy when corruption level is very high. Damania, Fredriksson and List [11] analysed the joint effect of trade openness and corruption on the stringency of environmental policy. Their results showed that trade openness increased the stringency of environmental policy in countries with more corruption (low governance). Halkos and Tzeremes [24] found a nonlinear relationship between countries' CO₂ emissions and governance measures such as voice and accountability;

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