Chapter 17
The Impact of Trade Openness on Environmental Pollution:
A Panel Cointegration and Causality Analysis

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ABSTRACT

This chapter analyzes the impact of trade openness on environmental pollution in the newly industrialized countries that have focused on trade over the period 1971-2010 by using recently developed panel unit root, cointegration, and causality tests. The results indicate a cointegration relationship between the variables. The results also show that trade openness increases carbon dioxide emissions with the elasticity of 0.53 and there is a Granger causality running from trade openness to carbon dioxide emissions in the long run. These findings may provide some policy implications. Without taking into account impact of trade on pollutions, optimistic environmental Kuznets curve hypothesis would be invalid. Therefore, policymakers who decide on environment policies should pay attention to not only growth effects but also trade effects on pollutions. Future empirical analysis would expose the new evidences for governmental policies and environmental regulations to change these effects positively.

INTRODUCTION

In this study, the impact of trade openness on environmental pollution is investigated in a sample of 10 newly industrialized countries for the period 1971-2010 by conducting a panel data analysis.

For this purpose, panel unit root, cointegration and causality methods are employed. Several studies (e.g. Baumol, 1971; Baumol & Oates, 1988; Anderson & Blackhurst, 1992; Tsai, 1999; Gallagher & Ackerman, 2000; Savard & Bohman, 2003; Saunders & Cagatay, 2004) examined the
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link between trade and environment by developing the partial equilibrium models. On the other hand, several studies (e.g. Walter, 1974; Pethig, 1976; Asako, 1979; Siebert, 1992; Perroni & Wigle, 1994; Lee & Roland-Holst, 1997; and Beladi & Oladi, 2011) contributed to the theoretical literature within the framework of general equilibrium models.

Baumol & Oates (1988) analyzing the effects of environment on trade suggested that the international pollution problems may discredit the idea of free trade. They concluded that tariffs may be appropriate to improve resource allocation in the world. Anderson & Blackhurst (1992) examined the relationship between trade liberalization and environment in a small and large country which have open economy. They exhibited that when a suitable environmental policy is applied the welfare and environmental quality of these countries could be improved. Unlike Baumol (1971), Baumol & Oates (1988) and Anderson & Blackhurst (1992), Perroni & Wigle (1994) developing a general equilibrium model suggested that the trade has a weak effect on environmental quality.

Antweiler, Copeland & Taylor (2001) investigated the relationship between trade and environmental quality by considering the scale, composition and technique effects of trade. Later on, this work was developed by several studies (e.g. Dean, 2002; Cole & Elliot, 2003 and Frankel & Rose, 2005) with the help of some methodological and conceptual modifications.

Empirical evidences related to this topic are not conclusive. Lucas, Wheeler & Hettige (1992) investigating rapidly growing countries found that trade-distorting policies may increase pollution. Dean (2002), Antweiler et al. (2001) and Copeland & Taylor (2003) concluded that liberalization has a beneficial effect on the environment. Frankel & Rose (2005) indicated no evidence for a detrimental effect on the environment. Using standard and generalized OLS techniques, Feridun (2006) found that pollution is positively related to trade openness in Nigeria. Managi, Hibiki & Tsurumi (2009) indicated that trade benefit to the environment in OECD countries by using the instrumental variables technique. Kukla-Gryz (2009) estimating the Structural Equation Model in the developing countries suggested that international trade and per capita income increase air pollution. Baek, Cho & Koo (2009) analyzing developed and developing countries showed that the impact of trade on environmental quality is positive developed countries. They also showed that trade negatively affects environmental quality in most developing countries. Finally, in G-20 economies Baek & Kim (2011) found similar results with Baek et al. (2009) by using a CVAR framework.

It can be said that the empirical findings are different depending upon research methods, time and sample of the studies. These studies examine a long-run relationship between the variables by employing different estimation techniques. But, they do not conduct cointegration and causality analyses. Using the methods of panel unit root, cointegration and causality, the present study investigates the relationship between trade and environmental pollution. It does not consider decomposed effects of trade as in the studies of Managi (2004) and Frankel & Rose (2005). This study uses the panel unit root tests presented by Levin, Lin & Chu (2002); Im, Pesaran & Shin (2003) and Pesaran (2007). CIPS statistics developed by Pesaran (2007) takes into consideration cross-sectional dependency. Here, Breusch-Pagan (1980) and Pesaran (2004) LM tests are employed to investigate whether the variables or model have cross-sectional dependency.

This study uses Westerlund & Edgerton (2007) cointegration method based on a bootstrap test to test for the presence of the long-run relationship between the variables. It bases on the LM test developed by McCoskey & Kao (1998). This technique allows us for accommodating correlation within and between the cross-sectional units. The main characteristic of this test is to reduce the distortions of the asymptotic test. In estimation of the long-run cointegration vector, this study also