Special issue on “Growth and the environment”

George Halkos¹ · Shunsuke Managi^{2,3}

Published online: 24 February 2016

© Society for Environmental Economics and Policy Studies and Springer Japan 2016

Nowadays, the interrelationship between economy and environment becomes more prominent. Due to the fact that wants and desires are unlimited, and natural resources are mostly limited, we face the problem of scarcity. Economics studies the appropriate allocations of scarce resources, while Environmental and Natural Resource Economics refers to the interactions between humans and environment. To sustain a healthy and functioning environment over a long time period, sustainable economic development is required to satisfy the current demand and needs and at the same time to respect demand and needs of the future generations. This in turn requires that the satisfaction of human needs is achieved without the extinction of natural resources with no large increases of pollution and no irreversible environmental damage.

The concept of sustainable development attempts to combine economic and environmental goals. Sustainable development may be defined as a continuous improvement in the socio-economic standards, fulfilled by increasing its stocks of physical and human capital, as well as improving the standards of technology together with the health of the environment. To guarantee the sustainable

✉ Shunsuke Managi
managi.s@gmail.com

George Halkos
halkos@uth.gr

¹ Laboratory of Operations Research, Department of Economics, University of Thessaly, Korai 43, 38333 Volos, Greece

² Urban Institute and Departments of Civil Engineering, School of Engineering, Kyushu University, 744 Motoooka, Nishi-ku, Fukuoka 819-0395, Japan

³ QUT Business School, Brisbane, Australia

development of the economy, environmental degradation should not be increased with time but to be reduced or at least to remain constant.

The relationship between economic development and the environment always remains a controversial issue. Economic development is a function of technological improvements and increases in capital stock. Besides, economic development is associated with the increasing provision of energy and intensive uses of natural resources which have as consequences higher pollution levels and gradually less capacity of the environment to absorb wastes. On these lines, the environmental Kuznets curve (EKC) hypothesis relies on this idea and proposes that there is an inverted U-shaped relationship between environmental degradation and per-capita income. Empirical formulations of the environment–income relationship and the exploration of the EKC hypothesis rely on econometric specifications that consist of an environmental damage indicator as dependant variable. This indicator depends on an economic variable representing economic development like GDP/c in level, square and cubic values used as independent variables. Due to lack of data, different variables have been used so far in empirical modeling to approximate environmental damage like air pollutants (SO_x , NO_x , CO_2 , etc.), water pollutants (e.g., toxic chemicals discharged in water, etc.) and other environmental indicators (e.g., deforestation, municipal waste, urban sanitation and access to safe drinking water). The concept of the EKC hypothesis is discussed in some of the chapters of this book.

Having this in mind, the main goal of this special issue is to investigate interactions between economic development and the environment and their implications for moving toward a sustainable development. It also seeks ways and means for achieving sustainability. For this reason, the development and application of indicators, as well as the implementation of policies for sustainable development, are explored.

This special issue consists of 5 papers. The first study by George Halkos and Iakovos Psarianos begins with a brief presentation of the Neoclassical Model of Economic Growth and continues with the inclusion of two additional variables that affect welfare in opposing ways: pollution and abatement expenditures. The optimal steady-state conditions are derived allowing for a preliminary comparison of the resulting balanced growth paths under the criterion of welfare maximization with and without environmental externalities. Empirical findings with the help of balanced panel data test the validity of the inclusion of the environment in the neoclassical growth model approximating pollution abatement with the electricity production from renewable sources and pollution with carbon dioxide emissions.

As already mentioned, sustainable economic development is necessary to satisfy the current demand and needs of the society respecting demand and wants of the future generations. The second paper by Shunsuke Managi, Zheng Zhang and Shinya Horie, discusses the issue of the development of novel products to satisfy the desires and anticipations of matured consumers, as the main way that firms may adapt to survive in the increased international conflict. Creativity or innovative efforts may permit firms to compete quicker and in the direction they prefer. For this reason, this study evaluates a system of real options approach (ROA) to a biomimicry R&D project together with traditional R&D and environmental R&D

projects. Uncertainties in investment cost and cash flows of the new product in each project are considered and it is shown that investments on environmental and biomimicry methods will result to promising expectations in Asia.

The next paper relies on the concept of the EKC and the inverted U-shaped relationship between environmental degradation and per-capita income. Specifically, the fifth paper by David Stern and Donglan Zha examines the case of particulate concentrations finding an U-shaped EKC curve for PM pollution in Chinese cities. Traditional EKC and the growth rates methods are applied and the results are consistent across both methods.

The fourth paper by Charles Perrings considers the problems of overharvesting and marine systems' pollution. Due to technological improvement and the large increase in world population, the available limited natural resources are being used in a very intensive way. This had driven to overexploitation of natural resources with various problems for the environment like overfishing. The influence of institutions in each case is reviewed and the options for reform are discussed. This is really an innovative study describing the way economists take into consideration the economics of optimal extraction of marine resources together with optimality in wastes' discharge of these pollution externalities in marine systems.

Finally, the last paper by George Halkos and George Papageorgiou assumes that the environment offers at large two distinct different services. Specifically, environmental resources may serve as inputs to the production of conventional goods or service provided is the environment itself offering various amenities like clean air, blue coasts, clean rivers and lakes. The important difference between the uses of the above services is how environmental quality affected and how much is the environmental degradation. Hence, the main task of this paper is first to consider the management at which the social planner has to maneuver emissions in the best way optimizing both environmental quality and stock of pollutants dealing with the conflict between a representative polluting producer and representative environmental quality enjoyers which actually abates.