Environmental Engineering and Management Journal xxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxx
http://www.eemj.icpm.tuiasi.ro/; http://www.eemj.eu

"Gheorghe Asachi" Technical University of Iasi, Romania

IMPACTS OF DEMOGRAPHIC FACTORS ON CARBON EMISSIONS BASED ON THE STIRPAT MODEL AND THE PLS METHOD: A CASE STUDY OF SHANGHAI

Yan Li[1], Yigang Wei[2,3*], Dong Zhang[4*], Yu Huo[5], Meiyu Wu[2]

[1]Business School, Shandong University, Weihai, Shandong, 264209, China
[2]School of Economics and Management, Beihang University, Beijing, 100191, China
[3]Beijing Key Laboratory of Emergency Support Simulation Technologies for City Operations, Beijing, 100191, China
[4]The School of Humanities and Social Sciences (the School of Public Administration), Beihang University, Beijing, 100191, China
[5]College of Economics and Management, Tarim University, Xinjiang, 843300, China

Abstract

The heavy dependence on fossil-based energy and inefficient use of energy add to the relentless growth of carbon emissions in China, and also lead to an array of serious environmental pollution issues, such as haze and smog. This situation threatens the health of residents and the sustainable development of society. China has to face the huge pressure of carbon emissions from international and domestic societies. This study aims to investigate the demographic driving factors of carbon emission in Shanghai from 1996 to 2015. The Stochastic Impacts by Regression on Population, Affluence and Technology model (STIRPAT) and partial least squares (PLS) regression method are used. Results show several key findings. (1) Population age structure, occupation and education are significant driving forces for carbon emission. (2) Educational structure and population size positively and statistically significantly affect carbon emissions with elastic coefficients of 0.017 and 0.011, respectively. However, age, occupational and gender structures and population density have constraining effects. (3) Environmental regulation has achieved initial success in reducing carbon emissions, and its negative coefficient (−0.181) supports the Porter hypothesis. The effects of GDP per capita and energy intensity on carbon emissions are positive with elastic coefficients of 0.004 and 0.013, respectively. These findings contribute to a complete theoretical framework of the effects of demographic factors on carbon emissions. Concrete and viable policy recommendations are provided to improve urban emission abatement and progress of the low-carbon city.

Key words: carbon emission, demographic factors, PLS regression, STIRPAT model

Received: June, 2019; Revised final: February, 2020; Accepted: April, 2020

* Author to whom all correspondence should be addressed: e-mail: weiyg@buaa.edu.cn, dzbuaa@sina.cn; Phone: +86(010)82319337