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ESTIMATING THE EFFECTS OF URBANIZATION ON CARBON EMISSIONS: EVIDENCE IN THE PHILIPPINES

INTRODUCTION

Urbanization, or the social and economic modernization of metropolitan cities (Poumanyong & Kaveko, 2010), has obtained unprecedented growth. As an inevitable phase of globalization, it has fuelled society's consumption patterns, alongside incessant technological development. Mass production and industrialization, the primary thrusts of the global market, require consumption of non-renewable resources arising from the increase in energy usage. These centers of production are concentrated in urban, highly populated areas. This phase of progress, however, comes at the expense of environmental quality. Levels of carbon emissions are concentrated in areas with high population density. This hampers the natural flow of the ecosystem and a sustainable environment might not be efficiently maintained. As a result of this trend, increase in the density of carbon emissions might potentially harness catastrophic impacts in the future.

The global carbon emission levels have increased twofold from 1960 to 2007 (World Bank, 2011). Furthermore, Martinez-Zarzoso and Maruotti (2011) found that middle-income to low-income developing countries account for more than half of such emissions. In the Philippines, the carbon emission levels depicted unclear trend from 1970 to 2007 although the overall increase from the same time period showed that such emission levels have grown three-fold (World Bank, 2011). A 2009 estimate ranked the Philippines 47th in the world and 15th in Asia with 72.4 million tonnes of carbon emissions, a 2.9 percent decrease from the 2008 estimate (Yale University, 2010).

Queries regarding how policy makers can induce environmental sustainability and international concern on global warming amidst industrialization efforts still remain. The delicate balance between pursuing economic growth and the mounting concern over the environment is at stake. Numerous variables influence the occurrence of emissions, including trade (Mongelli, Tassieli, & Notarnicola, 2006; Halicioglu, 2009; Yunfeng & Laike, 2010 and Nasir & Rehman, 2011), income inequality (Padilla & Serrano, 2006), and population growth (Cramer, 2002 and Shi, 2003). The impending matter to consider in this phenomenon is the compounded effect of multiple factors that construe population.

Written by
Jerome Abesamis
Jumel Carlo Campos
Cecille Castell
De La Salle University

Dietz and Rosa (1997) first formulated the Stochastic Impacts by Regression on Population, Affluence, and Technology (STIRPAT) Model, focusing generally on the effects of population on carbon dioxide emissions. Population (P), affluence (A) or economic activity per person, and the environmental impact per unit of economic activity or technology (T) were the basic foundations of this model.

Despite extensive measures to improve sustainable consumption and production processes, CO2 emission levels and the urban population are projected to rise rapidly, hence becoming a major environmental threat. The main focus of the problem that shape economic analysis should be the alleviation of carbon emission density through measures concerning population moderation.

In this context, the study examined the effects of the increasing urban population on carbon dioxide emissions using the Classical Linear Regression Model (CLRM) and the STIRPAT model developed by Martinez-Zarzoso and Maruotti (2011). It was inferred that increasing urban population had a significant effect while technology and affluence were found to be insignificant determinants. This could be attributed to the human input factor of the model.

DEVELOPMENT OF LEGAL FRAMEWORKS

Policies towards supervising carbon dioxide emissions heavily rely on existing environmental laws. Efforts must be geared towards effective implementation of laws such as the Republic Act (RA) 8749 or the Philippine Clean Air Act of 1999. As what the RA 8749 endorses, government regulation should focus on pollution prevention rather than merely controlling and providing a comprehensive management program on air pollution. Another purpose of the existing act is to inform people and get them involved in designing initiatives for air quality planning. Incentives can be given to encourage the public to actively participate in such activities.

To intensify public participation in government programs, efforts must be made to increase public awareness. Again, this can be done by proper implementation of existing laws such as RA 9512 or the Environmental Awareness and Education Act of 2008.

This law aims to educate the public with environmental issues and problems that society faces and the best practices that can be implemented to avoid further degradation. Environmental laws are introduced to make the public aware of existing policies being realised by the government.

Although contribution to carbon dioxide emission is relatively higher in urbanized areas, development cannot be hindered. Development of a locality cannot be completely stopped to lessen emissions; hence, a compromise must be made. This means that urban planning must also partake in environmental planning. This move will require the employment of environmental planners. The problem is that existing laws which regulate the profession of environmental planning have become obsolete with the development of new technologies. The solution to this problem is to pass new laws or amend existing laws pertaining to the issue.

Bills that can be helpful to this cause, that are currently pending, are the Senate Bill (SB) 3138 or the Environmental Planning Act of 2012 and House Bill (HB) 228 or the New Environmental Planning Act. Both bills recognize the importance of environmental planning in the development of the country while trying to regulate environmental degradation. Another commonality is the fact that both emphasize the importance of employing and developing world-class and globally-competitive environmental planners themselves. The HB 228, on the other hand, recognizes that the existing laws regulating environmental planning are now obsolete, and there is a need to revisit and revise them.

Another existing bill which recognizes the limitation of the existing environmental laws is SB 1896 or the New Sanitary and Environmental Engineering Law of 2007. This bill aims to target specific professionals such as sanitary engineers, environmental engineers and sanitarians as the beneficiaries of further training and education pertaining to environmental pollution.

Aside from laws regulating environmental degradation, another important factor, the increasing population in urban areas that contribute to carbon emissions, should be considered. The implementation of the Reproductive Health bill plays a vital role in trying to regulate population growth. The debates and attention given to the bill may prove to be a progressive step. Research conducted in line with the bill should not only focus on the effects of population with respect to poverty and family income, but also environmental degradation and its major effects.

DEVELOPMENT OF URBAN-RURAL AREAS

The concentration of population in urban cities remains one of the robust contributors of carbon emissions. This may be attributed to the lack of opportunities in rural areas. Balisacan, Edillon and Piza (2005) stress the importance of policy, investments and institutional reforms as key factors to improve rural living.

The government should initiate reforms by enticing investors to operate in rural areas. Additional Special Economic Zones (SEZ) should be aggressively pursued to facilitate rural employment and economic growth, specifically in the agribusiness sector where the Philippines may derive a competitive advantage in. As Arangkada Philippines (2010) highlights, agribusiness is one of the seven progressive sectors that the country should focus on. The government should increase their efforts in attracting more local and international trade partners for these businesses to prosper. Improvements in infrastructure facilities should also be underlined for investments to flow. This may contribute to rural development where people could gain better access to public services. Enhanced research and development still remains a critical factor for improved agribusiness operations, production, and yield.

The universities and colleges in these areas should also offer degrees that are geared towards a career in the agribusiness sector. Arangkada Philippines (2010) suggests the promotion of agricultural education and training programs which focus on harnessing entrepreneurial skills among students.

The Commission on Higher Education (CHED) together with the Department of Agriculture (DA) and the private sector should work with these universities in offering programs to undergraduate students and developing a solid agribusiness curriculum.

These solutions contribute to less carbon emissions in two ways. First, with more agribusiness activities, more crops and trees are planted, leading to higher oxygen levels and lower carbon dioxide concentration in the atmosphere. Second, it entices people to settle in rural areas which can curtail not only the population concentration in urban areas, but also its carbon dioxide emissions. Aside from the environmental benefits, these solutions are also potential drivers of growth and development not only in the rural setting but also for the entire economy.

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CONTACT INFORMATION

DLSU - Angelo King Institute
Room 223, St. La Salle Hall
2401 Taft Avenue
1004 Manila

Angelo King International Center
Corner of Arellano Avenue and Estrada Street
1004 Manila

+63-2-524-4611 loc. 287,
+63-2-524-5333, +63-2-5245347 (Fax)