

# ***ASPECTS OF GOVERNANCE AND CO<sub>2</sub> EMISSION: A NON-LINEAR ANALYSIS***

Yashar Tarverdi Mamaghani, Business School, the University of Western Australia, Address: M251, 35 Stirling Highway, Crawley, WA, 6009, Australia. Phone: +61 8 6488 5650 – Fax : +61 8 6488 1061- Email: yashar.tarverdi@uwa.edu.au

## **Overview**

CO<sub>2</sub> emission has been at the centre of worldwide debates on environmental issues. While, there is some controversy on the role of developed and developing countries on CO<sub>2</sub> emission reduction, its inclusion as one of the Millennium Development Goals (MDGs) has changed the “*rules of the game*”. Since, the introduction of MDGs in 2000, achieving MDG has been one of main eco-political policies of nations. One the main “*recipes*” by the World Bank to achieve a higher position toward MDGs has been to undertake reforms toward better governance (i.e. good governance), and consequently these reforms have been a key criteria for financial aid allocation from both the World Bank and developed countries. Governance is a multi-dimensional concept. While, the focus of the bulk of previous research has been on one single aspect (dimension) and its relationship with the environment, some studies (Pellegrini and Gerlagh, 2006; Fredriksson and Millimet, 2001) have also simultaneously considered two aspects of governance. However, these studies have ignored the multidimensionality of governance, and their focus has been on the impact of governance aspects on policy adoption rather than real and practical variables.

In this paper, we contribute to previous research by focusing on the role of several governance aspects (such as rule of law, corruption, voice and accountability and so on) on CO<sub>2</sub> emission reduction. This provides us with a more direct measure of the impact of governance on emissions, relative to previous research which have focused on the indirect transmission of this process. Also our study contributes to the relevant literature by expanding the model selection through exploring the relationship in panel data settings.

## **Methods**

To address the main research question in this study, we use Ordinary Least squares panel data analysis with two -way fixed effects. In two-way fixed effect models we control for both the unique characteristics of countries and time periods in our estimation. For achieving a better estimation of our parameters we also consider a set of control variables which have been used in relative studies. Our main data source is the World Bank database which provides comprehensive data covering about 120 countries in the time period of 15 years. In our model CO<sub>2</sub> emissions per capita is dependant variable and six Worldwide Governance Indicators (six aspects of governance) are our key independent variables.

In this paper first we create a proxy variable for governance as a whole concept, using Principal Component Analysis and explore the relationship between governance as a whole concept and CO<sub>2</sub> emission. Secondly, establishing the general linkage, we study the effects of various aspects of governance both individually and collectively. Finally, after finding the effective aspects we test for non-linearity and interaction between different governance aspects.

## **Results**

In keeping with previous research, our analysis finds a strong negative effect of governance on per capita CO<sub>2</sub> emissions. Our main findings can be summarised as follows: (i) we show that the impact of whole governance on per capita CO<sub>2</sub> emission increases at a decreasing rate after a threshold, -1.60 governance proxy, is reached; (ii) two of our six different governance aspects (namely control of corruption, voice and accountability) influence CO<sub>2</sub> emission; (iii) The effects of political stability and others disappear after controlling for serial correlation and heteroskedasticity and finally, (iv) our results suggest that there is a non-linear relationship between control of corruption and CO<sub>2</sub> emission which is not the same for the variables voice and accountability. The results imply a non-monotonic affect, that is before -0.667 value of control of corruption index, the additional effect of control of corruption on CO<sub>2</sub> emission per capita is positive, while after this threshold it is negative. (v) Interestingly, by considering the non-linear impact of control of corruption in our model, the effect of voice and accountability disappears. (vi) However, our results also showed that the interaction between the two variables, voice and accountability and control of corruption has no statistically significant influence on change in CO<sub>2</sub> emission per capita.

## **Conclusions**

In this study we show that the control of corruption is the most significant governance factor that can reduce the CO<sub>2</sub> emissions. Although governance as whole will have some impact on per capita CO<sub>2</sub> emission reduction, our analysis finds that there is a threshold level of control of corruption which contributes to per capita CO<sub>2</sub> emission reduction, and after this point the negative effect of control of corruption on CO<sub>2</sub> emission decreases.

## **References**

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