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Impact of Government Size on Environmental Quality

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ABSTRACT

Providing public goods and correcting externalities of market operation are reasons of government interfere in economy. Environmental quality is a pubic good and can be used as index for social welfare, so in this study examined the impact of government size on the environmental quality as a public good and society welfare in the Caspian Sea countries. For this aim used the data of government expenditures (consumption and investment), GDP per capita, openness and co_2 emission. For estimate the relationship between variables used panel data approach. Results show that relationship between government expenditure and co2 emission is negative, so, government expenditures have positive relationship with air quality, economic growth has a negative effect and impact of openness is ambiguous. The relationship between government expenditures and air quality indicates: first, government has a correcting effect on the externalities of market operations .Second, government has a positive impact on supply a public good namely air quality.

Key words: Environmental Quality, Government Size, Caspian Sea, CO2 Emission, Panel Data,

Introduction

Economic growth inevitably brings with it an increase in the use of natural resources, be it fossil fuels, metals or just the use of our atmosphere as a sink for CO2 and other pollutants. For ecological reasons it is simply not possible to continue with the existing type of growth for another century or so without disastrous consequences. Even if from now on there were no GDP growth in the world, the existing structure of production and consumption would not be sustainable. There are two key areas of importance: global warming and a scarcity of natural resources .

The world's temperature is getting warmer. There is no doubt that the world temperature has increased very rapidly in the past century and the warming process has accelerated in recent decades. And there can also be no doubt that this development will become very costly for humankind and the world economy. Scientists say's that an increase in global temperature of more than 2ºC will create huge and even incalculable costs. If no actions are taken, the report argues, 5 per cent of global GDP will be lost every year, now and forever. (Stern, 2007); Green New Deal Group, 2008))

The negative effect may be more dramatic than what is thought today to be the most likely outcome. Recent years have deepened the understanding that a number of effects that have historically not been predicted can lead to a cumulative non-linear increase of world temperature. For example, higher temperature will drive more carbon dioxide in the atmosphere as drying soils, dying forests and warmer oceans release more gas. (Stern, 2007)

Most of the increase in greenhouse gas emission comes from an increased global population and output growth in developing countries. CO2 emissions increasing most markedly after the 1980s. This means that, under present conditions, any catching up in GDP per capita by developing countries leads to an unsustainable, strongly accelerating trend in CO2 emissions. In addition, population growth in developing countries is still substantial (Stern, 2009).

According to the International Energy Agency, annual energy-related CO2 emissions in developed countries have increased between 1980 and 2010 only modestly from a level of ten billion tons, and will probably reach 15 billion tons in 2030. The CO2 emissions of transition countries stagnated at a level of around four billion tons, and this trend will probably continue over the next 20 years. However, it is estimated that developing countries have increased their CO2 emissions from four billion tons in 1980 to over ten billion tons in 2010, and this will grow to 20 billion tons in 2030 (International Energy Agency, 2006).

Today, the concentration of CO2 in the atmosphere is around 430 ppm, and in 2015 it will be around 450 ppm. if concentration of 500 ppm would already be dangerous. With a 95 per cent probability, the temperature then will be more than 2ºC higher than in 1850, with a 3 per cent chance that warming will be above 5ºC. In comparison, from 1850 until today, global average temperature has increased by only 0.8ºC, a rise which was itself extremely fast in historical perspective. Many scientists argue that an atmospheric concentration of 500 ppm of CO2 would in fact be much too dangerous and recommend bringing the level down to 400 ppm.

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The problem with global warming is not only higher temperature as such. Water has the biggest effect. The expected events are not only extreme weather conditions like droughts and floods, but also the melting of the polar ice and a rise in the sea level (in some scenarios by seven metres). Natural disasters, lost land by rising sea level and desertification of large areas will unavoidably lead to a new wave of migrations and to economic and political disturbances (Dullien *et al*, 2010).

So, Sustainable development has become one of the most popular catchwords on the world's policy agenda. Almost all governments have committed themselves to sustainable development by integrating economic welfare, environmental quality and social coherence.

The environmental sustainability of a country / region is generally influenced by a number of factors. The literature on environmental sustainability has focused on several routes through which growth-environment process in a country could be affected:

First, the Environmental Kuznets Curve (EKC) hypothesis focuses on the relationship between income level of a country (as measured by per capita income) and its environmental quality, indicating that growing income level beyond a threshold might be associated with the demand for better environment and consequent adoption of superior governance (e.g. better pollution abatement practices). Second, the Pollution Haven Hypothesis (PHH) looks into the possibility of environmental degradation in a country owing to trade-investment nexus, i.e., whether the FDI flow in a country is directed more towards the pollution-intensive sectors and influencing the production pattern negatively. Third, the Natural Resource Curse Hypothesis (NRCH) proposes a negative relationship between natural resource endowment and growth scenario in a country (Mukherjee and Chakraborty, 2010).

The level of CO2 emissions from developing countries has been rapidly exceeding that of the developed countries. Therefore, greenhouse gases and related environmental challenges seem to be of major issues of the present century. The main greenhouse gas in terms of quantity is CO2 emissions.

The increasing volume of CO2 emissions due to expanding and widening of the process of industrialization and the consequent urbanizations all over the world are a determinant factor of the ascending greenhouse threats. So, the study and the survey of these aspects are of great importance for all societies from developing to developed countries.

Halting the ongoing process is of special importance. Specification of eventual relations between greenhouse gases CO2 emissions and the level of the growth of national revenue has a great traditional economic signification.

a large number of empirical study examined the relationship between economic variables and environmental quality, some selected studies are coming below.

Copeland and Taylor (2001) examined how openness to international goods markets could affect the sulfur dioxide concentrations. The results showed that freer trade appears to be good for the environment. Yang (2001) using the Taiwan's social accounting matrix of year1996, examined the impact of trade liberalization on carbon dioxide emissions. The results showed that trade liberalization increases total carbon dioxide emissions.

Cole, Elliott and Shimamoto (2006), used Japanese firm-level data identified the factors that influenced the environmental management of Japanese firms. Their results indicate that, there is seemingly positive effect of exports and Foreign Direct Investment (FDI) on environmental management. Shui and Harriss (2006) studied the quantity of CO2 emissions that embodied in US - China trade. Their estimation shows that 7% to 14% of China's current CO2 emissions are the results of producing goods for export to the USA. Managi, Hibiki and Tsurumi (2009) by using the technique of instrumental variables, studied the relationships between trade openness and the environment quality in OECD and non-OECD countries. They found that beneficial effect of trade on the environment varies depending on the pollutant and the country. Trade has improved the environment quality in OECD countries. However, it has had a detrimental effect on sulfur dioxide (SO2) and carbon dioxide (CO2) emissions in non-OECD countries.

Fotros and maaboudi(2011) studied the relationship between trade openness and CO2 emissions in Iran. they found that trade openness has significant positive impact on the CO2 emissions.

Jafari Samimi, Ghaderi and Ahmadpour (2011) studied relationship between environmental sustainability index and economic growth in developing countries. They found an inverted-U curve regarding the relationship between environmental sustainability and economic growth.

Main objective of macroeconomic stabilization and fiscal policy of public sector is to provide another cornerstone of social well-being and sustainable economic development, namely high quality of environmental goods and services. Because of external effects involved and their public good character, environmental goods and services often do not enjoy an economically efficient level of financial support by private markets. Thus, governments have the indispensable responsibility to finance environmental public goods and correct external effects.

The purpose of this paper is to examine examined the relationship between government size and the provision of a particular, public good, namely environmental quality in Caspian Sea countries so, In the next

section introduced data and method. Section 3 investigates the relationships between CO2 emissions and other variables, and Section 4 offer conclusions.

Materials and Methods

Data:

In this study air quality is applied as a measurement of environmental quality and used CO2 emissions (kt) as an indicator for air quality. Co2 emission selected as a measurement for environmental quality because: first, air quality is widely regarded as one of the most important environmental quality indicators (Bernauer and Koubi, 2006). Second, the emissions of Green House gases is a serious issue in the air pollution and world warming and among the Green House gases CO2 has the highest proportion, and third, Green House gas in the atmosphere described by CO2 equivalent (IPCC ,2007).

To examine the impact of government expenditure on environmental quality used Government Consumption expenditure (GC) and Government Investment expenditure (GI) as a percentage of GDP.

Other economical variables that applied in this article are trade openness and GDP per capita as a measure for domestic production. These variables selected based on economic theory and other empirical study (see introduction). Trade openness is the sum of import and export as a percentage of GDP.

Sample countries are Iran, Turkmenistan, Kazakhstan, Russia, and Azerbaijan. Data are gathered from WDI during the period 1992-2007.

Method:

For estimation the relationship between variables based on equation no.1:

$$co2 = c_1 + c_2\ gdp + c_3\ gi + \ c_4\ gc + c_5\ \ open + \ \varepsilon_t \qquad (1)$$

To select the model first must identify that data are pooled or panel. If data are pooled data then we can use Ordinary Least Square (OLS) to estimate the relationship between variables, but, if data are panel data we must use panel data approach (fixed or random effect model).so first must identify the type of data. To this aim used Chow Test (Baltagi,2005).

Chow Test is a test between pooled data and fixed effect panel data. Null Hypothesis indicates that data are pooled. If Null Hypothesis rejected then must test between fixed effect and random effect of panel data approach, and for this purpose applies Hausman Test.(Hasio, 2005).

In Hausman Test Null Hypothesis indicates that random effect model must be employed. So, if Null Hypothesis rejected fixed effect panel data must applied, and if accepted, random effect panel data must applied (Green, 2003)

Results and Discussion

To find the relationship between variables first use Chow Test, result of Chow Test indicates that data aren't pooled data. Result of Chow test shows in table(1) and figures.1.

Table 1: result of Chow Test

Null Hypothesis	F-Statistics	Probability	Result
Data are pooled data	622.816707	0.000	Null Hypothesis rejected

Then use Hausman Test to select between Fixed and Random effect. Results of Hausman test shows that fixed effect panel data must apply to find the relationship between variables. Result of Hausman Test shows in table (2) and figures.2.

Table 2: result of Hausman Test

Null Hypothesis	F-Statistics	Probability	Result
Random effect	2491.27	0.000	Null Hypothesis rejected

Results of estimation equation (1) with Fixed Effect Panel data approach shows in table (3).

Results shows that, in Caspian Sea Countries, in the period of 192-2007, government consumption expenditure and government investment expenditure have significant negative relationship with co2 emission, GDP have a significant positive relationship with co2 emission, and trade openness have a insignificance negative relationship with co2 emissions

Table 3: result of Fixed Effect Model

Variables	t-Statistic	Probability
GDP	267.81	0.000
GC	-10389.5	0.000
GI	-9915.2	0.011
OPEN	-46099.8	0.334
F	89822	
R^2	0.99	

Conclusions:

Results show that relationship between government expenditure and co2 emission is negative, so, government expenditures have positive relationship with air quality.

The relationship between government expenditures and air quality indicates: first, government has a correcting effect on the externalities of market operations .Second, government has a positive impact on supply a public good namely air quality.

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