The relationship between national wellbeing and concern for the environment

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ABSTRACT

This paper examines the relationship between national wellbeing and concern for the environment based on a sample of 147 nations in 2016. National wellbeing is measured by the United Nations Development Programme's Human Development Index (HDI), and concern for the environment is measured by the Environmental Wellbeing (EW) component of the Sustainability Society Index (SSI) created by the Sustainability Society Foundation. Other variables included in the analysis for control purposes capture the impact of economic, political, and demographic factors on national wellbeing. After controlling for the effect of these variables, it was determined that there is a significant positive relationship between concern for the environment and national wellbeing.

Keywords: sustainability, Human Development Index, Environmental Wellbeing, Sustainability Society Index, United Nations Development Programme, environmentalism

INTRODUCTION

In 2020, the United States will celebrate the 50th anniversary of Earth Day. The creation of Earth Day marks the beginning of the modern environmental movement in the United States, which ultimately led to the creation of the Environmental Protection Agency, passage of Clean Air and Clean Water legislation, and the promotion of environmental awareness and concern (www.earthday.org, 2019). A survey undertaken by the Pew Research Center in 2016 found that the majority (74%) of adults living in the United States are supportive of legislation and regulations to protect the environment (www.pewresearch.org, 2017). Furthermore, according to a 2017 poll conducted by Gallup, 62% of Americans believe that the US government should do more to protect the environment (news.gallup.com, 2017).

Concern about environmental issues is not limited to the United States. According to a 2015 poll performed in 40 nations by the Pew Research Center, more than half of the respondents revealed that they consider climate change to be a very serious problem, and the same poll showed that 78% of those polled supported legislation to reduce greenhouse gas emissions (www.pewresearch.org, 2015). Additionally, ComRes undertook a survey in 8 countries for The Global Challenges Foundation in 2017 and found that 56% of those responding considered climate change to be the global risk requiring the most urgent response (www.globalchallenges.org, 2017) by policymakers.

However, concern for the environment is not universal. There are those who believe that the impact of climate change has been overstated (Lewis and Curry, 2018), or that it is a fiction (www.npr.org, 2019). It has also been argued that the environment is more robust than many think, and therefore the impact of climate change will not be as severe as predicted (Avery and Singer, 2007). These views are not considered in this paper.

It has been suggested that environmental legislation and regulation could have a negative impact on wellbeing. Actions to protect the environment could result in reduced output, fewer hours worked, lower wages, and therefore reduced employment and income. Additionally, resources devoted to the environment may crowd out expenditures on health and education, to the detriment of wellbeing.

The purpose of this paper is to investigate the relationship between national wellbeing and concern for the environment. There are other factors that influence national wellbeing, and they are included in the analysis as control variables. These variables consider the economic, political, and demographic characteristics of the nations in the sample. After controlling for these variables, it can be determined if a relationship exists between national wellbeing and concern for the environment.

The remainder of the paper contains a literature review and a discussion of the model, variables and the regression results. A conclusion and recommendation summarize the findings.

LITERATURE REVIEW

The link between pollution and economic wellbeing was initially proposed by Grossman and Krueger (1991) when they examined the impact of NAFTA on the environment. They find an "inverted U relationship" between certain pollutants and per capita GDP. This Environmental Kuznets Curve (EKC), as the relationship has come to be called, links higher incomes to better environmental conditions once some pivotal point of income is reached. Over the last twenty years, results show that this relationship is not very robust and depends, in part, on the sample

period, the pollutant and model specification. As Boucekkine, Pommeret and Prieur (2013) note, the relationship is more likely to be found for "local and flow pollutants" like sulfur dioxide, but the EKC is less likely to found when using "stock pollutants" like carbon dioxide. Plus, there is no agreement on what income is associated with the turning point in the relationship.

Coincident with Grossman and Kreuger's initial paper, other work started to examine the impact of the stock pollutants and climate change and their relationship to several factors. Schelling (1992) proposes that the macroeconomies of the United States, Japan and Western Europe are not likely to experience a significant impact on health due to climate change. However, the populations of less-developed countries will be more susceptible to climate change given their dependence on agriculture and other outdoor activities. As a result, Schelling notes that the payoff to controlling climate change is less valuable to the prior group. Cline (1992) examines climate change in a cost and benefit framework, and unlike other contemporaneous work, takes a long-run perspective of over 200 years. This perspective, which estimates economic damage from climate change suggests that richer economies have much to lose. Nordhaus (1993) analyzes several estimates of the annual financial impact of climate change on the U.S. noting that they range from a loss of $0.7 billion to a gain of $2 billion. Like Schelling, Nordhaus notes that the financial impact on developing countries much more difficult to assess, but undoubtably the impact will be more severe. Holtz-Eakin and Selden (1995) examine the relationship between CO_2 emissions and economic growth showing that as incomes increase (as measured by GDP per capita), a diminishing marginal propensity to emit (MPE) occurs. They also note that because poorer economies account for large amount of CO_2 emissions, these emissions will continue to increase because they have high MPEs. This stream of literature suggests no clear relationship between an economy's environmental status and its overall well-being.

Smit and Pilifosova (2001) offer another perspective on macroeconomies and their relationship to the environment by examining the determinants of a country's "adaptive capacity" to deal with climate change. The paper notes that this capacity is "likely to be greater" given a healthy economy, more stable government, better access to technology, strong social institutions, climate change awareness and sustainable development. Furthermore, the paper highlights the importance of how these relationships are enhanced with a country's promotion of improved education and reduction in poverty.

In more recent years as measures of these country-wide variables have been developed and refined, research has turned to estimating the relationship between a country's wellbeing and its environmental performance along with other factors that are related to adaptive capacity. For example, Sasimi et al (2011) use a modified HDI and find a positive relationship between human development and environmental performance, including a sub-sample for developed countries. Abelinde (2012) also finds a positive link between a country's EPI with wellbeing (measured with the HDI) and better governance.

As noted earlier, there is an opportunity cost of supporting economic wellbeing. In a twist on the previous literature, this paper considers similar variables but examines whether an economy's focus on the environment (as measured by the EPI) impacts its economic wellbeing. As Barro (1991) notes, economic growth is inversely related to government consumption. He proposes that the government's consumption funded by taxation creates "distortions" that negatively impacts economic growth. As early as 1992 when he proposed a multilateral approach to address greenhouse gas emissions, Schelling recognizes the (unequal) impact that taxes and regulations can have on the more developed economies. As Smit and Pilifosova note, the

economic costs and benefits of adaptive capacity are also difficult to quantify. While greater adaptive capacity leads to reduced negative impacts of environmental degradation on wellbeing, the costs of achieving this adaption could be especially higher in countries with "limited" adaption options. If these countries work to improve their ability to address their vulnerable environmental situation, they face limitations "beyond their infrastructure and economic means" (IPCC, 1998). To achieve this adaptability, could government policies that promote a greener environment hamper economic wellbeing?

MODEL, VARIABLES, AND DATA

A model was constructed to explore the relationship between national wellbeing and concern for the environment, after controlling for economic, political, and demographic influences. The dependent variable of the model, national wellbeing, was measured using the Human Development Index (HDI). This is a composite index number created by Mahbub ul Haq for the 1990 World Development Report, a publication of the United Nations Development Programme (www.measureofamerica.org, 2019).

The purpose of the HDI is to provide a broader measure of wellbeing than a narrowly focused economic measure such as GDP per capita. It is an index number that is composed of three elements thought to be important attributes of a nation's wellbeing: per capita income, life expectancy, and educational attainment. A separate index number is calculated for Gross National Income per capita, life expectancy, and educational attainment, and the HDI is the geometric mean of these three indices.

The primary independent variable of interest is the Environmental Wellbeing (EW) component of the Sustainable Society Index, created by the Sustainable Society Foundation (SSF). The SSF is a private organization that created and publishes the Sustainable Society Index (SSI), a composite index number that is composed of three elements: economic wellbeing, environmental wellbeing, and human wellbeing (www.ssfindex.com, 2019). Only the environmental wellbeing index is used in this paper.

The environmental wellbeing index has two major components. The first is natural resources which includes information about a nation's forest area (reduction over time and percent of land area that is protected), water usage (the percent of water used that can be replenished), and the difference between a nation's ecological footprint and carbon footprint, referred to as consumption. The second major category is climate and energy. It has 4 elements: energy usage per capita, the change in energy usage over the previous 4 year period, CO_2 emissions per person per year, and the percentage of total energy consumption that comes from renewable sources (www.ssfindex.com, 2019).

The Heritage Foundation's Economic Freedom Index (EF) summarizes the level of economic freedom in the countries included in the sample. This index is composed of 10 elements thought to be important determinants of economic freedom: property rights, freedom from corruption, fiscal freedom, government spending, business freedom, labor freedom, monetary freedom, trade freedom, investment freedom, and financial freedom (www.heritage.org, 2016). It is hypothesized that greater economic freedom should positively impact the HDI through the GNI per capita component.

It is possible that the HDI is also affected by a nation's political system. Of particular interest is the level of political freedom exhibited by the nations in the sample. Every year the non-governmental organization Freedom House calculates a political freedom index number (PF)

for all the nations in the world. This index number is centered on a nation's civil liberties and political rights, and is based on 4 elements of its political system: the existence of a multiparty system, universal adult suffrage (excluding criminals), fair and regular elections with secret voting, and the ability of all parties to access the media to facilitate open campaigning (www.freedomhouse.org, 2016). It is theorized that political freedom should be positively related to national wellbeing.

The final control variable is a nation's total fertility rate (TFR). A nation's TFR is an estimate of the number of children the typical woman in this nation would be expected to have if she survives from birth through the end of her reproductive life, based on the nation's age specific fertility rate (www.measureevaluation.org, 2019). The TFR is the standard measure used to compare fertility levels across countries (Spoorenberg, 2015). It seems probable that a high fertility rate will negatively impact the HDI, particularly the GNI per capita component.

Data were collected on HDI, EW, EF, PF and TFR for 147 nations in 2016. The Heritage Foundation, Freedom House, and the Sustainability Society Foundation were the sources for the data on EF, PF, and EW respectively. The HDI data were obtained from the UN's Human Development Programme, and the TFR data were provided by the World Bank.

Table 1 in the appendix lists the descriptive statistics for these variables. The table includes the mean, median, standard deviation, maximum and minimum values for the variables.

Multiple regression was used to estimate the parameters of the model, and then the appropriate statistical tests were used to evaluate both the overall model and the coefficients of the independent variables. Additionally, the variance inflation factor (VIF) was calculated for each independent variable in the model to determine if multicollinearity was an issue. Finally, the White test was used to test for the presence of heteroscedasticity.

RESULTS

The detailed multiple regression results for the model developed to investigate the relationship between HDI and EW, EF, PF, TFR can be found in Table 2 (Model Summary) and Table 3 (Coefficients) in the appendix. The summary statistical measures ($F = 311.8$, $p = 0.000$, adjusted $r^2 = 89.49\%$) show that the model has significant explanatory power. Two of the three control variables were found to have a statistically significant relationship with the HDI, EF ($t = 4.99$, $p = 0.000$) and TFR ($t = -8.70$, $p = 0.000$). Furthermore, the sign of the estimated coefficients agree with expectations. The sample data suggests that PF ($t = -1.33$, $p = 0.186$) is not related to the HDI at any reasonable level of significance.

The evidence from the sample indicates that there is a positive significant relationship between EW ($t = 11.15$, $p = 0.000$) and the HDI, after taking the influence of the control variables into consideration. The hypothesis that a relationship exists between national wellbeing and concern for the environment is supported by this result.

The variance inflation factor (VIF) was calculated for each independent variable in the model to determine the severity of multicollinearity. These VIFs can be found in Table 3. Multicollinearity is a common problem in social science research, and the question is not the presence of multicollinearity, but rather its severity. A conservative view is that if there are any variables with VIFs greater than 4, multicollinearity is a concern (O'Brien, 2007). The largest VIF in this analysis is 3.23, and no corrective action is required.

The White Test was used to test for heteroscedasticity. The results of this test ($\chi^2 = 15.03$, $p = 0.3759$) indicate that the homogeneity of variance assumption is satisfied.

CONCLUSIONS AND RECOMMENDATIONS

Based on the results of this analysis, concern for the environment does not appear to result in a reduction in national wellbeing, in fact the opposite seems to be true. A likely explanation is that for countries at a low level of development, the primary concern is increasing living standards, life expectancy, and educational attainment. Until these most basic needs are met, it may be considered wasteful to devote resources to improving the environment. More importantly, the tax policies and environmental regulations legislated in more developed countries do not seem to negatively impact economic wellbeing as measured by the HDI.

It is possible that the results of this research depend on the variables used in the model and its specification. It may be that using a different measure of national wellbeing and a different mix of independent variables could result in a different conclusion.

Another point to consider is that the variables used in this analysis have been around for a long time. For example, the HDI has been calculated since 1990. The same is true for the other variables in the model. Since there have been few changes in the methods used to calculate these indices, a logical extension of this research would be to do a study using panel data. Finally, it might also be useful to consider the change in income inequality in this panel study to capture the unequal effects of climate change on varying income levels.

APPENDIX

Table 1: Descriptive Statistics

Variable	Mean	Median	Std. Dev.	Minimum	Maximum
HDI	0.72	0.75	0.16	0.35	0.95
EW	69.26	70.84	14.68	37.10	90.68
EF	61.08	61.01	10.10	29.79	87.78
PF	59.83	63.00	28.09	3.00	100.00
TFR	2.69	2.10	1.37	1.20	7.20

Table 2: Model Summary

F Statistic	P-Value	Adjusted R^2
311.68	0.000	89.49%

Table 3: Multiple Regression Coefficients

Variable	Estimated Coefficient	T-Ratio	P-Value	Variance Inflation Factor
Constant	0.27	5.52	0.000	NA
EW	0.006	11.15	0.000	3.23
EF	0.003	4.99	0.000	1.89
PF	-0.003	-1.33	0.186	1.93
TFR	-0.043	-8.70	0.000	2.58

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