

Ava Langford

Jesse Green

Independent Study & Mentorship

13 November 2024

**Subject:** The Economic Effects of Climate Change

**MLA Citation:**

Tol, Richard S. J. "The economic effects of climate change." *Journal of economic perspectives* 23.2 (2009): 29-51.

**Assessment:**

I researched the economic effects of climate change for background information for my original work, which aims to investigate the impacts of climate change on local and global economies. Through the paper, I discovered how global economies benefit or suffer from climate change and subsequent policies.

The most commonly known gases that cause climate change are methane and carbon dioxide, according to Tol. Methane is emitted in the production of beef, mutton, dairy, and rice, while carbon dioxide is an output produced by manufacturing and industrial processes. Most notably, Tol recorded that in the year 2000, there was around "24 billion metric tons" of carbon dioxide emissions alone. Thus, climate change has an extremely significant impact on local and global economies. For researching for my original work, Tol emphasized that most research on climate change focuses on marginal cost estimates (i.e. the cost of producing one more of a product/one more unit of enhanced greenhouse gas emissions) rather than analyzing the total

economic effects of climate change. Yet marginal cost estimates are essential for making conclusions about policy design.

It is also important to define greenhouse gas emissions. Although Tol did not reference the difference in his paper, further studies by interviewing my physics teacher showed that the greenhouse effect is a good, natural process that allows animals to exist. Without the greenhouse effect, the Earth would stabilize at a much colder temperature (around  $-18^{\circ}\text{C}$  or  $64^{\circ}\text{F}$ ). Thus, what most individuals are attempting to analyze is the enhanced greenhouse effect, which is a harmful process that traps heat in the atmosphere and causes the temperature of the planet to rise.

A benefit of "The economic effects of climate change" is that it takes the reader through the process of how Tol analyzed the economic effects, namely the methodology of the research. Tol mentioned two approaches, the first being the enumerative method. The enumerative method uses "estimates of the "physical effects" of climate change...obtained one by one from natural science papers," which can be "based on some combination of climate models, impact models, and laboratory experiments." Then, the physical impacts are given a price and summed up. For example, agronomy (study of farming) papers are used to predict how climate change affects crop yield. After, market prices or economic models determine the change in output. This is the methodology for market goods and services. For nonmarket goods and services, like health, the approach Tol suggests "benefit transfer," using epidemiology (study of how diseases affect population) papers to estimate the effects, while "economic values are applied from studies of the valuation of mortality risks in contexts other than climate change."

The second approach Tol mentioned is the statistical approach, which consists of "direct estimates of the welfare impacts, using observed variations (across space within a single country) in prices and expenditures to discern the effect of climate." The statistical approach focuses on

one sector for selected countries, and the resulting data is “extrapolated to other countries and then added up.” There is no physical modeling, just natural science experiments, models, data, and observations. Thus, there have been conclusions that assume “climate is reflected in incomes and expenditures—and that the spatial pattern holds over time.”

Thus, I can use the same methodology for researching my original work. Since I am looking at both a local and global scale, I can experiment with these methodologies, and perhaps even interview professionals to gain their insight on using the methods. I am able to also compare my finding with the findings of Tol’s “The economic effects of climate change.” In his research (and other secondary sources), Tol found an agreement between the sources, discussing that “the welfare effect of a doubling of the atmospheric concentration of greenhouse gas emissions on the current economy is relatively small—a few percentage points of GDP.” However, “an environmental issue that causes a permanent reduction of welfare, lasting into the indefinite future, would certainly justify some steps to reduce such costs.” Therefore, the emission of greenhouse gases are linked to high-income countries while the negative effects have detrimental impacts on low-income countries. Tol notes two policy implications of this. The first is that “any justification of stringent abatement for greenhouse gases is at least in part an appeal to consider the plight of citizens of low-income countries around the world and the effects imposed on them by the citizens of high-income countries.” Secondly, pre-existing poverty is the primary cause for vulnerability to climate change. Stimulating economic growth of emission abatement can perhaps reduce the implications better.

Through Tol’s “The economic effects of climate change,” I learned the methodology of conducting research on how economies are affected by climate change and possible effects and

results of such resources. Although the research will be difficult, I am looking forward to conducting it and finding my own results.