

# Global Warming and the Pitfalls of Welfare Economics

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## 1 Introduction

Let me begin by thanking some people who have contributed greatly to my understanding of and work on climate change economics. My first serious discussions of these problems was with Graciela Chichilnisky and Geoff Heale at Columbia University in the 1990s, which led to my participation in several workshops and conferences they organized. In November, 2006, Neva Goodwin and Jonathan Harris invited Lance Taylor and me to participate in a workshop on environmental economic problems, including climate change, which gave me an opportunity to summarize the conclusion I had reached that if “business-as-usual” paths are inefficient there are no opportunity costs to correcting global warming and, in fact, that correcting global warming represents a net gain in welfare to the global economy. Armon Rezai, then a graduate student at the New School for Social Research, collaborated with Lance and myself in elaborating this point of view through the development of a growth model with climate damage which exhibits and roughly estimates the net gains to the correction of global warming. This work was published in *Economic Theory* in 2010. Armon and Lance are wonderful people to work with. Armon saw implications of the welfare economics point of view that greatly expanded the significance of the initial insights. Lance is an acute and astute critic, and has the uncanny ability to know the answers to quantitative questions before they have even been posed. I am delighted to be sharing this prize with Lance.

## 2 Economics of Climate Change

It is very commonly assumed that climate change can be brought under control only by means of a sacrifice on the part of the present generation. For example, the Stern Review recommends the present generation to make a small reduction

in its income (perhaps 2 percent) in order to bring about a much larger increase in world income in 150 years time. Nordhaus's optimized programme also shows a reduction in present income, which generates an increased income in the future through a reduction in climate damage.

But actually, no sacrifice on the part of current generations is necessary. Climate change can be controlled without a sacrifice on anyone's part. Because the emission of greenhouse gases that leads to climate change and climate damage is a "negative externality" (in the language of welfare economics), the "business-as-usual" path on which the world makes no effort to control climate change is inefficient. Correcting the externality, whether through imposing a carbon tax, or establishing a system of tradable emissions permits that lead to a positive real cost to emitters of greenhouse gases, or through direct regulation of emissions, will create a net economic surplus that can be divided in a variety of ways between current and future generations and among the various regions and classes of the world economy.

In immediate practical terms, even though reducing the emission of greenhouse gases does require real resources that could be used for other purposes, a policy of taking those resources from conventional investment yields net benefits because the reduction in climate reduction from reduced emissions more than offsets the costs to future generations of a smaller conventional capital stock. Thus it is possible to reduce greenhouse gas emissions and either maintain or increase the standard of living of current generations without inflicting economic costs on future generations.

The growth model Armon Rezai, Lance Taylor, and I developed to estimate the magnitude of these effects suggests that a diversion of less than 2% of world output from conventional investment (currently about 25% of world output) to investment in greenhouse gas mitigation would raise long-run world income per capita significantly, and achieve close to pre-industrial levels of greenhouse gas concentrations in the atmosphere over a time horizon of two centuries. While 2% of world output is, as they say, "real money" (depending on your estimate of world output, perhaps \$1-1.5 trillion at current prices) it represents a manageable reallocation of resources on a global scale. If we are ingenious enough to make sure that this diversion of resources comes at the expense of relatively low-yielding conventional investments, and to compensate the losers in a switch from fossil-fuel energy to renewable energy sources, current generations need experience no reduction in standard of living as a result.

### **3 Free lunches and all that**

Since the nineteen-eighties "economics" has appeared in public discussion primarily in the guise of a "hard-headed" realism insisting that policy choices involve "trade-offs", "winners and losers" and "budget constraints". This heritage of the "TINSTAAFL" ("there is no such thing as a free lunch") dogma promulgated by free-market enthusiasts unfortunately is at best a half-truth and has seriously confused public perceptions of policy options to deal with climate

change.

The half-truth in the TINSTAAFL doctrine is that human beings can only work with the resources they have and their own ingenuity to solve problems. These aspects of finite mortality do impose ultimate limits on human action and social policy.

The fallacy of the TINSTAAFL doctrine is its implication that actual institutions, policy and behavior are always somehow sure to reach the frontier of the feasible set defined by resources and technology. This is far from the truth, even under the most aggressive free-market policy regimes imaginable.

The discussion of climate change policy has suffered greatly from the distorting effects of TINSTAAFL thinking. It has led us to believe that there must be “trade-offs” to be faced in climate policy, which on careful examination prove not to exist in reality. The most pernicious of these fallacious trade-offs is the view that climate change is an “inter-generational” conflict, in which the interests of current generations have to be sacrificed for the benefit of future generations.

As I have just argued, the reason climate change does not lead to inter-generational (or any other economically meaningful) conflicts is that the burning of carbon-based fossil fuels is a negative economic externality. When someone decides to burn carbon they consult their own interests in trading off the benefits of the energy they reap against the costs of the fuel, but they do not take account of the costs they impose on others, in particular by adding to the atmospheric stock of carbon dioxide. As a result human society operates at an inefficient status quo ante in relation to greenhouse gas emissions. In terms of the TINSTAAFL doctrine, we fail to reach the frontier of feasibility in managing energy production and the risk of climate change.

One implication of the welfare economics of climate change is that correcting the greenhouse gas externality is an *economic benefit* to be distributed to human beings of current and future generations, not an *economic cost* that has to be met by some pattern of shared sacrifices. Controlling climate change need have no negative effects on any relevant economic outcomes (for example, growth, employment, or standards of living).

## 4 The ironies of welfare economics

One paradox of welfare economics is that the distribution of a potential benefit can be more problematic than the imposition of an inescapable cost. When human society as a whole or some part of it faces an externally imposed inevitable loss, it is likely that the result, whatever heroic sacrifices or selfish opportunism intervene, will not be any further from the shrunken frontier of feasible outcomes than the status quo ante was from the original frontier. Somebody has to take the hit, but there is no point in making things worse than they have to be. On the other hand, history is replete with examples of potential mutually advantageous changes that fail to be realized because the participants cannot agree on how to divide the gains. As a result no one may reap any share of

potentially very large benefits. Climate change threatens to fall into this second category.

## 5 The problem of financing compensation

Weaning the world from carbon-based fossil fuels is a significant challenge. It is not, however, an unprecedented challenge in historical perspective. The enormous investments and changes in life precipitated by technical innovations such as steam power, electricity, and information processing are at least as large and far-reaching, and have resulted in gains and losses of welfare on an equal or larger scale.

Concretely, the main negative economic consequences of restricting fossil-fuel energy production will be the devaluation of fossil fuel reserves, the accelerated depreciation of fossil-fuel linked investments such as gasoline-powered automobiles and carbon-based heating and air conditioning systems, and a permanent rise in energy prices. To implement a policy of climate change control without any losers will require compensating these losses.

How would this work? Consumers and producers facing high energy prices will spontaneously defend themselves as much as they can by substituting toward lower-energy alternatives. Suburban sprawl will give way to more compact urban development; square-feet of living space to better views; aluminum containers to cardboard; commuting automobiles to bicycles, and so forth. These defensive readjustments (economic “substitution”) will inevitably, however, leave consumers and producers worse off in purely material terms than before the rise in energy prices. These losses will have to be compensated, for example, by increased consumption of goods produced without fossil fuel energy.

Such an increase in consumption can be achieved, given the productive capacity of society at any time period, by reducing resources devoted to investment. But wouldn't this be bad for economic growth and the welfare of future generations who would inherit a smaller capital stock as a result? Considered in isolation a shrinkage of investment does hurt future generations, but, as I have argued already, considered as part of a package that includes lower climate damage, a policy of diverting resources from investment to non-carbon-intensive consumption can improve the welfare of future generations.

How could a shift from investment to consumption in order to compensate consumers and producers for higher energy prices be financed? One possibility is to lower taxes on current consumers and producers and finance the resulting shortfalls in government revenue by borrowing.

But won't that increased borrowing burden future generations with a larger debt? The usual economic argument against financing consumption expenditures with government borrowing is that the government borrowing “crowds out” productive investment. But as we have seen, the goal of climate change policy is precisely to shift resources from low-yield conventional investments to consumption to compensate for losses imposed by the transition away from fossil-fuel energy. Crowding out is an economically efficient way to do this,

because it works by raising interest rates on private borrowers, and therefore eliminates the lowest rate-of-return private investments in an efficient manner.

The issuance of debt to finance tax relief to compensate consumers and producers for a rise in energy prices is a way to ensure that future generations will not appropriate too large a part of the increases in welfare that controlling climate change delivers. Future generations effectively pay the current generation to restrict carbon emissions by paying the interest on the debt incurred.

A well-known theorem of welfare economics enshrined for generations in economics textbooks shows that a typical consumer cannot be made better off by the imposition of a tax on a good, even when the tax is rebated in a “lump-sum” form. The economic logic behind this theorem, which remains obscure to most legislators, is that the tax induces the consumer to substitute other goods in her consumption for the taxed good as a result of the higher price implied by the tax, and this change evidently cannot make the consumer better off. Rebating the tax revenue as a “lump sum” addition to the consumer’s income in general cannot fully compensate for this loss in welfare because the consumer has reduced her consumption of the taxed good.

This logic applies in reverse to the analysis of taxing (or otherwise raising the price of) a good the consumer is using in excess because of unpriced external effects like climate damage. In itself the rise in price of the good lowers the typical consumer’s welfare, but in this case rebating the tax revenue as a lump sum is sufficient, together with the relief the consumer experiences as a result of the reduction of the external damages from consuming the good, to compensate. Thus in principle if there is an unpriced external effect (climate damage) from the use of fossil fuels, raising their prices through an emissions control policy together with a lump-sum rebate of the resulting revenues, will improve the well-being of the typical consumer.

As policy economists know, however, in the real world this theoretical argument often fails to lead to welfare-enhancing policies (in this case emissions control to limit climate damage). Even when the fiction of the “typical consumer” is roughly correct, as in investments in infrastructure for transportation or public health, which presumably benefit individuals fairly uniformly, it is not easy to secure political support for expenditures.

## 6 Conclusion

Thus the political challenge of climate change is most accurately conceived as the problem of designing compensation and mitigation schemes that a reliable large majority of polities will support. The skewing of political power that results from high inequality in the distribution of incomes and the disproportionate influence of well-organized business interests on legislation does not make this task any easier. But even with these hard political constraints, there is good reason to believe that political viable and environmentally effective schemes for mitigation of climate change are feasible. It is a question of deciding to roll up our sleeves and do something about greenhouse gas emissions.