PRINCIPLES AND CONSEQUENCES OF CO2 DAMAGE ACCOUNTING

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Abstract:

Research programs at international development agencies and academic institutions focus on developing national accounts that reflect changes in the broad array of assets important to national economic development and human well-being. Some accounting efforts, such as the UN's System of Environmental and Economic Accounts, measure changes in these assets as a mix of physical quantities and economic value. Other efforts, the focus of this paper, attempt to measure changes in comprehensive wealth, in which all assets are translated into their relative contribution to human welfare. In theory, the latter approach makes trade-offs between assets comparable, and, crucially, it serves as an alternative to oft-cited statistics of economic "growth," such as GDP. GDP focuses on limited assets and has no theoretical link to human well-being nor sustainability. Comprehensive wealth, by contrast, has established theoretical importance for human well-being (Arrow et al. in press, Hamilton 1994) and for sustainability, as a persistent decline in the asset base from which humans derive welfare is by definition unsustainable. The measure includes a broader array of assets, including a short list of natural resources and human health, as well as damages caused by climate change. Theoretical and empirical research is advancing the methods to capture the changes in all forms of wealth. Here, we focus on the methods for calculating climate change damages.

Climate change accounting methods have developed over the past 15 years, from a simple cost-benefit analysis of projected impacts' local costs (Pearce 1996) to the Stern Review's (2007) in-depth analysis of climate change's economic and equity impacts. Stern's analysis of the social cost of carbon builds on Fankhauser (1997), whose damage estimates are used by at least two major national climate change accounting research projects (Arrow et al in press; World Bank 2006, 2010). Fankhauser's approach applies equity weights to Pearce's local, aggregated costs to determine the global social cost of carbon. The two current research projects apply this global social cost to all nations to assess climate change damages, but in distinctly different ways. Arrow et al. deduct from a particular nation's accounts the projected climate change damages suffered, regardless of who caused the damages, while the World Bank deducts the climate change damages caused by a nation's emissions.

As Anthoff and Tol (2010) and the World Bank (2010) itself noted, accounting for climate damages within national accounts is tricky because of the myriad ethical, economic, and political assumptions embedded in the accounting. This paper looks in-depth at these assumptions by dissecting the two leading approaches to climate change damage accounting. We assess each method's goals and motivation, as well as its main philosophical, economic, and political assumptions. For example, the World Bank method is roughly based on a polluter pays principle, yet, as we argue, the use of a global social cost of carbon weakens the force of its application, and the lack of compensation could result in signals to national decision-makers that result in a decline in national wealth and, thus, unsustainability. Arrow et al.'s method adopts a sovereignty principle, focusing on changes in domestic wealth. Again, we argue that the use of a global price of carbon may be inappropriate to satisfy this principle, and its signals have different, problematic decision-making ramifications that ignore liability.

We empirically show that different principles, economic assumptions, and political agreements can lead to wildly different estimates of carbon damages. These effects arise due to their effect on carbon's social price as well as assumed property rights. We explore each method's policy implications for national reinvestment and compensation due. Finally, we discuss the implications of our exposition for the accounting methods, wealth accounting, sustainability, and comprehensive wealth's policy relevance.

Anthof and Tol (2010) JEEM

Arrow et al (in press) Env. & Dev. Econ.

Fankhauser (1997) Env. Res. Econ.

Hamilton (1994) Res. Pol.

Pearce et al (1996) IPCC

Stern et al (2007) Stern Review

World Bank (2006) Where is the Wealth of Nations

World Bank (2010) The Changing Wealth of Nations