Space-Time Discounting in Climate Change Adaptation

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Background: Space-Time Discounting

Discounting is typically defined as the process of comparing the values of costs and benefits that occur at different times. This definition neglects *where* costs and benefits occur. For example, we might discount future costs and benefits because we care less about the welfare of people in the future, but we might also discount the welfare of people in different places. Or, we might discount future money because future people are wealthier, so a future dollar is worth less to them, but inequality in wealth exists across space as well as time. *This article presents new theory on space-time discounting and uses it to analyze how humans adapt to climate change*. Climate change adaptation refers to efforts to minimize damage or seize opportunity from the impacts of climate change. Three adaptation cases are considered, representing space-time discounting in project evaluation, cooperation, and conflict.

Project Evaluation: Crop Indemnity Payments

Crop indemnities payments are made to farmers due to losses suffered as a result of unfavorable growing conditions, which can be caused by climate change. Indemnity projects, like other projects, can be evaluated in terms of the welfare increase they bring. However, when the evaluation fails to discount indemnity payments across space as well as time, inaccurate results are obtained. This is because payments to wealthy farmers generally bring less welfare increase than payments to poor farmers. This point is demonstrated using a simple example based on indemnity payments in the U.S. state of Delaware in 2007 and 2008.

Cooperation: Commonwealth of Nations

The Commonwealth is composed of 53 nations with ties to the former British Empire. It is active in climate change adaptation, mainly through advocacy for and capacity building among its member countries. One reason for its cooperation is that it favors the welfare of its members to that of others. This spatial discounting of welfare exhibits an irregular spatial geometry: the borders of the Commonwealth. Another reason is because the Commonwealth's institutional capacity, which makes it more effective at helping its members. Finally, much Commonwealth adaptation action takes place at the national scale, even though different nations have very different population levels. All this shows that spatial discounting features complexities not found in temporal discounting, especially in the context of complex scenarios like adaptation.

Conflict: Migration and Conflict

Climate change is expected to cause extensive migration as some regions are impacted more severely than others. Climate change here is a form of space-time discounting because it causes changes over time in the value of different spatial regions, such that people in one region come to prefer being in a different region. Some expected that there could be as many as several hundred million climate refugees. Such migration may create or exacerbate tensions between migrant and host communities, resulting in conflict. Conflict can occur if the communities discount each others' welfare enough. However, if the communities bring benefits to each other – for example as labor – then conflict becomes less likely, another important aspect of space-time discounting.