



Economics Seminars

Friday 10 October 2025 at 12:00

Aula Anfiteatro

Facoltà di Scienze Economiche Giuridiche e Politiche - Viale Sant'Ignazio 17

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Population, Emissions and Climate Change: Integrating IAMs with STIRPAT

Abstract. The econometric studies built on the STIRPAT framework clearly show that greenhouse gas emissions respond much more strongly to changes in the population size than to changes in per capita production. Therefore, human population is one the major drivers of carbon emissions but nevertheless its specific role in determining emissions has never been specifically accounted for in the analysis of climate policy. Moreover, since emissions determine carbon concentrations which represent an important source of disutility, population plays a key role in determining the effectiveness of climate policy also through preferences. In order to understand whether and how the dependence of emissions on the population size affects our conclusions regarding mitigation, we integrate a global integrated assessment model of climate-economy with the STIRPAT formulation. In particular, we allow population to act as an independent factor affecting emissions in a non-proportional manner and utility to negatively depend on carbon concentrations. In this setting, we show that emissions, the temperature increase, and the cost of climate mitigation are all much larger than what traditionally believed, and thus more abatement efforts and earlier interventions are needed in order to effectively reduce the economic impacts of climate change. Therefore, by underestimating the detrimental environmental consequences of anthropogenic activity, extant literature provides a substantially biased analysis of the importance of climate policy, which instead requires more costly and urgent mitigation measures to achieve the mid-of-century objectives set by international climate agreements.