Research Statement

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My research evaluates the welfare consequences of global warming by combining climate econometrics and spatial dynamic models. More precisely, I seek to understand the impact of rising temperatures on the fundamental components of the economy and their ultimate effects on the world and local income and welfare. A proper quantification of these impacts requires integrating agents' reactions to these changes, in other words, the adaptation mechanisms through which agents might attenuate warming damages. In addition, my research examines the efficiency of different environmental policies, as well as their local impacts.

In my Job Market Paper, *Global Warming and Labor Market Reallocation*, I assess how global warming affects the economy in heterogeneous ways across geographic locations and economic sectors. To assess its welfare consequences and the reallocation of workers across different markets, I develop a dynamic economic model of structural transformation with spatially distinct labor markets facing varying exposure to warming damages on productivity. I incorporate trade of goods and migration across regions and industries, to account for the ability of agents to adapt to this phenomenon, and non-homothetic preferences, to reproduce the reallocation of economic activity when income grows. To measure mobility frictions, I collect data from censuses and population surveys, and employ methodologies from the demographic literature to provide novel estimates of worldwide bilateral migration flows. To identify the non-linear effects of temperature on productivity, I exploit weather fluctuations in a long-run panel and find that productivity in agriculture in the hottest countries declines by 6% when temperature rises 1°C. The model, quantified for 6 sectors and 287 countries and subnational units, suggests that agricultural workers face welfare losses three times larger than the average worker and that employment in agriculture increases. Although hot regions might reduce the production of agricultural goods and import them from less affected locations, sectoral specialization is mainly driven by the shift in consumption expenditure towards the subsistence goods, as warming reduces global income.

Along these lines, in *The Economic Geography of Global Warming* (joint with Esteban Rossi-Hansberg and under review in the *Review of Economic Studies*), we propose a dynamic economic assessment model of the world economy with high spatial resolution and endogenous growth. Our model features a number of mechanisms through which individuals can adapt to global warming, including costly trade and migration, and local technological innovations and natality rates. We quantify the model at a $1^\circ \times 1^\circ$ resolution and estimate damage functions that determine the impact

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of temperature changes on a region's fundamental productivity and amenities depending on local temperatures. Our baseline results show welfare losses as large as 19% in parts of Africa and Latin America but also high heterogeneity across locations, with northern regions in Siberia, Canada, and Alaska experiencing gains. We find that global warming will increase spatial inequality, since estimated welfare losses across locations are negatively correlated with current real income and welfare. There is large uncertainty about average welfare effects, but much less uncertainty about the spatial distribution of losses. Our quantification points to migration and, to a lesser extent, innovation as important adaptation mechanisms. We use the model to assess the impact of carbon taxes, abatement technologies, and clean energy subsidies. Carbon taxes delay the consumption of fossil fuels and help *flatten the temperature curve* but are much more effective when an abatement technology is forthcoming.

Looking forward, I plan to pursue several research avenues related to my previous work. First, I seek to construct a framework with a more nuanced response of the spatial and industrial distribution of economic activity to warming damages, in which some economic clusters might flourish or vanish. To this end, I plan to incorporate an endogenous forward-looking investment decision on capital, where this factor of production might be subject to different warming impacts, and analyze how reallocation depends on the relative damages on labor productivity and capital destruction, and the industry-specific elasticity of substitution. Second, since global warming is a worldwide negative externality, policy can potentially alleviate some of its negative impacts. More specifically, the developed frameworks can incorporate endogenous investment decisions on clean energy and fossil fuels and thus characterize the optimal tax on carbon dioxide and subsidy on clean energy investment. Third, the heterogeneity of warming impacts around the globe has discouraged countries to join international agreements. Since countries are more likely to mitigate emissions if they face net damages, such response might lead to the creation of voluntary groups sharing the cost of cutting fossil fuel use. Hence, I seek to study the configuration of political cleavages and climate clubs as warming intensifies. Finally, global warming is a particular dimension through which climate change might affect the economy. In addition, there are several climate shocks with a large regional component, like heat waves, droughts, storms, among others. The models constructed are equipped to evaluate the economic impacts of such climate events.

Climate change presents a daunting challenge for humanity. Designing the best tools to address it requires modern micro-founded economic models that incorporate multiple forms of adaptation and the rich heterogeneity of the world. My research agenda seeks to contribute to this effort.