

Nighttime Light, Superlinear Growth, and Economic Inequalities at the Country Level

Ore Koren

Department of Political Science, Indiana University

Bloomington, USA

Email: okoren@iu.edu

Laura Mann

Jet Propulsion Laboratory, California Institute of Technology

Pasadena, USA

lauraerinmann@gmail.com

Abstract—Research has highlighted relationships between size and scaled growth across a large variety of biological and social organisms, ranging from bacteria, through animals and plants, to cities and companies. Yet, heretofore, identifying a similar relationship at the country level has proven challenging. One reason is that, unlike the former, countries have predefined borders, which limit their ability to grow “organically.” This paper addresses this issue by identifying and validating an effective measure of organic growth at the country level: nighttime light emissions, which serve as a proxy of energy allocations where more productive activity takes place. This indicator is compared to population size to illustrate that while nighttime light emissions are associated with superlinear growth, population size at the country level is associated with sublinear growth. These relationships and their implications for economic inequalities are then explored using high-resolution geospatial datasets spanning the last three decades.

Keywords—nighttime light, scaled growth, economic development, Inequality

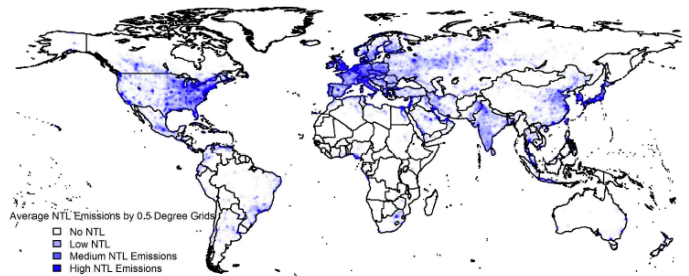


Figure 3. Average NTL Emissions by 0.5 Degree Grids, 1992–2013

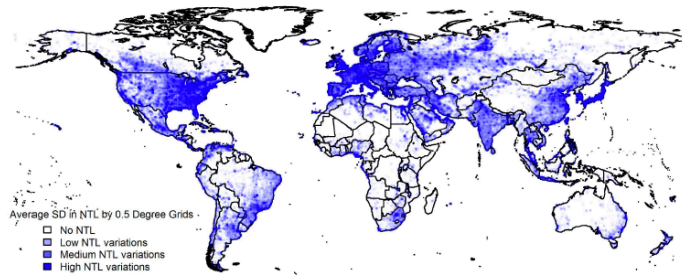


Figure 4. SD in NTL Emissions by 0.5 Degree Grids, 1992–2013

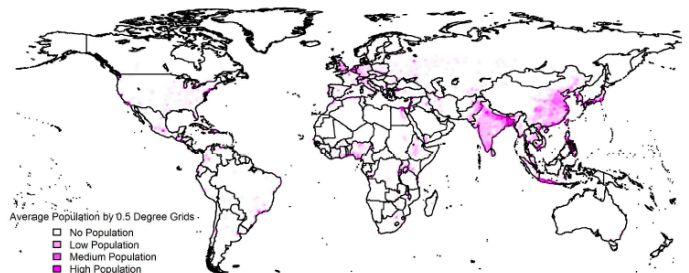


Figure 5. Average Population by 0.5 Degree Grids, 1995–2010