**Power law scaling in predicting urban and rural food consumption divergence**

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**Abstract**

Power law scaling has been reliably used to project the growth of socio-economic factors such as income, innovation, resource use and crime in urban environments as a function of population. We apply a variant of power law scaling to differentiate consumption patterns across agricultural foods, beverages and materials in growing urban environments. We empirically demonstrate that there is a systematic dependence of urban food consumption on city population size, resulting from the mismatch between the size dependence of wages and labour, so that in contemporary cities, regardless of income level, the consumption of certain foods such as proteins increases by more than 20 percent with each doubling of the population. In contrast, the consumption of grains, fresh fruit and vegetables declines by over 15 percent with each doubling of the population. These consumption shifts are driven by scaling laws governing urban resource use and are independent from socio-economic drivers per se. Rural areas experiencing little or no population growth are unable to exploit the benefits of scaling and thus growth in the consumption of certain foods remains stagnant. The diseconomies of scale represent a structural disadvantage for rural areas over long time horizons.