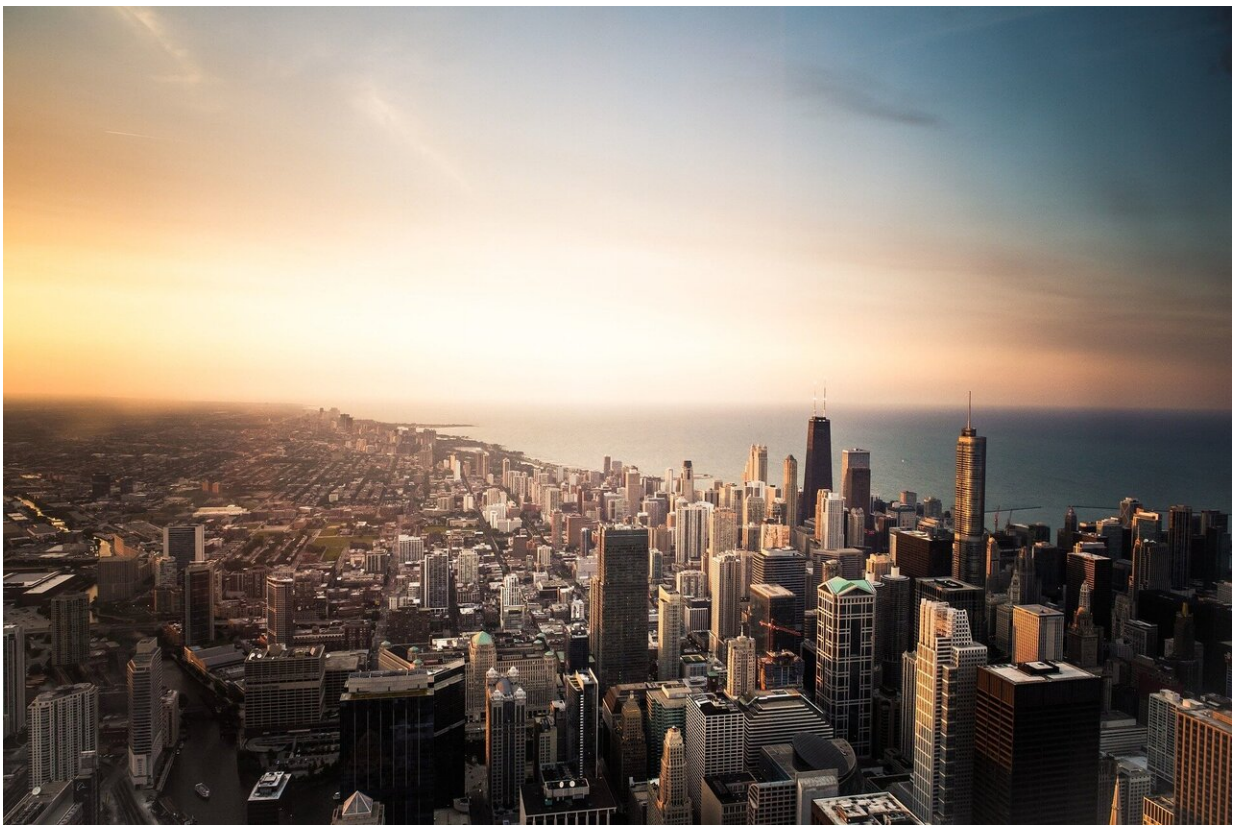


Creating meaningful change in cities takes decades, not years, and starts from the bottom

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Newly published research in *Science Advances* by University of Chicago researcher Luis Bettencourt proposes a new perspective and models on

several known paradoxes of cities. Namely, if cities are engines of economic growth, why do poverty and inequality persist? If cities thrive on faster activity and more diversity, why are so many things so hard to change? And if growth and innovation are so important, how can urban planners and economists get away with describing cities with Groundhog Day-style models of equilibrium?

Developing improved collective actions and policies, and creating more equitable, prosperous and environmentally sustainable pathways requires transcending these apparent paradoxes. The paper finds it critical that societies embrace and utilize the natural tensions of cities revealed by urban science in order to advance more holistic solutions.

"To understand how cities can be simultaneously fast and slow, rich and poor, innovative and unstable, requires reframing our fundamental understanding of what cities are and how they work," says Bettencourt. "There is plenty of room in cities to embody all this complexity, but to harness natural urban processes for good requires that we modify current thinking and action to include different scales and diverse kinds of people in interaction."

This is the goal of a new paper entitled "Urban Growth and the Emergent Statistics of Cities," by Luis Bettencourt, the Inaugural Director of the Mansueto Institute for Urban Innovation and Professor of Ecology and Evolution at the University of Chicago. In the paper, Bettencourt develops a new set of mathematical models to describe cities along a sliding scale of processes of change, starting with individuals and deriving emergent properties of cities and nations as urban systems.

At the heart of these models is a balancing act: humans must struggle to balance their budgets over time, including incomes and costs in units of money or energy. For most people, incomes and costs vary over time in unpredictable ways that are out of their full control. In cities—where we

are all part of complicated webs of interdependence for jobs, services and many forms of collective action—these challenges gain new dimensions that require both individual and collective action.

Accounting for these dynamics allows us to see how meaningful change at the levels of cities and nations can emerge from the aggregate daily hustle of millions of people, but also how all this struggle can fail to add up to much.

The paper shows that relative changes in the status of cities are exceedingly slow, tied to variations in their growth rates, which are now very small in high-income nations such as the U.S. This leads to the problem that the effects of innovation across cities are barely observable, taking place on the time scale of several decades—much slower than any mayoral term, which blunts the ability to judge positive from harmful policies.

Of especial importance is the negative effect of uncertainty—which tends to befall people in poverty but also everyone during the current pandemic—on processes of innovation and growth. Another challenge are policies that optimize for aggregate growth (such as GDP), which the paper shows typically promotes increasing inequality and social instability. In the paper, these ideas are tested using a long time series for 382 U.S. metropolitan areas over nearly five decades.

"Growth and change accumulate through the compounding of many small changes in how we lead our daily lives, allocate our time and effort, and interact with each other, especially in cities. Helping more people be creative and gain agency, in part by reducing crippling uncertainties, is predicted to make all the difference between a society that can face difficulties and thrive or one that becomes caught up in endless struggles and eventually decay," says Bettencourt.

More information: "Urban growth and the emergent statistics of

cities" *Science Advances* (2020). [advances.sciencemag.org/lookup ...
.1126/sciadv.aat8812](https://advances.sciencemag.org/lookup?...1126/sciadv.aat8812)

Provided by University of Chicago

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