



# Urban Economics: Geography and Spatial Dependence Matter to the Sustainability of Cities

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The “Urban Economics” section of *Frontiers in Sustainable Cities*, which lies at the intersection between economics and geography, seeks to address economic analysis applied to urban phenomena from a locational perspective while contributing to a knowledge base (also see Proost and Thisse, 2019) supporting cities whose socio-economic/demographic and environmental impacts foster a resilient urban habitat for existing populations without degrading its quality for future generations [see, e.g., EPS (Economic Planning Systems), 2011]. This journal section’s goal is to advance the research frontiers in this sub-field, bolstering its foundation established, in part, by the new urban economics of the 1970s with the more contemporary new economic geography championed by, among others, Glasser (2011) and Economics Nobel Paul Krugman. This inaugural editorial highlights sustainable urban spatial economics, essentially an interdisciplinary sub-field that studies safeguard reasons for economic activity concentration in and dispersion across networks of cities as well as within individual cities by emphasizing the roles of both spatial autocorrelation and distance factors (e.g., transportation costs), focusing on agglomeration and dispersion tendencies arising from this former georeferenced data property and constrained by these latter friction of distance operators. It interfaces with what has become known as the new science of cities (Batty, 2013) plus the domain of the more technical urban informatics (Shi et al., 2021).

Following a somewhat nebulous and more applied inception, urban economics began crystalizing in the 1960s, with the first books devoted exclusively to it appearing in the early 1970s: Mills (1972), Grieson (1973), Leahy et al. (1970), Rasmussen (1973), Richardson (1977), and Hirsch (1984), to name a few. A hallmark of this emergence was the release of *Cities* (Davis, 1973) by *Scientific American*, followed by the 1974 appearance of a dedicated subject matter journal; in contrast, its eponymous organization (i.e., the Urban Economics Association) formally founded itself much later, in the early 2000s. Accompanying the initial book publications were ones focusing on geographic aspects of urban economics that underlined its two spatial dimensions: *Internal Structure of the City* by Bourne (1971), and *Systems of Cities* by Bourne and Simmons (1978). This combined collection of formative texts is superseded today by far more comprehensive books also containing geographic information systems (GIS) output, such as O’Sullivan (2011/2019). The two geographic dimensions, coupled with state-of-the-art thinking reflected in, for example, O’Sullivan, suggest grand challenges facing modern sustainable urban spatial economics. These themes provide an impetus for the launching of this section; they are neither the sole nor an all-inclusive enumeration of topics, but rather are intended to stimulate the urban economic geography community to fill some of the glaring gaps existing in the literature.

## INTERNAL URBAN SPATIAL ECONOMICS CHALLENGES

O’Sullivan (his 2011 8th and selected earlier editions) proposes five axioms many, if not most, urban

economists consider to be well-established rules/principles describing especially the arrangement of within-city economic activities, widely accepted because of their individual intrinsic merits, whose more explicitly spatial versions supplemented with a sixth axiom furnish a conceptual framework upon which the structure of a more abstract sustainable urban economic geography rests:

1. prices adjust to achieve locational equilibrium (in part, relating to bid-rent curve theory)
2. self-reinforcing spatial effects generate extreme production, consumption, and/or transfer of urban wealth outcomes
3. *in situ* production is subject to economies of scale
4. spatial externalities cause inefficiency
5. spatial competition generates zero excess economic profit
6. public resources provision achieves a(n) (location-) allocation equilibrium in which no individual can be made better off without making at least one other individual worse off

In the 9th edition, O'Sullivan effectively translates these postulates into the following key standard economics concepts: opportunity costs (manifested as location rent), the marginal principle, Nash equilibrium (named after the Economics Nobel), comparative statics, Pareto efficiency [Schumpeter (1952) lists Pareto as one of the 10 great economists to that date; The Best Schools, <https://thebestschools.org/features/top-economists-1900-to-present/>, ranks him 19th among the top 50 economists from 1900 to the present], and self-reinforcing changes. Ahlfeldt et al. (2015) add another element here by emphasizing equilibrium instead of marginal effects, which is great for measuring externalities (also see Bayer et al., 2007) such as agglomeration economies as well as spatial economic spillovers such as pollution. Linking these axioms and their key concept replacements coupled with shifts from marginal to equilibrium analysis to sustainable urban economics presents an epic challenge.

Another overall challenge collectively signaled by these propositions is inculcating a widespread adoption/application of spatial econometric methodologies (i.e., accounting for spatial autocorrelation) when engaging in urban economic data analyses; doing so also fosters a recognition that spatial spillover effects can diminish or reinforce sustainability. The first axiom promotes land use and housing research; sustainability coincides with equitable and affordable housing. The second sanctions agglomeration economies research, with particular reference to localization and urbanization economies; sustainability can exploit geographic cluster-generated synergisms that render beneficial socio-economic/demographic and environmentally benign outcomes. The third axiom encourages research about trade-offs between economies of scale and assembly and distribution transportation costs: sustainability relates to how economic downturns intersect with geographically concentrated production specialization, respective hallmarks of business cycles and scale economies. The fourth axiom endorses research addressing almost any aspect of spatial autocorrelation in an urban setting, from arts and entertainment district formation, through pollution monitoring and abatement, to zoning impacts on land use: sustainability can flourish in the midst of spatial spillovers (see Bonnet et al., 2021). The fifth tenet alludes

to location rent, local geographic monopolies, and spatial optimization achieved by the packing of market and other catchment areas: sustainability at least loosely links to geographic equilibria, an insufficiently investigated linkage. Finally, the sixth principle concerns the provision of urban public goods, many of which involve diseconomies of scale, and whose financing frequently consumes large portions of municipal budgets: urban spatial economics encompasses municipal fiscal sustainability. The primary general challenge here is having this assortment of precepts guide a sustainable urban spatial economics research agenda. More specific challenges exist, too. Investigating market area reallocations accompanying retail and other private sector multiple facility location site closures (e.g., the Internet replacing bricks-and-mortar retail), supplementing the present literature about expansion through site additions: sustainability embraces site closure rehabilitation/remediation. Better understanding socio-economic/demographic fragmentation within the context of, for example, the Economics Nobel Schelling's model (1969; 1971), particularly with reference to urban housing markets: sustainability inspires diversifying housing unit density and mix. Extending internal urban structure conceptualizations from the North America-Europe-Australia (e.g., a la Burgess, Hoyt, and Harris-Ullman) version to a wider world view (supplementing what currently is known about South America, Africa south of the Sahara, China, the Middle East, and centrally planned socialist cities): sustainability endorses workforce housing nearby employment centers, in part seeking to solve the urban spatial mismatch problem. Further developing urban land use explanations beyond the Alonso type of description: sustainability mediates the transportation-land use relationship to reduce air pollution and other emissions. Evaluating polycentricity within the context of employment centers as well as population density as new megalopoli/conurbations materialize (e.g., Buffalo-Chicago-Cleveland-Detroit-Indianapolis-Milwaukee-Pittsburgh-Toronto): sustainability emboldens cooperation rather than competition among nearby cities, ultimately forming polycentric mega-metropolitan regions. Provision of public goods across urban areas: sustainability marries economic and social profits. This last theme relates to many substantive matters, such as urban crime prevention, education, infrastructure, environmental monitoring and remediation, mass transit, municipal services, poverty, public health, and local politics/elections. A lack of updates to essentially obsolete North America-Europe-Australia studies, together with a paucity of non-North America-Europe-Australia geographic landscape treatments, further enhance this general challenge.

These foregoing axioms also apply to between-cities urban economics.

## SPATIAL ECONOMICS AND URBAN SYSTEMS CHALLENGES

The rise and fall over time of cities, by their rank, in the United States (US) urban system (see <https://datarep.tumblr.com/post/62429554918/top-20-largest-us-cities-by-rank-1790-2010>) illustrates this notion of a pressing need to make more

current existing outdated findings, but in the context of the second geographic dimension of urban spatial economics. For example, Yeates and Garner (1980, p. 68) published a timely first-attempt articulation of the North American urban hierarchy. Their constructed hierarchy places Detroit in the second of a five-tier structure, at the same level as Chicago, Los Angeles, and Toronto. Today, Detroit, one of the fast shrinking cities in the US, if not the world, at best is in the third tier of this evolving urban hierarchy. This exemplification draws attention to another salient challenge: although many cities throughout the world are experiencing growth (e.g., locational shifts in economic activities spurred by information and communications technologies, such as teleworking, are reminiscent of industrial revolution generated city size growth), and numerous cities seem remarkably resilient (see, e.g., Davis and Weinstein, 2002), many cities also are experiencing depopulation (Meng et al., 2021), a process warranting intensive study, with special reference to sustainability. History divulges a number of abandoned cities, in both the ancient world (e.g., Ani, Turkey; Carthage, Tunisia; Great Zimbabwe, Zimbabwe; Machu Picchu, Peru; Mesa Verde, US; Pompeii, Italy; Tikal, Guatemala; Vijayanagar, India; and Xanadu, Mongolia) as well as the modern world [e.g., Bodie, US (1940); Fordlândia, Brazil (1934); Hashima Island, Japan (1974); Kolmanskop, Namibia (1956); Pripyat, Ukraine (1986); Wittenoom, Australia (2007)]. The urban systems context for many of these cities involves a much longer timespan than the few centuries affiliated with US cities; the Roman Empire established one of the first elaborate urban systems (Kaplan et al., 2004), whereas many national urban systems, such as Poland's, span a time period of many hundreds of years (Rykiel and Jazdzewska, 2002).

The diffusion of novel COVID-19 virus infections exemplifies another important reason to have more published research about empirical urban hierarchies. Griffith and Li (in press), unlike almost all other authors evaluating the spread of this disease, demonstrate that national urban hierarchies play a prominent and conspicuous role in the diffusion of this virus across national territories. The preceding six axioms help underscore that building such an urban hierarchy, whether for a regional, national, continental, or global landscape, needs to consider urban economy size, taxonomic category of city, population density, and flows (e.g., commuting, residential relocation, journey to shop) among locations, as well as other attributes. Verma et al. (2014) furnish an insightful world urban hierarchy articulation that could support an expansion of the Griffith-Li analysis. But few countries, such as Peru and Poland, have meaningful articulations of their contemporary urban hierarchies, revealing a glaring gap in the literature. The bewildering absence of these hierarchy articulations poses a threat to the sustainability of the evolving organization of cities as we know it; COVID-19 infection risk, for example, reflects poorly on agglomeration forces involving proximity and density, and hence potentially functions as a principal relocation discourager in migration decisions (Whitaker, 2021).

Urban spatial pricing and price inflation across a spatial economic landscape constitute another theme in need of further urban spatial economic research: sustainability requires

affordable cities. Satisfying inelastic demand in spatially separated markets (e.g., cities) relates to a linear programming problem whose optimal solution results in pricing between cities differing by, at most, a certain specified transportation cost. Meanwhile, the regional convergence literature argues that relative, if not absolute, prices should converge across cities (e.g., Chmelarova and Nath, 2010). In many ways, these two conclusions are antithetical. Accordingly, one question asks whether or not elasticity of demand can ensure price convergence among cities. Nevertheless, sustainability is wholly interwoven with inter-urban commodity price convergence (see Jo et al., 2019).

The world's population is moving toward being nearly completely housed in urban areas, with these metropolitan areas expanding and merging into regional complexes. The United Nations (2019) forecasts that more than two-thirds (~68%) of the total global population will be classified as urban by 2050: roughly 85% in what it labels more developed countries; and, roughly 66% in what it labels less developed countries. Rural-to-urban migration is one major cause of this shift in the worldwide geographic distribution of population, a process ongoing at a rapid pace in Africa south of the Sahara and South America, at a moderate pace in countries such as China, and at a relatively slow pace in, for example, the US and Europe. Once people relocate to cities, if they migrate further, researchers often find that these moves mostly tend to be to other cities, with urban-to-rural migration occurring on a relatively small scale. National and international trends of this type merit additional scrutiny, as demonstrated by Cattaneo and Robinson (2020). Although numerous data sources are available about urbanization and migration separately, few joint comprehensive, comparable, and reliable sources exist for them. Accordingly, an important urban economic challenge insinuated here addresses national and international rural-to-urban, urban-to-urban, and urban-to-rural migration. The resulting urban population growth can be sustainable if properly managed by increasing productivity, renovating to smart cities, and upholding a livable environment, among other strategies.

## URBAN SPATIAL ECONOMIES EMBEDDED IN THE SPATIAL ECONOMICS OF URBAN SYSTEMS

Spatial economic landscapes cooperatively interact with the internal urban spatial economic structures of their cities, a collaboration featuring external factors captured in part by regional input-output tables. Local economic impact studies typify high profile urban sustainability challenges in the policy and practice arena within this kind of context. For example, in the tradition of many colleges and universities, Griffith (2020) documents the following urban spatial economic detail: currently every \$1 million in US Federal research funds that the University of Texas at Dallas (UTD) secures on an annual basis maintains ~24 full- and part-time jobs in the Dallas-Fort Worth (DFW) metropolitan region—the annual US Federal research funding received by the UTD has generated and now continues to support

roughly 1,334 jobs in the DFW urban economy—or, equivalently, every \$1 that the UTD secures in US Federal research funds on an annual basis maintains \$2.3 in final demand output in the DFW metropolitan region. Sustainability requires maintenance of, and perhaps an increase in, this type of employment contribution. Its contextualization in this case study shows the importance of both the east-Texas urban system and the DFW spatial economy to sustainability. In addition, its accompanying publication challenge is meta-analysis papers describing collections of such unpublished reports; in this specific instance, Griffith cites a few of the sizeable number of similar studies done by numerous institutions, including selected State University of New York (SUNY) campuses (Albany, 2004; Binghamton, 2014; Buffalo, 2002, 2007, 2009, 2017; Cortland, 2008; Farmingdale, 2008; New Paltz, 2017; Oswego, 2006; Stony Brook, 2019) and the SUNY system in its entirety.

## GOING FORWARD

As editor of this new “Urban Economics” section of *Frontiers in Sustainable Cities*, I invite original novel theoretical, conceptual, and/or empirical research (i.e., focusing on hypotheses,

theory/concepts, and/or methodology) as well as review [i.e., focusing on policy and practice, a stipulated topic, systematic subject matter summaries, relevant geospatial technology and/or GIS code, and meta-analyses of published and unpublished (e.g., government/agency/institutional reports) materials] articles that analytically engage with the preceding challenges or other trailblazing themes at the cutting-edge of sustainable urban spatial economics. This section also welcomes brief research and case study reports, mini-reviews, research perspectives, policy briefs, and urban spatial economic data reports (e.g., Federal Reserve Bank data, and new census data). Individual book reviews may be suggested for consideration.

## AUTHOR CONTRIBUTIONS

The author confirms being the sole contributor of this work and has approved it for publication.

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