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Prospects for a unified urban general equilibrium theory ☆

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Abstract

This is a short essay on open questions in urban economic theory.

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Essays predicting the future of a field are like cheap light bulbs: they are dull and have short shelf life. That will no doubt be true of this essay as well, but I shall at least be brief and focus on a very specific issue and research agenda, in the hope of stimulating a few filaments. If a light bulb (cheap or not) goes on somewhere, all the better. First, I shall describe the general context and problem, then hone in on the specifics of the models and the prospects for a solution to the problem.

Why should a unified urban general equilibrium theory be of interest? The current state of the literature is a scattered set of models set up to address specific questions.[1] There is nothing wrong

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[1] Examples are the infinite variations of the Hotelling model used to address questions concerning firm location, where the locations of consumers are fixed; the monocentric city model of the New Urban Economics used to address questions concerning consumer location, housing, and land rent when firm locations are fixed; and models of natural advantage, labor pooling, urbanization externalities, localization externalities, and the New Economic Geography used to examine local or regional agglomeration. Just as the standard general equilibrium model can be used at large scales, say for macroeconomic questions, as well as small scales, for example to address questions concerning the efficiency properties of local taxes, urban general equilibrium models are flexible.

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with this approach, provided that the models yield testable hypotheses so that competing models can be run against each other using data. One can argue about whether this actually happens, but in this limited space I won't address that issue. The purposes of a unified theory are:

- To make the commonalities between models and their differences absolutely stark. Here we mean to focus on both the assumptions, implicit or explicit, and the results.
- To allow new models of the same phenomena to be introduced and classified.
- To make the robustness of models clear.
- Such unified structures also give us new ways of thinking about and teaching material, much as general equilibrium theory, welfare economics, and the theory of the second best gave us new ways to see market failures, in contrast with partial equilibrium theory and classical one market cost–benefit analysis.

Isn't there already a unified urban general equilibrium theory? Actually, no, there isn't. There are many variations of models with perfect and imperfect competition, land modeled in various ways, pure exchange or production, a continuum or a finite number of agents, and various assumptions about agent mobility or location. There is little point to creating new combinations without sufficient motivation, namely questions that beg to be addressed, be they normative or positive. Many models, such as those of the New Economic Geography, seem tied to specific functional forms.[2]

What distinguishes urban models from others? Clearly, the use of mobile agents (in addition to commodities that might be mobile or immobile) is a distinguishing feature. One might think that what distinguishes urban models are the correlation of land use and the location of the agents using it, but this can be misleading.[3] Instead, I propose that it is the indivisibility of agents in terms of their choice of location (namely, each agent can only be at one place at any given time and state of the world) and the differentiation of commodities by this locational attribute that distinguishes urban models. But it is important to emphasize that in fact, the *field* of urban economics (as opposed to the models) is defined by a set of *questions*, not by a set of models.[4]

The first order of business is to seek commonalities. The purpose is to prove (though not in this essay) theorems on existence of equilibrium, welfare, core, certain comparative statics, and so forth for all the models simultaneously. Such a unification would bring out the essential elements of the theory, including the underlying commonality in the commodity space, and thus the deeper and simpler structure of the mathematics common to urban models.

In this proposal, I shall attempt not to use many assumptions. The discussion might appear to be very abstract, but it can easily be made concrete by using the examples provided. I hope that it will subsume most known models, and a few unknown ones as well.

[2] My view of the New Economic Geography is provided elsewhere, in Berliant (2006). As explained there, examples are usually the beginning of a research program, not the end. And since they represent a set of measure zero in the parameter space of the model, they are unlikely to be robust or even representative. For instance, what would we know about economics if we only knew that competitive equilibrium allocations were Pareto optimal for examples?

[3] After all, at least in theory, agents could own bits of land everywhere, but this wouldn't look much like an urban model.

[4] Although it is not the primary focus of this essay, it is useful here to provide some of the questions that define the *field* to contrast with the assumptions that define the *models*. What determines land use and rent? What factors explain the locations of firms and consumers? How can we explain the patterns of growth and development of cities and regions? What is the relationship between scale economies, agglomeration, and externalities?