

## **The Welfare Economics of Urban Structure**

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In defense of the sprawling, low-density development which increasingly characterizes modern cities, Gordon and Richardson (1986, 1996) argue that the urban spatial structure generated by market forces reflects the will of the people. Planners, in contrast, typically have little faith in either the efficiency or equity of market-determined outcomes, and advocate detailed land use planning. To evaluate these conflicting points of view we need to explore the welfare economics of urban land use.

### A. Excessive Decentralization in the Monocentric City

Urban spatial structure in the most basic monocentric-city model is efficient, as noted earlier. It is reassuring that the Invisible Hand can work with respect to the location of economic activities. Unfortunately, this efficiency property is of questionable practical relevance because of the pervasiveness of externalities in actual cities. We start with one that is particularly important and has been extensively studied within the monocentric framework: traffic congestion.

The congestion externality arises because the user of a motor vehicle does not pay for its marginal contribution to congestion. Consequently, the private cost of travel during peak periods falls short of the social cost. Travel is misallocated across transport mode, route, and time, and overall travel may be excessive too. As is well known, this externality can be internalized by means of a congestion toll equal to the marginal congestion externality evaluated at the optimum. However, optimal congestion tolls are charged nowhere and as a result congested travel is underpriced almost everywhere. (Uncongested travel, by contrast, may be considerably overpriced, especially in nations with high fuel taxes.)

What does this imply about urban form? Even in today's complex urban structures, the most severe congestion continues to occur on radial travel to and from the central business district (CBD), and it is here that underpricing is most severe. If urban structure is fundamentally shaped

by commuting costs to the CBD, as postulated by the monocentric model, then such underpricing causes the city to be more spread out than is optimal. This excessive residential decentralization is compounded by a less obvious effect, working through the land market. Underpricing travel distorts land values in a way that encourages planners to allocate too much downtown land to roads. To see why, suppose the only cost associated with a road is the opportunity cost of the land it uses. Now let the planner employ the following “naive” cost-benefit rule: at each location, expand the road by using more land until the incremental travel cost saving from further expansion equals the incremental market value of land in residential use. This rule is a fair characterization of current practice: cost-benefit analysis is often undertaken for road projects and typically accepts market land prices as valid when computing costs. The market value of residential land reflects the private transport cost savings from a more central location, the corresponding shadow value, meanwhile, the social savings. With underpriced congestion, therefore, the market undervalues downtown residential land locations, so that application of the naive rule results in too much land there being devoted to roads. Relatedly, Wheaton (1978) has argued that the failure of cost-benefit practice to take into account the underpricing of urban auto travel resulted in massive overbuilding of urban highways in the U.S., especially in the 1950’s and 1960’s.

If automobile travel cannot be priced efficiently, then government intervention may be warranted to correct the resulting excessive decentralization. Possible policies include second-best cost-benefit analysis of transport projects, minimum density controls, and greenbelts. In fact, policies in the United States have worked in exactly the opposite direction, as emphasized by Downs (1992) and others. Subsidies for home ownership, subsidized highway construction and maintenance, and minimum-lot-size zoning are just some of the policies which have exacerbated excessive decentralization in U.S. metropolitan areas. Many planners advocate policies, such as building mass transit facilities or downtown convention centers, to reverse this trend. But because the pricing errors of the past have been cast in brick and asphalt, such policies are often misguided.

## B. Economies of Agglomeration and Welfare

We have seen that although agglomeration economies are the *raison d'être* of most cities, their exact nature is in flux and only partially understood. Our current understanding of them is based on a variety of factors including Smithian specialization, idiosyncratic matching, interaction, and innovation. Because these notions are soft, no one has really succeeded in coming to grips with how they affect the industrial organization of the modern city. Why, if there are economies of scale, is production not undertaken by a single large firm? Why do some forms of interaction occur within firms, while some others operate through the market, while yet others take place informally? And why do some interactions appear to require face-to-face contact while others can be effected via telecommunication? The answers given to these questions often refer to transactions costs, incomplete contracts, trust, and flexibility.

Given such likely causes of agglomeration economies, does the market -- broadly speaking -- deal efficiently with them? The standard answer is negative. If the agglomerative economies of scale are internalized, then efficient pricing cannot be supported by competition. If they remain external, firms will under-employ those business practices that contribute social value to their neighbors. The standard argument neglects, however, that efficiency could be achieved by competition among private city-developers who would set up optimally-sized cities, thereby internalizing the agglomeration economies. Each optimally-sized city would operate at minimum average cost -- a point of locally constant returns to scale -- with increasing returns in the production of goods being balanced by decreasing returns in the production of lots (because of transport costs). Under marginal-cost pricing the losses from goods production are just offset by the profits from the production of lots, which are manifested as land rents. (This is a variant of the Henry George Theorem.) To a limited extent the developers of edge cities are playing this role. We do not, however, observe developers trading cities in a competitive market, and we suspect that the assumptions of the implicit model on which the above argument is based are significantly unrealistic in some respect. Given our limited understanding of agglomeration economics, the policy implications of their incomplete internalization is unclear. When the familiar litany of

arguments that our big cities are too big is trotted out, we should though keep in mind that there are items on the other side of the ledger which though less tangible may be even more important.

### C. Welfare Economics and Polycentric Structures

We have seen how agglomeration economies tend to create clusters of economic activity within a city and how these clusters influence surrounding residential densities. Within an urban area, such clusters may play roles similar to the regional hierarchy of cities derived in the central place theories of Christaller (1933) and Lösch (1940). But given the rich nature of interactions within urban areas, they play many other roles as well. What can we say about the optimality of the resulting urban structure?

Our theoretical review suggested that urban subcenters, like cities themselves, are formed from the tension between centripetal and centrifugal forces. Both sets of forces entail strong externalities; external economies producing the agglomerative tendencies, and congestion or nuisance externalities limiting the size and density of agglomeration that is achieved. The first set of externalities is largely positive, suggesting an inadequate private incentive to join an agglomeration and hence excessive dispersion. The second set consists of negative externalities, so may cause too many activities to locate too close together. Since different externalities operate at different scales, it is quite possible for the spatial pattern of economic activity to be too centralized at one scale (e.g., cities that are too big) and too decentralized at another (e.g., subcenters that are too small). To further complicate matters, the externalities are linked; for example, downtown crowding, along with the excessive residential decentralization caused by underpriced transport congestion, may give rise to excessive employment decentralization which may in turn spawn excessively large secondary agglomerations.

The Anas two-location model, reviewed in the previous section, illustrates another type of externality -- one associated with subcenter *formation*. Initially, with a small population, equilibrium and optimum coincide, with everyone living at one of the locations. As the population grows, there comes a time when it is optimal for a *mass* of population to move to the second

location. Since, however, the social gains from relocation exceed the private gains, under atomistic migration the second center would not be established until later. Thus, the optimal and “market” growth paths differ. According to this reasoning, some collective action is needed not only to establish the second center at the right time but also to protect it until it becomes stable and self-sustaining. Those who have faith in the market would argue, to the contrary, that private developers can internalize these externalities, and hence have a profit incentive to form the second center at the right time.<sup>1</sup> In a more realistic model, however, with multiple locations, rivalry among developers, each trying to create her own subcenter, creates complex strategic interdependence which may result in other inefficiencies (Henderson and Slade (1993)). Thus, there may be a role for government in assisting subcenter formation, through the provision of infrastructure, the regulation of developers, or subsidization of developer activity or firm location.<sup>2</sup>

The comparison between optimum and market-determined spatial structure is further complicated by history dependence. The most obvious source of history dependence is the durability of structures and infrastructure. But, as noted earlier, even with non-durable structures, multiple stable equilibria can exist, some more efficient than others, with history determining which obtains. On balance, therefore, it appears formidably difficult to ascertain how the equilibrium size distribution and composition of subcenters differs from the optimum. While that there is certainly scope for ameliorative government action, a precise prescription of “good planning” in this arena remains elusive.

#### D. Zoning

Zoning is the principal tool used by government to influence urban spatial structure. Even if there is scope for improvement in land use over the unregulated market, zoning is not necessarily the best policy. Alternatives include pricing policies (such as differential property tax rates or

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<sup>1</sup> On a smaller scale, Rausch (1993) shows how the developer of an industrial park, in which there are production complementarities between firms, can achieve efficiency by subsidizing the first firms moving into the park in order to attract additional tenants. Shopping center developments employ a similar strategy by giving rental discounts to anchor stores.

impact fees<sup>3</sup> on developers), government creation of previously absent markets (such as that for transferable development rights), or the redefinition of property rights (such as the use of restrictive covenants in Houston). Zoning has the advantages that it entails relatively low transactions costs and is well-established. But, it is inflexible and unresponsive to market signals, and the private gains from rezoning invite rent-seeking behavior and corruption.

### Land use externalities

We distinguish three types of land use externalities: incompatible land uses, density externalities, and open space externalities.

Cities are awash in very localized externalities, from traffic created by a corner store, to the noise created by a neighborhood discotheque, to the smells from a fish shop, to the blockage of ocean views by neighbors' houses. Just how important they are is a matter of some debate, with Mills and Hamilton (1994, pp. 252-4) for instance arguing that they are not significant. Our view is that zoning to deal with incompatible land uses is valuable, especially since pricing solutions would normally be too cumbersome, but that such zoning tends to be too coarse. The separation of retail and residential land uses, for example, results in visual monotony and unnecessary inconvenience and auto travel. In any event, it is hard to see how such zoning can have a major impact on spatial structure at the scale of the city.

Density restrictions, in contrast, can obviously affect urban form. It strains credulity that such considerations as more sunlight and improved airflow at street level justify the substantial costs that many density restrictions impose -- increased travel costs, more unpriced traffic congestion, and the provision of infrastructure to exurban areas that would otherwise be undeveloped. Density restrictions are successful in preserving exclusive downtown neighborhoods but, except where the neighborhood is of outstanding architectural beauty, this is hardly a compelling justification for them.

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<sup>2</sup> The same issues have been raised on a larger scale in the debates on France's poles de croissance, Britain's New Towns Policy, and LDC policies to control growth of primate cities.

We are sympathetic to the view that open space -- greenbelts and urban parks -- is a potentially valuable public good. In many U.S. cities and in almost all cities in LDC's, there are too few places of repose, away from the urban cacophony. The argument can, however, be overdone. Most urban parks in major U.S. cities are not places for the serene contemplation of nature. And the bucolic landscapes surrounding London and Paris come at the cost of miserable and badly overcrowded neighborhoods for the poor.

Planners are fond of using land-use controls to combat urban sprawl. But what they see as haphazard development may well be efficient mini-agglomerations with some land left free for future development at higher density than is justified today.

#### Development externalities

The main objective of most development restrictions is to benefit current homeowners, whether by controlling congestion, excluding poor households, or driving up property values. There are, however, valid efficiency considerations, specifically who should pay for the infrastructure that new development requires -- roads, schools, hospitals, and so on. Vickrey (1962) provides the most incisive discussion of the topic in the literature, and advocates financing according to the user pays principle. In North America over the last quarter-century there has indeed been increasing reliance on user fees, as well as greater use of impact fees. But previously the lion's share of infrastructure costs was paid for out of general government revenue. Development restrictions were probably justified to prevent the excessive development that would otherwise have occurred.

#### Other second-best issues

Extensive reliance on property taxation at the local level may distort development in two ways. First, it causes development to occur later and at lower density than it otherwise would (Arnott and Lewis (1979)). However, considering the subsidy to development implicit in

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<sup>3</sup> This is a generic term applied to a levy, in whatever form, charged a developer to defray part or all of the cost of the

government provision of infrastructure, this might be for the better. Second, property taxation strengthens the incentive for exclusionary zoning. Under property taxation, owners of the more expensive homes in a community subsidize the public services of those with less expensive homes. To reduce the extent of subsidization, the rich have an incentive to exclude the poor and minimum-lot-size zoning is an effective tool to achieve this. Exclusionary zoning is not only a major cause of excessive suburban decentralization but also contributes significantly to social stratification and racial division. How best to combat such zoning in the context of the U.S. political system characterized by jurisdictional fragmentation and suburban-dominated state legislatures, is unclear

When markets are incomplete, the welfare theorems do not hold in general. Real estate markets are severely incomplete. Builders and homebuyers face capital market imperfections, and markets to insure against real estate risk are almost absent. In principle, these imperfections expand the range of potentially welfare-improving government intervention, but it is hard to see how zoning would be an appropriate instrument for dealing with them.

#### E. The Role of Government

In this paper we have implicitly assumed that market pressures drive urban spatial development. Yet almost half of urban land is in the public domain with the other half extensively regulated, while government control over public urban infrastructure gives it potentially huge leverage over urban form. Despite this, we feel that our emphasis is justified since urban spatial policy is, for the most part, accommodating and reactive rather than leading. Infrastructure investment is responsive to the wishes of the electorate, as expressed through the ballot box, neighborhood meetings, and referenda. Public facilities are built when they are needed, subject to overall budgetary restrictions. Also, most zoning policy aims to channel market forces not to counter them; to do otherwise invites political opposition. That urban spatial structure has evolved



in qualitatively the same way in all market-oriented economies<sup>4</sup> suggests that market forces are well-nigh inexorable.

To be sure, there are significant differences across cities in how, and the extent to which, government policy has influenced urban spatial structure. But, for the most part, these differences reflect alternative ways of responding to market forces. Paris is an interesting object lesson, since its urban form has probably been more strongly influenced by government policy than that of any other major western city. High-rise buildings have been successfully resisted in the center (the *Ville de Paris*), and through strict land use controls the government has channeled exurban development towards planned satellite towns. But the planners have been unable to control the overall growth of the Paris region, and the pressure for the creation of the satellite towns has resulted from market forces. Furthermore, the successful resistance to high-rise development in the center has been achieved only by the combination of widespread public support, an unusually powerful central government and planning establishment, and the expenditure of vast sums of money on the transport system. Continued resistance will require the construction in the center at immense cost of vast subterranean developments and a maze of underground highways.

When we first started working on this paper, we posed the provocative question: Will the Paris of tomorrow be the Los Angeles of today? We can now provide a tentative answer. Though the same powerful economic forces are at work, the center of Paris will retain its unique identity because Parisians are willing to suffer the attendant inconvenience and because *les provinces* are forced to bear much of the cost. Outside the center, spatial structure is changing rapidly and coming increasingly to resemble that of Los Angeles. In other cities around the world, the resistance to Los Angelification will be less strong.

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<sup>4</sup> In their urban design, some planned economies successfully resisted market forces. The result was grossly inefficient spatial structure. Now that these economies are becoming market-oriented, the spatial organization of economic activity in their cities is being rapidly transformed and coming increasingly to resemble that of western cities.