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Urban Economics

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urban economics

Urban economics emphasizes: the spatial arrangements of households, firms, and capital in metropolitan areas; the externalities which arise from the proximity of households and land uses; and the public policy issues which arise from the interplay of these economic forces.

Cities exist because production or consumption advantages arise from higher densities and spatially concentrated location. After all, spatial competition forces firms and consumers to pay higher land rents – rents that they would not be willing to pay if spatially concentrated economic activity did not yield cost savings or utility gains. Economists have long studied the forces leading to these proximities in location, focusing first and foremost upon the importance of transport costs.

Early theorists (for example, von Thünen, as early as 1826; see Hall, 1966) considered land use and densities in an agrarian town where crops were shipped to a central market. Early models of location deduced that land closer to the market would be devoted to producing crops with higher transport costs and higher output per acre. Cities in the 19th century at this time were characterized by high transport costs for both goods and people, and manufactured goods were produced in close proximity to a central node – a port or a railway from which goods could be exported to world markets. The high costs of transporting people also meant that workers' residences were located close to employment sites.

Transport improvements in the late 19th century meant that urban workers could commute cheaply by streetcar, thereby facilitating the suburbanization of population into areas surrounding the central worksite. More radical technical change in the first decades of the 20th century greatly reduced the cost of transporting materials and finished goods. The substitution of the truck for the horse and wagon finally freed production from locations adjacent to the export node. The introduction of the private auto a decade later further spurred the decentralization of US metropolitan areas.

Spatial forces

The seminal literature in urban economics provides positive models of the competitive forces and transport conditions which give rise to the spatial structure of modern cities. These models emphasize the trade-off between the transport costs of workers, the housing prices they face, and the housing expenditures they choose to make. Relatively simple models can explain the basic features of city structure – for example, the gradient in land prices with distance to the urban core; the house price gradient; the relationship between land and housing price gradients; the intensity of land use; and the spatial distribution of households by income (see Breuckner, 1987, for a review).

Empirical investigations of these phenomena reveal clearly that these gradients have been decreasing over time. Indeed, the flattening of price and density gradients over time has been observed in the United States since as long ago as the 1880s. (Early work is reported in Mills, 1972.) In interpreting these trends, it is important to sort out the underlying causes. The stylized model described above emphasizes the roles of transport cost declines (in part, as a result of technical change and the role of the private auto), increases in household income, and population growth in explaining suburbanization. These models also rely upon the stylized fact that the income

elasticity of housing demand exceeds the income elasticity of marginal transport costs. The alternative, largely ad hoc, explanations stress specific causes, for example the importance of tax policies which subsidize low-density owner-occupied housing, the importance of neighbourhood externalities which vary between cities and suburbs, or the role of variations in the provision of local public goods. There is a variety of empirical analyses of the determinants of the variations in density gradients over time and space. A general finding is that levels and intertemporal variations in real incomes and transport costs are sufficient to explain a great deal of the observed patterns of suburbanization.

Durable capital

But, of course, variations in many of these other factors are highly correlated with secularly rising incomes and declining commuting costs, so any parcelling out of root causes is problematic. The elegant and parsimonious models of urban form have proven easy to generalize in some dimensions – for example, to incorporate stylized external effects and variations in income distributions across urban areas. It has proven to be substantially harder to recognize the durability of capital in tractable equilibrium models. The original models assumed that residential capital is infinitely malleable, and that variations in income or transport costs would be manifest in the capital intensity of housing over space in a direct and immediate way. The decline in land rents with distance from the urban centre means that developers' choices of inputs vary with capital-to-land ratios – declining with distance to the core. Dwellings are small near the urban core and large at the suburban fringe. Tall buildings are constructed near the urban centre, and more compact buildings are constructed in peripheral areas. But, of course, these structures and housing units are extremely durable, with useful lives exceeding 40 years or more. Thus, insights derived from the perspective in which the capital stock adjusts instantly to its long-run equilibrium position in response to changed economic conditions are limited.

   Incorporating durable housing into models of residential location and urban form implies some recognition of the fact that 'history matters' in the structure and form of urban areas. Cities with the same distribution of income and demographics and with identical transport technologies may be quite different in their spatial structures, depending upon their historical patterns of development. Extensions of these simple models analyse the form of urban areas when developers have myopic or perfect foresight and when development is irreversible. With myopic developers, land is developed at each distance from the centre to the same density as it would have been built with malleable capital, but, once built, its capital intensity is frozen. Thus, with increasing opportunity costs of land over time, population and structural densities may increase with distance from the urban core.

   With perfect foresight, the developer maximizes the present value of urban rents per acre, which vary with the timing of urban development. The present value of a parcel today is its opportunity cost in 'agriculture' until development plus its market value after conversion (minus construction costs). With perfect foresight, developers choose the timing of the conversion of land to urban use as a function of distance to the urban core, and development proceeds in an orderly fashion over time. Locations are developed according to their distance from the centre.

   Of course, durable residential capital also implies that structures may depreciate or become obsolete. In particular, a historical pattern of develop-

ment along concentric rings from the urban core, together with rising incomes, means that the most depreciated and obsolete dwellings are the more centrally located. But embedded in each of these parcels of real estate is the option to redevelop it in some other configuration. Obsolete and depreciated dwellings commanding low prices are those for which the option to exercise redevelopment is less costly.

Models of development with perfect foresight in which residential capital depreciates imply that the timing of initial redevelopment of residential parcels depends only on their distance from the urban core (since that indexes their vintage of development). These models imply that the capital intensity of land use does not exhibit the smooth and continuous decline with distance from the core. Capital intensity does decline with distance, on average, but the relationship is not monotonic.

With uncertainty, developers take into account their imperfect knowledge of future prices in making land use decisions today. But this means that developers may make mistakes by developing land too soon. As a consequence, land development may often proceed in a leapfrog pattern. Landowners may withhold some interior land from development in anticipation of higher rents and profitable development later on (see Capozza and Helsley, 1990, for a unified treatment).

The key point in these modern models of urban form which incorporate durable residential capital is that the timing as well as the location of development affect the choices made by housing suppliers. History 'matters' in these models, just as it does in the decisions of housing suppliers in urban areas.

Externalities

Theory

Recent work has greatly extended these urban models to address explicitly the production and consumption externalities which give rise to cities. The basic models combine Marshallian notions of 'economics of localized industry' and Jacobs's (1969) notions of 'urbanization economies' with the perspective on monopolistic competition and product diversity introduced by Dixit and Stiglitz (1977).

On the consumption side, the general form of these models assumes that household utility depends on consumption of traded goods, housing, and the variety of local goods. The markets for traded goods and housing are competitive, while the differentiated local goods are sold in a monopolistically competitive market. If there is less differentiation among local goods, then variety loses its impact on utility; greater differentiation means that variety has a greater effect on utility. Under reasonable assumptions, the utility of a household in the city will be positively related to the aggregate quantity of local goods it consumes and the *number* of types of these goods which are available in the economy (see Quigley, 2001, for examples).

On the production side of the economy, the importance of a variety of locally produced inputs can be represented in a parallel fashion. For example, suppose that the aggregate production function includes labour, space and a set of specialized inputs. Again, the markets for labour and space can be taken as competitive, while the differentiated local inputs are purchased in a monopolistically competitive market. If there is less differentiation among inputs, then variety loses its impact on output; greater differentiation means that variety has a greater effect on output. For example, a general counsel

may operate alone. However, she may be more productive if assisted by a general practice law firm, and even better served by firms specializing in contracts, regulation and mergers. Again, under reasonable conditions, output in the city will be related to quantities of labour, space, and specialized inputs utilized and also to the number of different producer inputs available in that city.

The theoretical models built along these lines yield a remarkable conclusion: diversity and variety in consumer goods or in producer inputs can yield external scale economies, even though all individual competitors and firms earn normal profits. In these models, the size of the city and its labour force will determine the number of specialized local consumer goods and the number of specialized producer inputs, given the degree of substitutability among the specialized local goods in consumption and among specialized inputs in production. A larger city will have a greater variety of consumer products and producer inputs. Since the greater variety adds to utility and to output, in these models larger cities are more productive, and the well-being of those living in cities increases with their size. This will hold true even though the competitive and monopolistically competitive firms in these models each earn a normal rate of profit (see Fujita and Thisse, 2002, for a comprehensive treatment).

Applications: pollution and transport

As emphasized above, however, the advantages of urban production and consumption are limited. Explicit recognition of the land and housing markets and the necessity of commuting suggests that, at some point, the increased costs of larger cities – higher rents arising from the competition for space, and higher commuting costs to more distant residences – will offset the production and consumption advantages of diversity. Other costs like air and noise pollution no doubt increase with size as well. Nevertheless, even when these costs are considered in a more general model, the optimal city size will be larger when the effects of diversity in production and consumption are properly reckoned. Urban output will be larger and productivity will also be greater (see Quigley, 1998).

The empirical evidence assembled to support and test these theoretical insights about the regional economy is potentially very valuable. Hitherto, much of the discussion about the sources of economic growth was framed at that national level, and most of the aggregate empirical evidence – time series data across a sample of countries – was inherently difficult to interpret. By framing these theoretical propositions at the level of the region, it is possible to investigate empirically the sources of endogenous economic growth by using much richer bodies of data within a common set of national institutions. Geographical considerations of labour market matching and efficiency (Helsley and Strange, 1990), of the concentration of human capital (Rauch, 1993), and of patent activity (Jaffe, Trajtenberg and Henderson, 1993) have all been studied at the metropolitan and regional levels, and considerable effort is under way to use regional economic data to identify and measure more fully the sources of American economic growth. These are major research activities exploring urban externalities in urban economies throughout the developed world. This research programme is still in its infancy.

Of course, specialization, diversity and agglomeration are not the only externalities arising in cities. High densities and close contact over space reinforce the importance of many externalities in modern cities. Among the most salient are the external effects of urban transport – congestion and

pollution. Most work trips in urban areas are undertaken by private auto. (Indeed, in 2000, less than four per cent of commuting was by public transit; see Small and Gomez-Ibanez, 1999.) In most US cities, automobiles are the dominant technology for commuting from dispersed origins to concentrated worksites. This technology is even more efficient for commuting from dispersed residences to dispersed worksites in metropolitan areas. Since commuting is concentrated in morning and evening hours, roads may be congested during peak periods, and idle during off-peak periods. Road users pay the average costs of travel when they commute during peak periods. They take into account the out-of-pocket and time costs of work trips, and in this sense commuters consider the average level of congestion in their trip-making behaviour. But commuters cannot be expected to account for the incremental congestion costs their travel imposes on other commuters. This divergence between the marginal costs of commuting and the average costs of commuting may be large during peak periods on arterial roadways.

The imposition of congestion tolls, increasing the average costs paid by commuters to approximate the marginal costs they impose on others, would clearly improve resource allocation. In the absence of efficient road pricing, the rent gradients in metropolitan areas are flatter, and the patterns of residential location are more centralized than they would otherwise be. Land markets are distorted and the market price of land close to the urban core is less than its social value.

The obstacles to improved efficiency are technological as well as political. Until recently, mechanisms for charging road prices were expensive and cumbersome. But modern technology (for example, transponders to record tolls electronically) makes road pricing easy on bridges, tunnels and other bottlenecks to the central business district. Regular commuters affix a device to their autos, a device which can automatically debit the traveller's account. It would be a simple matter to vary these charges by time of day or intensity of road use and to make the schedule of these changes easily available to commuters. So far, at least in the United States, about the only form of price discrimination on bridges, tunnels and bottlenecks has been by vehicle occupancy, not by time of day and intensity of road use. It is surely possible to profit from the experience of other countries (such as Singapore) in pricing scarce roadways.

Political resistance is a major factor inhibiting the diffusion of road pricing. Typically, tolls are imposed in new facilities and the proceeds are pledged to retire debt incurred in construction. Paradoxically, tolls are thus imposed on new uncongested roads. Later on, when the roads become congested, the initial debt has been retired, and there is political support for removing the toll. (After all, 'the investment in the bridge has been repaid.') This is surely an instance where economics can better inform public policy.

Applications: social, spatial and neighbourhood

Urban areas have always been characterized by social externalities as well. The close contact of diverse racial and ethnic groups in cities gives rise to much of the variety in products and services which enrich consumption. But the city is also characterized by the concentration of poverty and by the high levels of segregation by race and class.

The spatial concentration of households by income is, of course, predicted by the models of residential housing choice described above. A central question is the extent to which poverty concentrations give rise to externalities which disadvantage low-income households *relative* to their deprived cir-

cumstances in the absence of concentration. A great deal of qualitative research by other social scientists suggests that this is the case. Quite recent econometric research, however, suggests that this proposition is quite hard to demonstrate quantitatively by reliance on non-experimental data (see Manski, 1995.) Nevertheless, the view that concentrations of disadvantaged households lead to more serious social consequences simply because of concentration is widely shared. For example, in low-wage labour markets most jobs are found through informal local contacts. If unemployed workers are spatially concentrated, it follows that informal contacts will produce fewer leads to employment.

Economic models of residential location also suggest that households will be segregated by race – to the extent that race and income are correlated. Yet research clearly indicates that the segregation of black households in urban areas is far greater than can be explained by differences in incomes and demographic characteristics.

Until quite recently, these patterns of segregation could be explained by explicitly discriminatory policies in the housing market. During the period of black migration to northern cities, rents were substantially higher in black neighbourhoods than in white neighbourhoods. As levels of migration tapered off in the 1970s, price differentials declined. The patterns of residence by race may be explicable by the tipping point models of Thomas Schelling (1971). In these models, there is a distribution of tolerance among the population, reflecting the maximum fraction of neighbours of a different race tolerated by any household. In this formulation, the race of each household provides an externality to all neighbouring households. It is easy to show that the racial integration of neighbourhoods may be impossible to achieve under many circumstances.

Despite this, there is widespread evidence of conscious discrimination in the markets for rental and owner-occupied housing (Ross and Yinger, 2002), four decades after passage of the first Fair Housing legislation.

Racial segregation in housing markets may have particularly important welfare implications as jobs continue to suburbanize at a rapid rate. Racial barriers to opening up the suburbs for residence may lead to higher unemployment rates among minority workers (see Glaeser, Hanushek and Quigley, 2004.)

The barriers to the integration of the suburbs by race and income are also related to the fiscal externalities which are conferred by one category of residents upon another category. Most local tax structures emphasize *ad valorem* property taxes, and in most urban areas towns are free to vary property tax rates to finance locally chosen levels of public expenditure. If local tax revenues are proportional to house value, and if local public expenditures are proportional to the number of households served, local governments have strong incentives to increase the property value per household in their jurisdictions. To achieve this outcome, local governments may simply use zoning regulations to prohibit construction of housing appropriate to the budgets of lower-income households. The prohibition of high-density housing and multi-family construction, the imposition of minimum lot-size restrictions and the imposition of development fees can all be used as devices to increase property tax revenue per household. Importantly, these rules also increase the price of low-income housing. Many of these regulations can also be cloaked in terms of ecological balance and environmental protection. The inability of higher levels of government to achieve balance and equity in new residential development in US urban areas is quite costly.

Summary

The field of urban economics emphasizes the spatial arrangements of households, firms, and capital in metropolitan areas, the externalities which arise from the proximity of households and land uses, and the policy issues which arise from the interplay of these economic forces.

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See also

< xref = U000064 > urban agglomeration;
< xref = U000061 > urban production externalities;
< xref = xyyyyyy > urban transportation economics.

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Index terms

cities
congestion
density gradient

diversity (ethnic and racial)
endogenous growth
external economies
housing markets
human capital
labour markets
land markets
land use
monopolistic competition
patents
pollution
price discrimination
property taxation
regional economics
residential segregation
road pricing
Schelling, T.
social externalities
spatial competition
suburbanization
tipping point models
transport costs
urban agglomeration
urban consumption externalities
urban economics
urban production externalities
von Thünen, J.
zoning

Index terms not found:

density gradient
diversity (ethnic and racial)
endogenous growth
external economies
patents
property taxation
regional economics
residential segregation
urban agglomeration
urban consumption externalities
urban production externalities