

Department of Economics, Brown University  
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To: EC 237 Students  
From: Prof. Glenn C. Loury

1. This note summarizes some connections between the articles that I want to point out, and some themes that I want to underscore for the first two parts of the course – Part I on Physical Place and Part II on Socio-Economic Structure.

2. Key articles from the first part are Benabou, “Workings of a City;” Fernandez-Rogerson, “Income Distribution, Communities...”; and Sethi-Somanathan, “Inequality and Segregation.” Also of interest was the paper by Echenique and Fryer on the measurement of segregation. These papers are all location models and they have some important things in common:

a. A “single-crossing property” on preferences insures that higher income people outbid lower income people for the privilege of locating close to other higher income people. This makes the trivial equilibrium (in which all types are indifferent between the two locations, which are identical in their composition) unstable, and makes the maximally segregated equilibria (where locations are strictly income/skill stratified a stable outcome).

b. Rent differentials compensate marginal decision-makers for differences in local externalities [in technology (Benabou) or preferences (Sethi-Somanathan)] that vary across locations in a segregated equilibrium.

c. In general, the sorting process is socially inefficient. E.g., Benabou’s most striking result has to do with “self-defeating flight” (if the technology is not too productive, then withdrawal of high skilled from contact with low skilled leads the latter to drop out of the workforce, thereby lowering the productivity of the high skilled, so that in the ultimate equilibrium total output falls as does the number of people obtaining high skills, while those choosing high skills are no better off.) Fernandez and Rogerson’s key result is that income-stratified communities form in such a way that everyone could be made better-off if the lowest income marginal agent in any given community were reassigned to the next poorest community.

d. Implicit in all of these models, but not explicitly discussed, is the *network structure* transmitting the externalities in production or consumption which make these models go. That is, each paper assumes but does not explain the existence of sites (communities, locations, places in physical space), and posits that all agents need to locate at one and only one a site in order to produce/consume. Moreover, given that a certain set of agents locate at the same site, the actions of each agent in that set affect the welfare of the other agents at that same site, but not the welfare of agents at the other sites.

e. Thus, define a *network structure* to be a set of nodes (representing agents) and a set of links (denoting a “connection” of some kind between pairs of nodes.) Given such a network structure, we can look at which nodes are linked

to which other nodes, and we might suppose, for two nodes that are linked, that some external effect is transmitted from the action of any one agent onto the welfare of all others linked to this one agent. The models of physical place and inequality discussed above have this implicit network structure: a “community” or “neighborhood” is just a subset of nodes with the property that every node is linked to every other node in the subset. (Hence, Benabou’s city consists of a network structure with two clusters of nodes, and with every node interacting with every other node within a cluster, but no interactions (except through market prices) between clusters.) In this formulation, as well as in that of the other authors, the network structure transmitting externalities is taken as fixed. Agents just decide where within a given structure to locate. Markets for space allocate agents among nodes by affixing rents to all but the least desirable sites, where the level of rent determined (ala Ricardo) by a requirement that marginal agents be indifferent between locations.

f. These spatial models with their exogenously imposed network structures also have the implication that even when agents are ex ante identical, stable equilibrium allocations will be asymmetric ex post. In other words, these are models where symmetry-breaking is the norm.

g. The Echenique-Fryer paper is interesting in this context because it proposes an empirical strategy for measuring segregation that is grounded in the concepts of graph theory, where properties of the network structure are taken as building blocks for the measurement. The E-F “spectral segregation index” is computed by first constructing a graph that shows which nodes (blocks in a city, say) are “linked” to which others (two blocks are linked for instance, if both have mainly black residents and they are located within a one-mile radius of one another). From these data one constructs an “adjacency matrix,” and from the largest eigenvalue and associated eigenvector of this matrix one derives the segregation index. My interest in this work stems from the prospect that these techniques can be profitably adapted to other context of social interaction.

3. In Part II the key articles have been Loury (1977, 1981), Becker-Tomes, Mookherjee-Ray, Bowles-Sethi, and Montgomery.

a. All but the last of these articles deal with inequality given intergenerational altruism and imperfect capital markets or spatial segregation.

b. Notice that here too there is a social network structure at work: within each dynasty, one agent is tied to a specific other agent across the generations. The former agent gets utility from the consumption (or welfare) of the latter, and the latter agents gets human capital investment resources from the former. This social structure is treated as given, and the long-term implications for inequality of the absence of capital markets and the altruism-driven provision of human capital investments are investigated in these articles.

c. Mookherjee and Ray do us the service of unifying results from this literature, and identifying conditions under which dynastic equality in the steady states of these intergenerational models can be expected. Heterogeneity of the cross-generation investment options cuts against dynastic equality (the “narrow span condition” is necessary and sufficient for the existence of an equalizing

steady state). And, lumpiness of the set of investment options promotes the existence of multiple steady states, some equalizing and some disequalizing (a “perfectly rich” occupational structure admits of a unique steady state, which can be equalizing if and only if the narrow span condition holds.)

d. So, perfect richness (i.e., close substitutes exist for every human capital bequest decision) assures that history eventually doesn’t matter for the distributional outcome in the long run. And, the failure of narrow span (i.e., a wide diversity of the types of human capital which can be bequeathed) assures that any steady state must be disequalizing.

e. Finally, notice that Montgomery also exploits an explicitly modeled social network (it’s stochastic; links between any two nodes exist only with probability between zero and one) in his model of job referrals and wages. Employers know that workers ties to one another are not purely non-random, and can exploit this knowledge of social structure to draw inferences about the quality of information (i.e., referrals) provided by incumbent workers.

f. While I may briefly discuss the Costrell-Loury paper if time permits, it does not fit neatly into the classificatory scheme provided above. It’s just a more or less interesting paper showing how wage inequality relates to skills inequality, given a certain specification of the structure of production.

4. Here are some open questions suggested by the foregoing summary:

a. Can we successfully combine the spatial structure of the location models with the generational structure of the dynastic inequality models? Sethi and Somanathan are explicit in raising this question for further research. Loury (1977) stated his problem in these terms, but did not model the location process rigorously. Combining Loury’s (1977) question with Sethi and Somanathan’s (2004) model might be interesting. (An effort in this direction is the paper by Bowles and Sethi.) Also interesting might be an effort to introduce intergenerational effects and dynamics into the local externality-global complementarity framework of Benabou.

b. Can we successfully endogenize the network structures implicit in these models of space and of social influences on inequality? In the location models, and in the dynastic inequality models, the links among nodes are presumed given. (In the location context, people choose the nodes at which to locate in a given structure, but links among nodes are fixed.) But, what if people were choosing the links between themselves and others, instead of the nodes at which to locate? (Think of this as investing in a friendship, where spillover externalities are anticipated as a result of a link to any other person. Links are limited because the cost resources to maintain. And, the value of a link to some other person depends on whom that person is linked to. In equilibrium, the network structure must be stable, in that nobody wants to form a non-existent link or dissolve an existent one.) Can we build a reasonable theory with endogenous links (see article by Goyal and Bala in Econometrica about 2001-02 on a theory of endogenous networks for a suggestive discussion of this problem.) Or, asking a related question, what would the model of Montgomery lead to if one tried to endogenize the network structure on which he relies in constructing his job-referral equilibrium?

c. Can we extend this kind of analysis of social influences and inequality to the realm of “virtual communities?” E.g., what is the network structure of the economics profession,

and how is inequality in publication success (say) related to that structure? Suppose I say that each economist is a “node,” and the existence of a published paper by one of them expressing thanks for the comments of the other constitutes a “link” between the two. Ideas flow across links in this structure. Links are endogenous, and secondary links (who the people I’m linked to are themselves linked to) will also matter. What kind of structure should I expect to see evolving in such a network over time, and how likely is it that the long run result will be anything close to equalizing?