INTRAURBAN LOCATION AS A CLUE TO CONDITIONS OF URBAN DUALISM

By

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Introduction

Can the urban economist adapt the tools of analysis he uses to describe American cities and make sense of the curiously fragmented urban economies of Southeast Asia?

The economic fragmentation of cities, in its simplest form, is what is commonly called urban dualism. This phenomenon of dualism is the segregation of the urban economy into two sectors: the "formal" and the "informal." Available data describe production in the formal sector as relatively capital-intensive, wages as stable, and employment as regular. About the informal sector we really have very few hard facts, but we may take production there to be labor-intensive, wages to be unstable, and employment irregular.[1] Conditions in the informal sector are difficult to verify directly. It turns out that this sector, in spite of its apparently large size, is often missed by official industrial and labor-force surveys in less developed countries.[2]

The point of this paper is to suggest that a way to verify hypotheses about economic conditions underlying urban dualism is to look at patterns of urban location. If conditions of dualism persist over the long run, they will be reflected in discernible regularities of urban spatial structure. The urban economist discerns such regulari-

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[1] For more elaborate discussions on dualism, see Geertz (1963), Doctor and Gallis (1964), Oshima (1971), Weeks (1975) and Sethuraman (1976).

[2] See Weeks (1975).

ties with the help of key theoretical tools, especially what he calls rent functions and gradients.[3] I intend to show here how such tools may be derived to take explicit account of dualism and to shed light on its nature.

Hypotheses on Urban Dualism

It is not all very clear what causes urban dualism. To blame the phenomenon on history and accident is no help at all. The accepted economic explanation is that dualism is largely an outcome of distorted factor prices. Institutions and government intervention are seen as the culprits.

One hypothesis attributes urban dualism to institutionally overpriced urban labor as a consequence of either stringent minimum wage legislation or the bargaining power of organized labor. This is the view taken by Todaro (1969) in his model of migration and unemployment. The way he sees it, the informal sector is nothing but a residual, the excess of urban labor supply over demand in the formal sector. Those who happen to belong to this residual are forced to somehow eke out a living by means of various marginal economic activities. Thus the informal sector is treated as a reserve pool of labor, of people barely getting by while awaiting opportunities in the formal sector.

Another hypothesis is that it is not that labor is overpriced, but that capital is too cheap. Artificially cheap capital is the result of a complex package of privileges: tariff protection, an overvalued local currency, interest rate ceilings, government lending and investment procedures, and a host of other fiscal and monetary policies. Such cheap capital would be of very limited supply. The firms with access to it make up the formal sector. The rest of the economy comprises the informal sector, which is excluded from state privileges and left to deal with small financial markets beyond government regulation.

This is not to say that the two hypotheses are mutually exclusive. Both may hold at the same time. The first focuses on labor as a factor of production while the other has its attention on capital. Neither hypothesis by itself seems to be adequate. If we introduce land as a third factor of production, we can derive implications of

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[3] The names associated with such tools are Alonso (1964), Muth (1969), Mills (1967) and Solow (1973).

both hypotheses on intraurban location, and see how they agree with what we know about locations in the world.

Framework and Concepts

Imagine a monocentric city on a featureless plain. The city produces a single good that must be transported to the market at the center to be sold at a given price. Producers incur transport costs to bring the good to the market downtown while households pay for journey-to-market and journey-to-work costs. Transport and journey costs for everyone are a rising function of distance from the center of the city.[4] In an effort to save on such costs, four groups compete for land and locations close to the center: (i) formal-sector producers; (ii) informal-sector producers; (iii) formal-sector households; and (iv) informal-sector households. In the end, nobody really has an advantage in location because all savings in transport and journey costs are matched by higher land rents charged by greedy absentee landlords.

1. Formal and Informal Production

Formal and informal producers maximize profits subject to identical production functions, but face different factor prices in different sectors. The common production function is linearly homogeneous with variable factor proportions. For each producer an average cost function can be derived and expressed in terms of factor prices.[5] The average cost function for the typical producer in the formal sector is defined here as:

$$C^f(x) = C(w^f, i^f, r(x)) \qquad (1)$$

and for the typical producer in the informal sector as:

$$C^n(x) = C(w^n, i^n, r(x)) \qquad (2)$$

where x is distance from the center; w, i, and $r(x)$ are labor wage, price of capital, and price of land per unit time respectively. The superscripts f and n identify the formal and informal sectors respectively. Our hypotheses specify $w^f > w^n$ and $i^f < i^n$.

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[4] These are heroic assumptions but they keep things simple and they are the same ones that have yielded very credible results for urban economists.

[5] The derivation and properties of this cost function are given in Shephard (1970). Its usefulness in urban economics was first shown by Solow (1973).

In long-run equilibrium, profits at any location drop to zero. Land rents adjust to cover the spread between the price of the produced good and the sum of its production and transport costs. This equilibrium condition is

$$p = C^f(x) + t(x) \tag{3}$$

$$p = C^n(x) + t(x) \tag{4}$$

where p is the given price of the good at the market and t(x) is transport cost per unit of the good.

2. Formal and Informal Households

Households consume two goods — the produced good and residential land — which enter the same utility functions, but are constrained by different incomes in different sectors. Let a single wage earner provide for each household. Net household income is therefore given as $w^f - j(x)$ in the formal sector and $w^n - j(x)$ in the informal sector, where j(x) is journey cost per unit time.

An equivalent problem to maximizing utility subject to a given budget is to minimize expenditure subject to the attainment of a given utility level. The latter problem yields what is known as the expenditure function whose arguments are goods prices together with a utility index.[6] Expenditure per unit time of the representative household in the formal sector is given here as

$$w^f - j(x) = E(p, r(x), U^f) \tag{5}$$

and of the informal sector as

$$w^n - j(x) = E(p, r(x), U^n) \tag{6}$$

In the long run, land rents adjust so that no household can raise its level of utility by changing its residential location. Every household in the same sector reaches the same level of utility, given as U^f in the formal sector and U^n in the informal sector. The level of utility is higher in the formal sector simply because $w^f > w^n$.

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[6] The use of the expenditure function here is a fresh application. Its derivation, properties, and uses in public finance are demonstrated by Diamond and McFadden (1974).

3. *Rent Functions and Gradients*

A rent function is defined implicitly by each of equations (3), (4), (5), and (6). Each rent function specifies the highest land rent a household or producer is willing to bid at every point of distance from the center of the city. The land market assigns locations to the highest bidders. Since transport and journey costs are rising functions of distance, rents must fall with distance (rent gradients are negative); and as long as transport or journey costs do not rise more than proportionately with distance, substitution in production and consumption makes rents decline at a diminishing rate.

With rent functions that are monotone decreasing, it is the household or producer with the steeper rent function who bids for and wins the location closer to the center. The slope or gradient of the rent function depends on relative factor prices for a producer and on relative goods prices and income for a household.

A Stylized Picture of Intraurban Location

Before we proceed to derive rent gradients, let us specify a pattern of intraurban location that will tell how such gradients should behave. The simplest picture that comes to mind is of a city with three concentric zones. The central core (or what is known as downtown) is occupied by the producers of the formal sector: banks, hotels, department stores, office buildings, and large warehouses. Surrounding this core is a vast zone of mixed land uses: traditional market places, dressmaking shops, repair services, retail stores, and other shops of informal producers — all mixed together with a huge number of low-income residences, or the homes of informal households. The outermost zone is devoted to the residential districts of the more well-to-do households of the formal sector.

To depict the city of Manila in the way just described might result in something like Fig. 1.[8] To be sure, such a stylized picture must be considered very tentative. It is pieced together from nothing more

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[7] This gestalt is shared by McGee (1967) who notes that most of the Southeast Asian city "is characterized by a tremendous mixing of economic activity and land use." (p. 127).

[8] The zones are not strictly circular because of the particular shape of Manila's transportation network, as well as natural and political barriers.

than casual observation and description.[9] But it does seem to be a plausible image and for the present we shall take it as given. The next thing to do is to see whether our hypotheses about the conditions underlying urban dualism are consistent with this given caricature of a city.
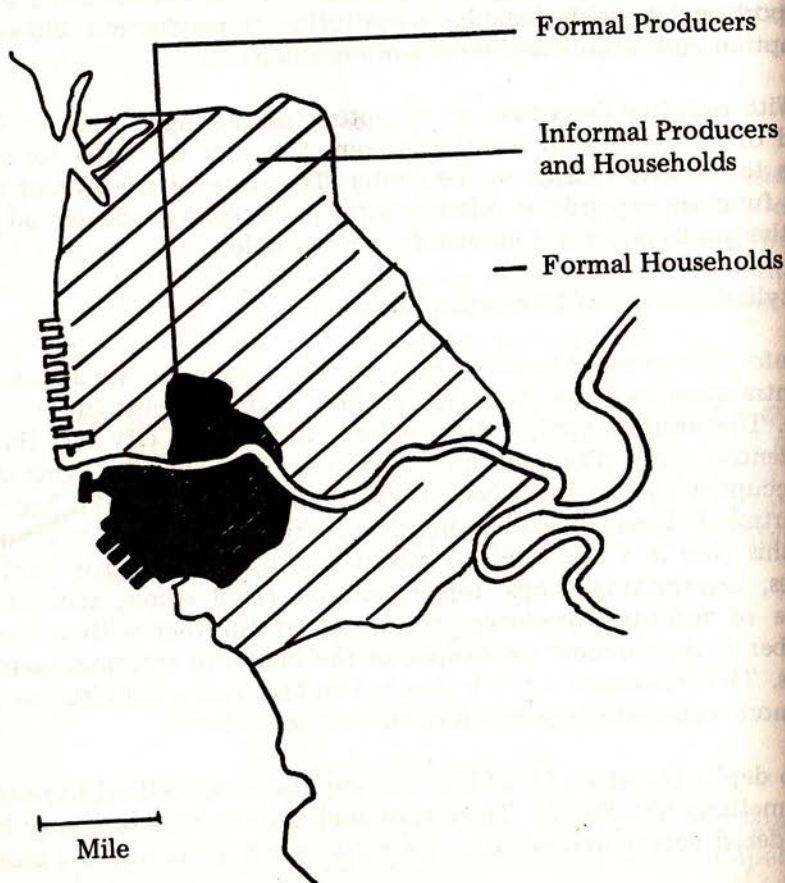

Formal Producers

Informal Producers and Households

Formal Households

Mile

Figure 1. A Stylized Picture of Manila

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[9] The standard source for a description of the pattern of land use in Southeast Asian cities is McGee. For Manila, a good source might be land-use maps of the Project Planning and Development Office of the Department of Public Works.

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Implied Conditions of Dualism

Designate r_1, r_2, r_3 and r_4 as the rent functions of formal producers, informal producers, formal households and informal households respectively. The given description of intraurban location implies three key conditions about the relative values of the rent gradients: (i) $r_1 < r_2$ since formal producers locate closer to the center than informal producers; (ii) $r_3 > r_4$ since formal households locate further from the center than informal households; and (iii) $r_2 = r_4$ since informal producers and households locate together within the same zone. The conditions are shown graphically in Fig. 2.
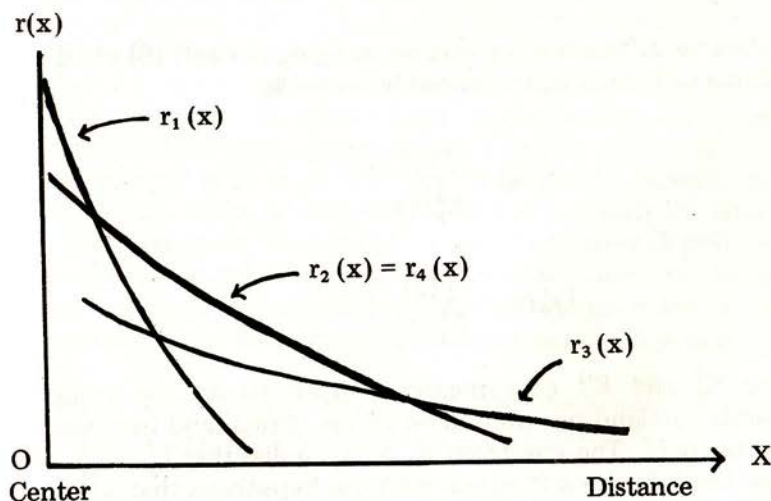

Figure 2. Rent Functions

1. Factor Prices

Differentiating with respect to distance x and rearranging equations (3) and (4) individually give the rent gradients for formal and informal producers:

$$r_1'(x) = \frac{-t'(x)}{C_r^f(x)} \tag{7}$$

$$r_2'(x) = \frac{-t'(x)}{C_r^n(x)} \tag{8}$$

where C_r^f and C_r^n conveniently turn out to be the derived demands for

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land per unit of output in the formal and informal sectors.[10] For the condition $r_1' < r_2'$ to hold, it must be the case that $C_r^f < C_r^n$ — that formal producers less land per unit of output. This is consistent with the hypothesis that $i^f < i^n$ since that induces formal producers to substitute more capital for land. In this case, the other hypothesis — that $w^f > w^n$ — is not so appealing because it works in the opposite direction. It encourages substitution of land for relatively costly labor in the formal sector. But it cannot be ruled out entirely. Both hypotheses may operate as long as the net effect is substitution away from land by formal producers more than informal producers.

2. Household Incomes

Likewise differentiating and rearranging (5) and (6) yield the rent gradients of formal and informal households:

$$r_3'(x) = \frac{-j'(x)}{E_r^f(x)} \tag{9}$$

$$r_4'(x) = \frac{-j'(x)}{E_r^n(x)} \tag{10}$$

where E_r^f and E_r^n conveniently happen to be the compensated demands for land per household in the formal and informal sectors respectively.[11] The condition $r_3' > r_4'$ implies that $E_r^f > E_r^n$. This is a happy result because it agrees with the hypothesis that $w^f > w^f$. The households with higher income will naturally have greater demands for residential land, and will consequently choose to live further away from downtown.

3. The Informal Sector

Normally, urban producers of goods and services locate closer to the center of the city than do households. But such is not the case in

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[10] The partial derivative of a cost function with respect to a factor price gives the derived demand for that factor. This is a classic property of the cost function (see Shephard, 1970).

[11] The partial derivative of an expenditure function with respect to the price of a good gives the compensated demand for that good (see Diamond and McFadden, 1974).

the informal sector. Our stylized picture puts informal producers and households together in the same zone. The rent functions coincide: $r_2' = r_4'$. From (8) and (10) we obtain

$$\frac{-t'(x)}{C_r^n(x)} = \frac{-j'(x)}{E_r^n(x)} \tag{11}$$

What peculiar conditions push informal producers away from the center and informal households toward the center so that they locate together? On the part of household location the answer is quick: low wages limit the demand for residential land (making E_r^n low) so that informal households end up with the congested areas close to downtown.

However, the same situation of low wages induces informal producers to substitute more labor for land (making C_r^n low as well) which encourages even more central shop locations. Something else must offset the effect of low wages on the intensity of land use. Indeed, the hypothesis that $i^f < i^n$ serves that purpose well. A sufficiently exorbitant price of capital to informal producers turns the tide: they are forced to use much less capital and more land (pushing up C_r^n) and are driven away from the center where land is dear.

All in all, the two hypotheses taken together seem to fit in very snugly with our adopted picture of intraurban location.

Conclusion

The key idea is to show how patterns of intraurban location can help to explain the nature of urban dualism. The tasks we have performed are: (i) to present two hypotheses attributing urban dualism to distorted factor prices; (ii) to construct a framework yielding the appropriate rent functions and gradients; (iii) to describe a stylized picture of urban spatial structure serving to impose restrictions on the values of the rent gradients; and (iv) to check to see how such values agree with those implied by the hypotheses.

The results are by no means meant to be definitive. One possible source of doubt is the given picture of a dualistic city. While the picture's gross simplicity may be excused on the grounds that a more detailed portrait will only serve to torment the analysis, its empirical basis has yet to be established in a systematic way. The need to search for stylized facts of location remains.

The analysis stands on the assumptions of a single produced good and of identical production and utility functions, assumptions so contrived as to allow us to focus narrowly on the effects of dichotomous factor prices. The same assumptions may not be justified if we are to evaluate sharply the hypotheses which try to explain dualism in other terms.

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