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CONTRASTS IN AGGLOMERATION: NEW YORK AND PITTSBURGH

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The natural inclination of a scientist when confronted with a new problem is to try to solve it with old tools. When he is finally convinced that the old tools will not do the job, he retreats to his shop to fashion some new tools. The burden of my argument in this paper is that we have reached the stage in regional economics when we must begin to fashion some new analytical tools.

When I say regional economics I have in mind specifically the analysis of the growth and structure of the economy of geographic subdivisions within a national economy. This type of analysis is now being carried on in at least a dozen metropolitan areas throughout the country and in numerous other types of subdivisions, large and small. I have been associated with two such studies: the New York Metropolitan Region Study, which just recently published its final report, and the Pittsburgh Economic Study, which is at its halfway mark, having been initiated in June, 1959, and being scheduled for completion in June, 1962. My observations, as the title of my paper suggests, are drawn from these two immersions in regional economics.

The basic-nonbasic approach to the analysis of a region has been under severe attack from many quarters in recent years. But I think it is fair to say that alternative approaches have differed in degree of refinement more than in kind. Fundamentally, we still go about our business in the same way. We try to identify the autonomous influences operating on the region and chart a network of interdependence between sectors within the region. I have no quarrel with this approach. I find it difficult to frame the problem otherwise. My quarrel is with the limitations of the maps of interdependence which are typically drawn.

I will surely be doing some of my colleagues an injustice with the following generalization but, begging their pardon, I state it anyway: our efforts so far have been almost exclusively devoted to the demand dimension of interdependence. The supply side has been virtually ignored. Let me elaborate.

The basic-nonbasic model is a way of coming to grips with the demand side of interdependence in one fell swoop. The links in the output-income-consumption chain, the links in the output-capital-

formation chain, the links in the output-tax revenues-government spending chain, and the links in the output-materials purchased-output (i.e., input-output) chain, are all subsumed under one grand link between the exogenous and the endogenous elements of the system. Sometimes we can get away with this leap over a lot of treacherous ground just as in football a seventy-yard pass from the thirty-yard line occasionally results in a touchdown. To maintain the metaphor, most of us prefer to gain more yardage on the ground before passing into the end zone.

So we move in small steps. We try to chart the flows between our sectors in greater detail. A dollar of output of industry A, we observe, generates a demand for the output of industry C which is not equal to the demand generated for the output of industry C by a dollar of output of industry B. We observe, further, that a dollar of output of industry A generates more or less personal income than a dollar of output of industry B. If we are really keen observers, we might even discover that a dollar paid out to workers in industry A generates demands for consumer goods, housing construction, and government services which are different from the demands generated by a dollar paid out to workers in industry B.

My point is that in the main we improve upon the crude basic-nonbasic approach by a process of flow disaggregation—a process which hopefully will reduce our margin of error. I characterize this activity as the application of old tools to new problems for the obvious reason that input-output relationships, consumption functions, investment functions, and the like are old tools which were fashioned to solve the problems of a national economy. Furthermore, all those tools are used to come to grips with the demand side of the interdependence between sectors in a regional economy.

When I say that the supply side has been ignored, I mean simply that we have not come to grips with the following question: How does the level of activity in industry A in a given region influence the factor supply curves confronting industry B in the same region? Let me hasten to exclude one kind of effort from my indictment. We certainly have tried to incorporate the influence on industry B of the availability of the output of industry A as an input to industry B. Probably the best example of this kind of work is the Isard-Kuenne study of the impact of the Fairless Works. But this is only one of a number of supply relationships which need to be explored and, as far as I can tell, they have not received adequate attention from regional economists.

My former colleagues on the New York Metropolitan Region Study staff could certainly register a strong objection at this point. After all, another term for supply interdependence is external economies and

diseconomies, and there is certainly a lot of discussion about them in a number of volumes of the New York study.

But this discussion is limited to two problems: one has to do with intraindustry external economies and diseconomies the other has to do with the influence of the aggregate size of the region on the costs of individual firms. The first problem is too narrowly defined and the second too broadly defined from my point of view.

Nevertheless, I believe, regional economics owes a great debt to the New York Metropolitan Region Study for highlighting these external relationships. It was only after we were confronted with the problem of understanding certain features of the Pittsburgh economy that we at the Pittsburgh Study felt compelled to probe more deeply into the nature of these interindustry effects.

Pittsburgh, as a metropolitan economy, stands in sharp contrast to New York with respect to these three summary variables: size, industrial structure, and rate of growth in recent decades. New York is between six and seven times the size of Pittsburgh. New York has a much more diversified industrial structure. And, while New York has grown at just a bit less than the national rate for the last thirty years, Pittsburgh has grown at less than half the national rate in the same period.

Superficially, all these contrasts fit a familiar pattern. Large areas are more diversified than small areas. Diversified areas exhibit more stability in their growth because their fortunes are not tied to the fortunes of a few industries. In these terms, Pittsburgh's story seems easy to tell.

Unfortunately the matter cannot rest there. Pittsburgh is much more specialized than any large SMA with the exception of Detroit, including many which are no larger than Pittsburgh and many which are considerably smaller. The question, why is it not diversified, therefore, remains largely unanswered. Of course, if we could accept the lack of diversification as inevitable, we might not have to try to understand it. For it is difficult to quarrel with the proposition that the future of such an area can be safely projected once we project the future for its one or two dominant industries. But here we may be caught on the horns of a dilemma. Suppose we project a sharp decline in the dominant industries along with a modest decline in the region's minor industries. True, the dominant industries will retard the growth of the region but in the process they will also decline in relative importance. The region will then become more diversified in its old age, so to speak. What then? Do we correct for the increased diversification? Does it open up new opportunities to the region?

The need to understand the whys and wherefores of diversification should therefore be quite apparent. This has led us to consider the

question which I posed earlier: How does the growth of one industry in an area affect the area's suitability as a location for other industries?

But we are not yet ready to assert that the latter question has to be answered. We might avoid it if we could show that different degrees of diversification in areas of comparable size are due simply to the fact that some areas have a variety of locational advantages which makes them attractive to a variety of industries while other areas offer advantages only to a small number of industries. Observe for example the figures in Table 1 for Cleveland and Pittsburgh.

TABLE 1

EMPLOYMENT IN SELECTED MANUFACTURING INDUSTRIES, 1957

	Cleveland	Pittsburgh
Food	14,532	20,459
Textiles and apparel	14,130	3,550
Printing and publishing	14,618	10,042
Chemicals and products	17,959	6,823
Stone, clay and glass	3,260	21,372
Primary metals	46,894	154,215
Fabricated metals	38,378	31,298
Machinery, nonelectrical	52,552	23,534
Electrical machinery	20,746	27,652
Transportation equipment	55,570	11,047
Total	311,471	358,239

SOURCE: Bureau of the Census, *Annual Survey of Manufactures*, 1957.

Pittsburgh is way ahead in glass and primary metals and leads also in food and electrical machinery. Cleveland, on the other hand, is ahead in textiles, printing, chemicals, fabricated metals, nonelectrical machinery, and transporation equipment. On the whole, Cleveland is a much more diversified manufacturing center. But maybe this is just the outcome of the process by which individual industries gravitate to those areas which are best for them. If Cleveland had attracted the 154,215 employees in primary metals, it might still look more like itself than like Pittsburgh in the rest of its manufacturing profile.

I cannot assert positively that this is an unsatisfactory way of approaching the matter, but I can suggest a number of reasons why I find it necessary to go beyond it. For one thing, this approach implies that location of industry is heavily determined by transportation factors or, as we say in our jargon, transport oriented. By this we mean that the location of markets and materials and the transport network determine the geographic distribution of industries. If a lot of industries end up in one place, presto, you have a diversified regional economy.

Nobody believes that the logic of location runs in these terms for the majority of manufacturing industries. My former colleague, Robert

Lichtenberg, of the New York Study, after a painstaking review of factors influencing industrial location classified 50 per cent of American manufacturing as nontransport oriented. P. Sargent Florence has repeatedly emphasized in his writings that transport orientation is a minor influence in location. There is also a fairly general consensus that the proportion of industry which is transport oriented is diminishing as time goes on.

Once we recognize that variations in production costs are important determinants of location, we cannot avoid the consideration of interindustry factor cost relationships. Production costs are not given by nature, except that nature may influence the cost of energy and the cost of plant. These are trivial determinants alongside the influence exerted by the way in which a region's natural advantages are exploited. If we ask why are wage rates higher in one area than another, it is only in rare cases that nature will provide the answer. In most cases the explanation will run in historical terms; that is, in terms of the heritage of each region as it bears on labor supply.

For many purposes it is sufficient to recognize the difference in wage rates, and there is no compulsion to explain why it exists. A firm which is seeking a maximum profit location for a new plant might very well take the wage-rate differential as given—a type of behavior which fits so well the textbook model of a competitive firm. Even so, a conscientious consultant might very well post a warning signal. After all, a plant represents a twenty-year commitment. What is the wage differential likely to be twenty years hence? Be that as it may, it is certainly inappropriate to take wage-rate differentials as given in a twenty-year projection for a region. A static atomistic approach will not do for a problem in aggregate dynamics.

I also find the multiple-locational-advantages theory of diversification unsatisfactory for another reason. It permits us to assess an area's potential for growth only with reference to industries with known locational requirements. But in a projection, it is difficult enough to anticipate the bill of goods, let alone to project the locational needs of the industries which will be producing them. This may suggest that we ought to give up the ghost. Those who have this alternative are blessed. The rest of us have to seek ways to mitigate the curse. One is to develop the concept of a region's capacity for attracting new industries with considerable freedom of location from a transport point of view. If we are to develop such a concept, we need to probe into the region itself more deeply than we do when we locate industries one by one.

I have said enough—perhaps too much—about my reasons for raising these questions. I will now proceed to the main business of this paper, which is to offer some hypotheses about interindustry influences

on factor costs. To begin with, I think that the net has to be spread a lot wider than most people assume. I propose to consider all the traditional categories: entrepreneurship, capital, labor, and land, in that order.

Entrepreneurship. This is a production factor which, to my knowledge, no one has tried to price out at different locations. The implicit assumption, I suppose, is that the supply schedule of entrepreneurship is identical at all locations. Our colleagues studying international differences in growth reject this assumption explicitly. I am convinced that we need to reconsider its validity in regional economics.

When you tell a location analyst that a firm is where it is because its founders prefer to live there, he throws up his hands. Such cases, he claims, are outside his domain. Our own experience suggests that for many industries cost is almost invariant with location—or at least there is no "min min" location. Yet we are reluctant to treat such cases as random phenomena because we feel there are significant variations in the cost of entrepreneurship. Moreover, these differences may be large enough to offset other cost differences.

I came to this notion by reflecting on the differences between New York and Pittsburgh, but I hasten to say that area size is only one variable. For a given size of area, the entrepreneurial supply curve is also a function of certain traditions and elements of the social structure which are heavily influenced by the character of the area's historic specializations.

The proposition I offer is this: An industry which is competitively organized—in the neoclassical sense of the term "competition"—has more entrepreneurs per dollar of output than an industry which is organized along oligopolistic lines. The average establishment in the apparel industry, for example, has one-sixth as many employees as the average establishment in primary metals. Furthermore, multi-unit firms account for 82 per cent of the employment in primary metals, while they account for only 28 per cent of employment in apparel. Now you may have as much management per dollar of output in primary metals as you have in apparel, but you certainly do not have as many managers who are also risk-takers and this is my definition of an entrepreneur.

What is the consequence of this? My feeling is that you do not breed as many entrepreneurs per capita in families allied with steel as you do in families allied with apparel, using these two industries for illustrative purposes only. The son of a salaried executive is less likely to be sensitive to opportunities wholly unrelated to his father's field than the son of an independent entrepreneur. True, the entrepreneur's son is more likely to think of taking over his father's business. My guess

is, however, that the tradition of risk-bearing is, on the whole, a more potent influence in broadening one's perspective.

I think I have formulated a proposition which can at least theoretically be tested, although I confess that I have not tested it yet. For all I know, this may already be a well-established proposition in entrepreneurial history.

But if an oligopolistic environment has a lower entrepreneurial birth rate, there remains the question of how receptive it is to the in-migration of entrepreneurs. Here, too, I would argue that the competitively organized area has an edge. Receptivity as measured by factor costs we shall discuss under separate headings later on. What I have in mind now is receptivity as it relates to the entrepreneur's "utility function." There is an aura of second-class citizenship attached to the small businessman in an environment dominated by big business. It manifests itself in many small ways, such as the kinds of social clubs he can belong to, the residential areas he will comfortably fit into, the business organizations he can join, and so forth. The ease of entry, to borrow a concept from industrial organization, is considerably greater in an environment dominated—not dominated, to be more exact—by small firm industries. I am not sure that we can satisfactorily test this notion, but I am hopeful.

Capital. Many of the same observations are relevant to regional differences in the availability of capital. Here, too, we are dealing with a factor whose cost is typically assumed to be invariant with respect to location. This is surely not so. It is true that capital is almost perfectly mobile, provided the probability distribution of returns is approximately known. G.M. and U. S. Steel can raise capital almost anywhere with equal ease. But a small firm embarking on a new enterprise will find a much more receptive ear over the home counter than it will over-the-counter in "foreign" places. The cost of transferring confidence may be high enough to give us a capital-supply function which has distance as an important independent variable.

Once we admit of such immobility, it becomes relevant to inquire into differences in local capital supply among areas. Again the industrial organization of the dominant industries strikes me as an important variable. A major source of capital to new firms in general is the undistributed profit and unexpended depreciation allowance of old firms. Now, the surplus capital which accumulates inside large multiplant companies, I would argue, is more mobile interregionally within the company than intraregionally outside the company. A large corporation is more likely to respond to investment opportunities in its traditional activity at other locations than to investment opportunities at home in

unrelated industries. The small firm, by contrast, is more likely to make its surplus capital available to other local enterprise in another industry than to a distant enterprise in the same industry. (Actually, I have overstated the case to avoid a complex formulation. All I need to argue is that the marginal rate of substitution between local and foreign outlets is greater [smaller] for the large multiplant firm [small firm]. Given an equivalent array of investment opportunities at home, the surplus capital of the multiplant industry is more likely to "leak" out to other areas.)

The commercial banks, of course, also play a vital role in the initial financing of new business. Are banks in one area more receptive than banks in another area to the demands of new business and, if so, are these differences in attitude shaped by the industrial traditions of the area? I say yes, on both counts. My conviction on this point is based less on deductive than on inductive reasoning. I have been told that this is the case. Having been told, I can think of some fairly good reasons why this might be the case. When banks cater to a competitively organized industry, they are more likely to accept the insurance principle of making money, not on each customer, but on the average customer. If you have U. S. Steel and Westinghouse on your rolls, you do not have to learn to make money on the insurance principle.

In the present state of my knowledge, I am not too optimistic about being able to test these hypotheses empirically. However, I am not prepared to pronounce them as untestable. This is an altogether too easy way out. I believe if we think hard enough, we can spell out some corollaries which, if we dig hard enough, we can subject to empirical test.

Labor. Now we come to what most will assume and I am prepared to concede is the cost factor, which is most sensitive to interindustry influence. Yet, even here, I suspect I will be spreading my net farther than most people would.

First, the wage level. My colleague on the Pittsburgh Study, Mel Bers, is exploring this question in great detail. The presumption that the wage level in the dominant industry influences the wage level in other industries is one which no one can seriously question. I am confident that Bers's research will throw more light on the network of interdependence than anything that has been done so far. Bers is also immersed in the study of the influence of labor organization in the dominant industry on the structure of wages in the region. These two issues are inseparable in his framework.

But there are other influences relating to labor cost and supply which are not generally recognized. Bers found, for example, that the rate of participation of married women in the labor force in the

Pittsburgh region is far below the average for metropolitan areas. When standardized for industry mix, however, it turns out that the rate is as high as you would expect it to be. The question arises, therefore, do these women represent a potential supply or not? Why are not female-labor-using industries attracted by the surplus? Wages aside, there are at least two other factors relating to the character of the dominant industries which influence the outcome.

The first is the dispersion within the region of the plants of our dominant industries. The ratio of central city employment to SMA employment in manufacturing is much lower in Pittsburgh than in any of the large SMA's. Outside the Central City, the gradient in Pittsburgh is also flatter. The reasons are obvious. Our industries could not be piled up one on top of another as in the garment district even if our land were flat. The topography encourages still greater dispersion. But the importance of this for our purposes is that the early dispersion of manufacturing (plus the dispersion of mining) led to a dispersal of population which is also unmatched among our large SMA's. To the extent that pools of female labor are relevant to industrial location, Pittsburgh is at a disadvantage because a greater radius is required to form a pool of a given size. One must bear in mind that the areas in which the plants of the dominant industries operate are not exactly the most desirable as sites for other kinds of industry. (We shall return to this point later on.)

The second point has to do with the work schedule of the man in the family. Steel is a three-shift industry. The typical worker is not assigned to a particular shift for an indefinite period. Instead he works from 8:00 to 4:00 for some time, then 4:00 to 12:00 for some time, then 12:00 to 8:00 for some time. He also has to put in his share of weekends. It is reasonable to suppose that under these conditions the housewife is somewhat less willing to work than under ordinary conditions. Taken together, these factors tend to dissipate some of the labor force advantages we normally attribute to SMA's. And they are consequences of characteristics of the dominant industries.

Land. We normally assume that an SMA is large enough in area to nullify any considerations of site availability as a location factor except for industries with very special requirements like steel and chemicals. In general, I think this is a sensible approach. Nevertheless, I feel compelled to attach some importance to the impact of an industry's operations on the quality of the air and water in the surrounding area. Pittsburgh, as you all know, was notorious until recent years for its smoke and dust. There were three causes for this condition. The principal one was the use of soft coal as fuel in households and industry. A second was the steel industry. And a third was the railroads with their steam

engines. All this has changed now and I do not mind using this forum as an opportunity to plug the radical improvement in the quality of Pittsburgh's air. A white shirt will now stay white in Pittsburgh for as long as it will in any city in the country. But it will take some time to work off our reputation. And furthermore, at a time when the reputation was founded in fact, it was bound to exercise a restraining influence on the growth of subsidiary industries in the region.

Intermediate Goods and Services. So much for the primary factors of production. I said earlier that location analysts have paid attention to a dominant industry's impact on the location of other industries which are oriented to the supply of the product of the dominant industry. But agglomeration is nourished more by the availability of a wide range of goods and services created in the first instance by the growth of the dominant industries. Transportation is the classic illustration of this phenomena. One industry attracts the service, and a second industry coming in finds that the service is available at costs which are lower than they would be in virgin territory. The second industry also finds already in existence a whole community of suppliers of business services such as legal, accounting, duplicating, etc.

The question I raise is whether the emergence of these services and their availability to other industries depends on the character of these industries which trigger development in the first instance. I think much depends on the internal organization of these industries. Large firms incorporate many of these services within their own operations because they can achieve scale economies within the firm. They are much more fully integrated and therefore depend less on outside suppliers. On the one hand, this means that, dollar for dollar, their business is less of a stimulus to the creation of a community of independent suppliers. On the other hand, the new entrant is not likely to find that the company is anxious to spread its fixed costs by making its services available to outsiders.

Again, consider the classic example of external economies: transport services. A firm which operates its own truck fleet on an exempt basis is specifically forbidden by the ICC to transport freight as a common carrier. Imagine then that you have two communities of equal size. In one of these, all the firms rely on common carriage. Hence service to and from a wide variety of places is available to all comers. In the other community, every firm has its private truck fleet. True, the roads are built and this helps a lot. But there is no service available to the new firm coming in unless it starts big.

We do know that Pittsburgh is not up to par in employment in ancillary services. This is indicated by a calculation of location quotients based on the 1950 Census of Population. The Duncans in

their recent book, *Metropolis and Region,* also found that Pittsburgh had less than the national average per capita employment in service industries broadly defined. Only Detroit among the SMA's of 1,000,000 population or more shared this characteristic with Pittsburgh. It goes without saying, that much of my reasoning is applicable to Detroit as well.

Summary and Conclusions. It should be apparent by now that what I am reaching for is the specification of a function which relates external economies and diseconomies to industry structure, size being held constant. My feeling is that we have been too prone to associate external economies and diseconomies with size. We have been disturbed at not being able to derive a satisfactory correlation between the two. What I have tried to do is explore some of the residual variation around the size function. I recognize the difficulties of adequately formulating and testing these notions. But I do not think we can afford to ignore them because they are difficult if, as I maintain, they are relevant to an understanding of the dynamics of area development.

To come back to my first point: I think we are not using the optimal combination of tools in regional analysis. We know we can do a lot more to refine the methods we use to trap what I have called the demand side of interdependence. We need bigger and better regional input-output tables, regional capital coefficients, regional consumption functions. But we are not equating marginal returns in all directions if we do not, at the same time, push vigorously on the supply side of the problem.

I said we need new tools in regional analysis. I am prepared to modify that statement in favor of this one. We need to make better use of some old tools which we have not yet applied very extensively to regional analysis. We need to work out the regional implications of market organization.