

MACROECONOMICS OF UNBALANCED GROWTH: A COMMENT ^{c/}

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by

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Professor W.J. Baumol's recent article^[1] on unbalanced growth is an interesting analysis of the problems of the modern city but its formal analysis does not necessarily point in the direction indicated by its author. Furthermore, the implications strongly implied by Baumol's analysis are as likely to compound the cities' problems as to ameliorate them.

I. Baumol's Formal Analysis

For purposes of analysis, Baumol divides the modern economy into two sectors, a progressive sector where technological progress continually increases output per man, and an unprogressive sector where an unavoidable personal element makes it technically impossible to expand output per man indefinitely. Labor, assumed for convenience to be the sole input, is mobile and capable in both sectors so wages tend strongly to equality. It follows that the relative labor cost per unit of output will rise in the unprogressive sector, with the result that the effective demand for its products will decline unless the relevant income elasticities are large and the price elasticities low. Any effort to hold or increase the share of labor in the unprogressive sector will reduce the growth rate. Thus both the natural thrust of technological development and the policy emphasis on growth work against demand for productive services in the unprogressive sector.

Baumol's purpose is to "offer guidance to policy that eludes micro models". A significant part of his paper is, therefore, found in applications that are said to follow for the modern economy, specifically that: many quality things of life are threatened with virtual extinction (stately homes, hand-made fine pottery, glass and woodworking, haute cuisine, fine theater); most of the services provided by municipal governments (education, hospitals, police protection) will rise progressively and cumulatively in cost because they fall in the unprogressive group and because externalities tend to make costs of soot fall, traffic and presumably other aspects of urban living rise by approximately the square of the population per "city"; and finally, the cost burden to be borne by the cities is aggravated by the tendency of the more law-abiding and affluent to move to the suburbs which, together with the use of the automobile, results in the underuse of public transportation facilities thus raising their costs, while reducing the city's tax base. After this analysis, it is a little surprising that his recommendations are limited to a rather off-hand endorsement of the Heller-Pechman proposal for the use of federal financial resources to assist the cities.

II. Analysis of the Formal Model

I have no quarrel with the simplifying assumptions nor with the logical steps. A conviction that Baumol overstates the limitations on the growth of productivity in the unprogressive sectors named is passed over

in order to concentrate attention on the strongest hinge of his argument. For his analysis suggests a less likely of at least two logical conclusions, namely that the production in the less progressive sector will tend to diminish.¹ This may reflect Baumol's concentration on the price and income elasticities of goods in the unprogressive sector and to his failure to introduce a specific community indifference curve. The latter seems to rest on an underlying belief that such a curve could not reflect a proper interest in the arts.² Yet under the technological conditions postulated any of a large family of community indifference curves will eventually place virtually the whole labor force into the unprogressive sector, and it is by no means clear that this family is a less likely eventuality.^[3]

The alternatives can be visualized with the aid of Figure 1, which simplifies Baumol's analysis slightly so as to present his strongest case. Two examples of linear homogeneous community indifference functions are added, one which illustrates an extreme exaggeration of Baumol's fears and another which eventually requires an expansion of the labor force in the unprogressive sector. The southwest quadrant of Figure 1 gives every division of the labor force between the two sectors. The quantity of labor is held constant throughout the analysis. The southeast quadrant delineates the relationship between input and output in the unprogressive sector. For convenience we assume diminishing returns and a zero increase of productivity from time period to time period. Both of these favor Baumol's conclusion

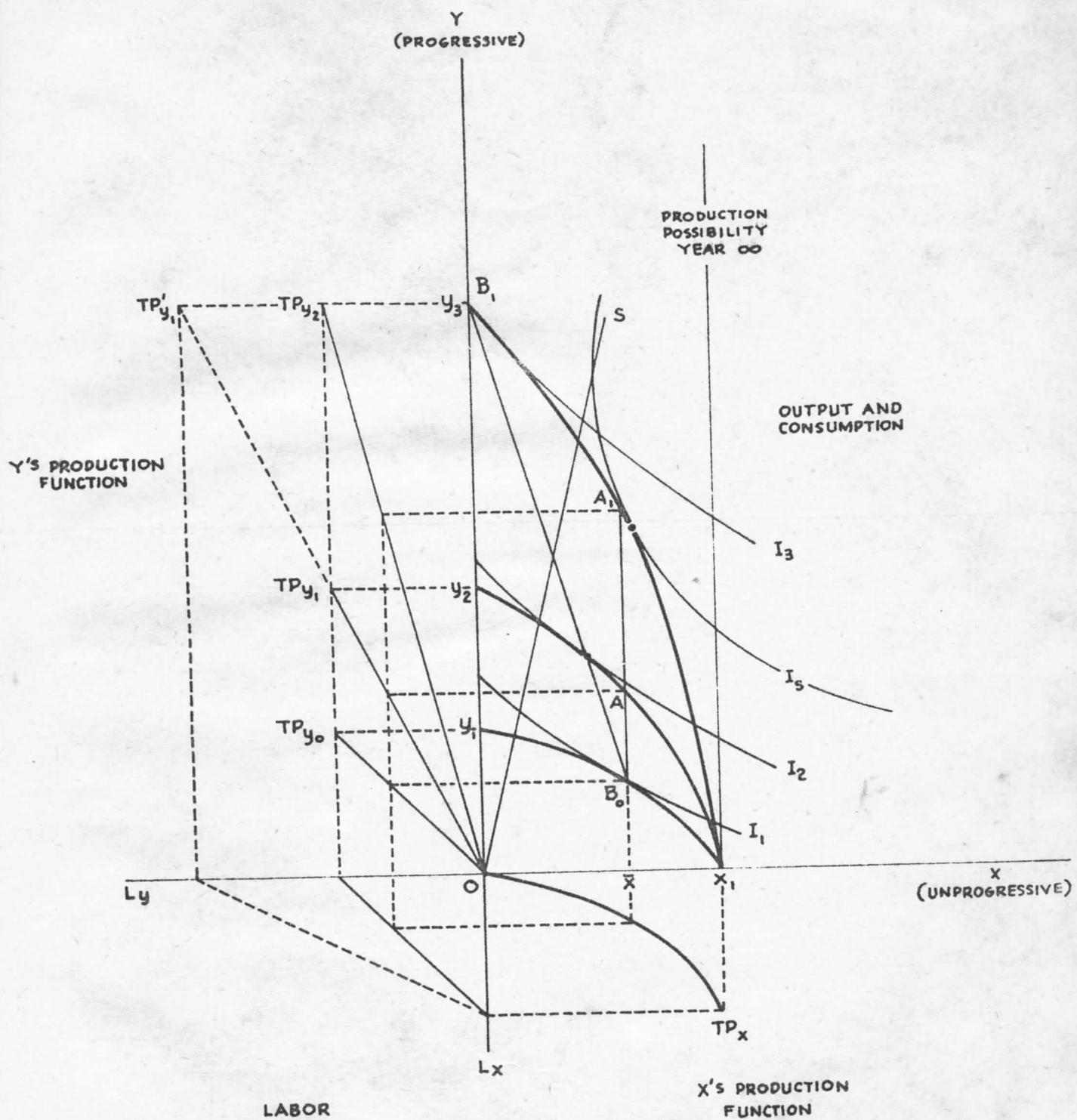


FIGURE 1

that the output of this sector will not increase as technological progress proceeds. The northwest quadrant shows the relationship between labor input and output in the progressive sector in three successive time periods. The rate of progress as shown is constant, for output per unit of input doubles from one time period to the next. In each period constant returns is hypothesized. The latter is also especially favorable to Baumol's conclusion. The northeast quadrant depicts the three production possibility curves that summarize the two production functions for each year on the simplifying assumption that the latter curves are not affected by the actual output mix of the preceding period. Ultimately, growth of this type will produce a production possibility curve that is virtually vertical for a considerable distance above point x on the horizontal axis although, of course, it eventually meets the vertical axis.

The thrust of Baumol's analysis clearly follows if the community indifference curves are linear of degree one and intersect the vertical axis as is illustrated by I_1 , I_2 , and I_3 . The resulting expansion path B_0B_1 shows the effect of "unbalanced growth" if the community indifference curves are of this type.

At the other extreme of linear, degree one community indifference functions are those which display satiation at some level. One such is illustrated by I_s . Line OS can be viewed as the locus of satiation points

for y at various levels of x . It is evident that the equilibrium mix between x and y must lie to the right of OS, so it follows that constantly increasing productivity in the y sector eventually requires the shift of virtually the whole labor force to the unprogressive sector if the community preference function is of this type. An extrapolation of OS reveals, in the present instance, that the quantity of x must exceed \bar{x} (with an attendant flow of labor to x from y) before the end of the fourth time interval. Many linear and non-linear community indifference patterns are easily conceivable, and no particular a priori reallocation of resources is inevitable.³

Baumol's implied choice among the possible social preference functions may strike the reader as far more reasonable than the other theoretical alternatives. We argue below that the implications which Baumol draws are in error quite without regard to this matter. Nevertheless, it should be noted that his implied choice of social preference function is more plausible than persuasive. Consider the move from B_0 to A_1 in Figure 1. Baumol assumes that prices in the progressive sector will be constant so that money wages must rise and, with them, the prices in the unprogressive sector. Thus he seemingly discovers a need for an extraordinary combination of high income and low price elasticities for the products of the unprogressive sector if they are to continue to sell even a constant, \bar{x} , quantity, and therefore hold a constant share of the labor force. Yet when one places

the shoe on the other foot, the demand for y is made to seem precarious. Thus, let money wages remain constant. The price of x then remains constant so long as \bar{x} of x is sold. But as the capacity to produce y doubles with each succeeding time period, the cost (and therefore the price) of y is halved again and again. Anxious eyes now scan the horizons for adequate markets for the flood of y which rises progressively and cumulatively.

The latter is the more traditional and natural view since the expanding sector is the one that is more obviously thrust into unknown markets. Yet the latter statement is equivalent to the former (except for the balance of payments with a fixed price for gold), and one approach does not tell more about the probable course of events than does the other.

Better guideposts are probably to be found by examining the demand for the luxuries of by-gone days to see if they became inferior (or less superior) goods when their output rose, and by scrutiny of the expenditure patterns of the first, second and third generation rich to see if, as their affluence grew and became habitual, they turned less to the purchase or endowment of the output of the unprogressive sector.

III. Analysis of the Implications

A number of problems are raised by the implications of the foregoing analysis as viewed by Baumol. One is an extraordinarily pessimistic estimate of the financial capabilities of local and regional governments re-

lative to their burgeoning needs. But if these needs are in consonance with the wishes of the community special problems of finance beyond those always associated with the financing of desired public goods should be encountered only if public goods are a rising proportion of total consumption, or if the institutional problems of financing them become more difficult. No doubt more public goods will be desired, but this does not guarantee an increase of their proportion to national consumption. The flight to the suburbs may worsen the problem of finance but not if the local tax boundaries are made suitable to the situation. The boundary problem is discussed further in connection with the Heller-Pechman proposals.

A second problem is a dilemma which Baumol finds between "rapid growth" which is said to require the shift of additional inputs to the progressive sector, and desirable output which involves the expansion of the unprogressive sector. But what economist calculates growth in physical terms without regard to the preferences of the community? Growth is not furthered by producing, say, ten more of y at the cost of one less of x when community preferences favor the one x. One may argue that the social welfare function and the community preference function are quite different things, and this distinction may be part of Baumol's externalities argument - which is the subject of the next few paragraphs --- but not his argument on quality.

Finally, and most important, Baumol cites the well-known "externalities" that have become problems of urban life (crowding, air pollution, preferences for the private automobile to rapid transit, and suburbanization) and concludes that his analysis offers theoretical support for the Heller-Pechman proposals to use federal finance to expand the indicated urban services. These proposals certainly have their attractions from the standpoint of fiscal policy but they also involve incompletely resolved problems of resource allocation to public goods.

There is a tendency to assume that public goods are always subject to technological economies because in either case the marginal cost appropriate to optimal rationing is less than long run marginal cost of the service. Applied to a public good, such as clean air or the use of streets, marginal cost pricing may mean zero pricing. But if free pricing encourages a distribution of population that greatly increases the costs of public goods, and perhaps private goods as well, technological diseconomies are inherent in any expansion caused by the low price. In that case, the subsidy necessary to permit free pricing should be borne in such a way as to discourage such a distribution of population. If it is not so borne, the subsidy to the public good may contribute to the worsening of the quality of life that Baumol, as much as anyone, wishes to prevent.

The Heller-Pechman proposals would use the national taxing power to finance "solutions" to urban problems such as those listed above.

They would, therefore, amount to a subsidy to the residents of each community because the taxes paid to the federal government would not be related in a substantial way to the costs that individuals cause by polluting the air, failing to use public transportation, fleeing to the suburbs, etc. Thus, even with the costs covered by taxes the marginal cost of alternatives to the city-dweller are only imperceptibly affected and the external effects are treated as if external economies of production were always present when in fact diseconomies must often exist. Welfare economics prescribes the imposition of a tax or the charging of a rent in such a way as to prevent wasteful overexpansion of private goods production in such cases. It is not self-evident that this is the wrong prescription for public goods subject to technological diseconomies.

Baumol's analysis of air pollution and traffic problems which finds costs rising by the square of the population density strongly suggest technological diseconomies. If so, what purpose is served by subsidized rapid transit? It is bound to increase the population density near its terminals. It is often instituted as a device to preserve the "central city", the greatest concentration of all. Dispersion of population and enterprises into numerous smaller centers is more keeping with reduction of the costs of crowding and is increasingly practical with electrical power, high grade communication, truck transport and highly educated married women in the labor force who prefer to work close to their homes and the childrens' schools. It is true that tax values in

the central city areas may fall along with property values there, and will rise elsewhere. Aggregate land values and tax collections in the region may fall. But why should highly concentrated urban areas be maintained by subsidy after developments in power, transportation, communication and the emancipation of the housewife have made another urban pattern more economical?

A more nearly correct application of the externality argument would be to find a way to charge to users the full cost of the urban services, including rents. If traffic jams are more costly to society than to the individuals, some device to raise the cost to the individuals and reduce the number going to the central city is indicated. Limiting parking downtown by police power has been suggested. If some device like this is instituted, and mass transportation still cannot find a remunerative rate structure, a shift away from concentrated central areas is all the more clearly indicated.

The worldwide urban problem may be aggravated by externalities not discussed by Baumol. For example, the cost of children to the individual family has been drastically reduced in most nations by desirable humanitarian policies based on the notion that children should not be penalized because parents cannot or will not limit their families to the size for which they can care. The effect of such policies is the subsidization of children, i.e., treating the production of children as if increasing returns

were involved which merit a subsidy if the optimal population size is to be reached. Yet the burden of recent argument is that external diseconomies rather than economies are involved.

In addition, I believe that some of the crowding and attendant urban diseconomies may due to the greater profusion in the cities than elsewhere of subsidized good quality education, medical services, social services of all types, and especially social welfare services, such as employment agencies, aid to dependent children, unemployment compensation and general assistance. The reader should understand that I favor most if not all of these services. Moreover, some of them may not only partake of the characteristics of public goods but may be produced subject to increasing returns so that it is more economical to supply them in concentrated central city locations. Nevertheless, if high population density is subject to substantial externalities the social cost of which rises at a cumulatively increasing rate, as Baumol persuasively argues, decentralization and suburbanization might reduce the diseconomies of high population density by more than the cost in lost economies.

In short, Baumol's article can be interpreted (although Baumol might not do so himself) as a rationale for the use of central government power by such means as the Heller-Pechman proposal to preserve an aristocratic

structure of tastes, existing structures of local government and recent trends in the concentration of population the latter two of which are based on an outdated system of transportation and communication. An alternative reading of Baumol's model suggests that aristocratic tastes may be a function of income and not be in need of special aids. The theoretical support given the use of federal finance to overcome the effects of externalities in the cities' problems rests on an implied questionable association of external economies with public goods which does not always, and perhaps only seldom, exist. When public goods are subject to external diseconomies a priori welfare analysis points towards taxes or rents designed to modify the choices of individuals rather than subsidies from a central government financed from general revenues, and it points to the decentralization rather than the centralization of urban complexes.

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FOOTNOTES

* The author is a Visiting Professor at the University of the Philippines, on leave from the University of Washington. He wishes to thank Jeffrey G. Williamson for his thoughtful and helpful assistance and A. Timothy Peterson for his useful suggestions. All responsibility for remaining errors is mine.

¹ This statement may be stronger than Baumol's intention. But it is suggested by such statements as the following: "Proposition 2: In the model of unbalanced productivity there is a tendency for the outputs of the 'nonprogressive' sector whose demands are not highly inelastic to decline and perhaps, ultimately, to vanish". [1, p. 418]. The model is applied to various cases in the following pages. Retailing and education are found to have strong survival value, others less, and on balance it is easy to conclude that the nonprogressive sector taken as a whole will tend to decline relatively, perhaps absolutely, as some sectors become attenuated and others run into progressively more forbidding financial problems. Thus in the section entitled "8. Conclusion -- The Financial Problems of the Large City", he concludes in part, "These phenomena imply that the activities of the municipality will have to be expanded if standards of city life are to be

maintained.... It suggests that self-help offers no way out to the cities." [1, p. 426].

- 2 This conclusion is not strongly stated and may not reflect Baumol's true position since he has written recently, " I must sharply disagree with the implications of Scitovsky's view, for at its worst it offers unrestrained license to the 'bluenoses' ", and gives his support to government interference when external effects are important " to permit consumer's sovereignty to operate undistorted, not to suppress it" [2, p. 29].
- 3 These conclusions are not altered in any significant way if we relax the condition that the labor force be held constant, or if a stock of capital is introduced and permitted to grow. Suppose the labor supply were to grow. Then successive labor allocation lines (in the southwest quadrant of Figure 1) would lie parallel to the one shown but further from the origin. The limits of production of both x and y are then progressively extended. The shapes of the corresponding production possibility curves are somewhat altered, being generally somewhat steeper (since the possible extension of production is greater for y). If the greater labor force is a consequence of a larger population, the community indifference function is also altered, for example, making OS lie somewhat closer to the axis (on the assumption that satiation is more properly related to per

capita consumption than to aggregate consumption). On the other hand the growth in the relative abundance of y as compared to x is accelerated.

Much the same can be said for the introduction of capital. If capital is equally productive in both sectors, labor productivity rises in both. This leads to the same result as does an increase in the supply of labor except, perhaps, for an altered community preference function appropriate to an altered distribution of income. But one would suppose from Baumol's treatment that capital is more effective in the progressive sector. Assuming that to be the case, it would be like an increase in the supply of labor to the progressive sector unmatched by any such increase in the supply to the unprogressive sector. The increase is, of course, in addition to the gain due to technological progress. This result is shown in Figure 1 by the dashed line in the southwest quadrant and the extension of y 's production function for the second time period. It will be noted that the production possibility curve drawn for the third period is attained in the second period. Since the labor force (and presumably the population) is held constant, the community function is not much altered (save by a redistribution of income). Thus the relative abundance of y grows more rapidly, putting more urgent pressure on the allocation of labor from x to y , or the reverse, as dictated by the community preference function.