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[T]he Lilliputians think nothing can be more unjust, than that People, in Subservience to their own Appetites, should bring Children into the World, and leave the [burden] of supporting them on the Publick.[1]

[T]echnicized societies may be close to the threshold beyond which it will be impossible to evaluate, let alone control, the effects on human life of the new environments created by technological innovations.[2]

So the people selected a thousand locations where new cities should be built or existing small towns enlarged.[3]

I. INTRODUCTION

For several thousand years two demographic problems have periodically dogged man, population explosion and population implosion—or, in less rhetorical terminology, too many people and too many people concentrated at points in space. The ineffectiveness of the solutions proposed for each of these problems has demonstrated that man's propensity for "progress" has continued to swamp his capacity to adapt to the changes he has produced. In sum, man remains confronted with the need to achieve balance between the costs of change[4] and the costs of arresting change.[5]

Attempts at solving population problems are conditioned by the means believed available, by the manner in which options are believed to be sequentially ordered and chained in time, and by the environment of change, which currently emphasizes facticity and technological means to the neglect of both the complementary change in the socioeconomic milieu and careful consideration of the ends to which the means supposedly are related. The current ideational and aspirational environment of the United States, together with its technological milieu, is notably different from what it was 50 years ago. What can be accomplished and the means of accomplishment are affected

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1. J. SWIFT, GULLIVER'S TRAVELS 43 (R. Greenberg ed. 1961).
2. R. DUBOS, SO HUMAN AN ANIMAL 230-31 (1968).
3. Owen, *How the Cities Solved Their Transportation Problems—A Fable*, BELL TELEPHONE MAGAZINE, July/Aug. 1970, at 26, 29.
4. *See* J. STAMP, THE SCIENCE OF SOCIAL ADJUSTMENT (1937).
5. *See* 3 A. TOYNBEE, A STUDY OF HISTORY 88-111 (2d ed. 1951).

accordingly. The capacity for change is much greater today than in the past, now that the industrial age, which moved man largely out of agriculture, is being replaced by the "technetronic" age.[6] Man is no longer bound directly or indirectly to the soil. Instead, he is free, within very wide limits, to settle wherever employment and support are available. This mobility is made possible in part by the fact that about seven-tenths of the labor force will be in services by 1980. Moreover, since a large fraction of total employment is controlled by a small fraction of employers, the location of this employment no longer needs to be dominated by stochastic processes; it can, again within wide limits, be located at the discretion of the nation's "key decision makers." This freedom of location is complemented by modern means of communication, together with the capacity of the computer to facilitate coordination of dispersed activities. It will be further increased by the ascendancy of serviees over goods and by miniaturization of plants and instruments of production.

II. THE MEANS OF CONTROL

The effectiveness with which the distribution of population in space can be controlled depends upon the means available, including such indirect means as the limitation of population growth and hence of the number to be redistributed in space. Presently available methods of control include legal and administrative constraints, changes in the incentive-disincentive structure, and education and propaganda.

A. Control of Population Growth

Population growth can be controlled by limiting the reproduction rate and by restricting immigration. Legal and administrative constraints have their most frequent application in the regulation of immigration and some forms of internal migration; they have not been used, except in isolated instances, in the control of reproduction, mainly on the ground that this would entail undue infringement of individual "rights."[7] At present, net immigration is supplying about one-fifth of this nation's population growth. This fraction will decline slightly if natural increase rises in the near future as a result of an increase in the relative number of women between ages 20 and 29, themselves products of the baby boom of the 1950's. Should the net reproduction rate

6. *See* Z. BRZEZINSKI, BETWEEN TWO AGES (1970). *See also* N. CALDER, TECHNOPOLIS (1970).

7. M. KOHN, CLASS AND CONFORMITY (1969); D. RIESMAN, THE LONELY CROWD (1953).

descend to the replacement level in the near future and as a result, births and deaths gradually approach equality, the share of immigration in population growth will approximate one-fourth over the next 30 years. This inflow could easily be reduced or eliminated by law.

Currently acceptable reproduction controls fall within the incentive and informational categories. They are: (1) means designed to modify the norms that define desired family size; (2) improvement in the flow of information about contraceptive agents; and (3) modification of the system of incentives and disincentives that condition reproduction.[8] In the United States, major emphasis is placed upon providing more information about contraception because it is assumed that the norms do not need much changing, given universally available contraceptive knowledge and means.

Available data supports the assumption that great importance must be attached to the dissemination of contraceptive information. Between 1960 and 1965, about 4.7 million births, or about one in five of all births, and one in three of Negro births, would have been prevented by "perfect contraception." About "two million of these unwanted births occurred among the poor and the near poor, and half of these among the Negro poor and near poor."[9] Both contraceptive failure[10] and lack of recourse to contraceptives account for the unwanted births. In addition, between 1960 and 1965 two-fifths of all wanted births occurred sooner than planned. These statistics suggest that an increase in easy access to contraceptive information and relevant medical counsel, together with the expected improvement in contraceptive means, would reduce the reproduction rate appreciably, probably close to the replacement level.[11]

The "demand" for children is, of course, a major factor in population growth. Given the availability of "perfect contraception," how is demand affected by the costs of children and the "returns" to be received from them? The "returns" children provide may be grouped under four heads: (1) productive services and income; (2) financial

8. For a conspectus of incentives and means to fertility see Berelson, *Beyond Family Planning*, 38 STUDIES IN FAMILY PLANNING Feb. 1969, at 1, and Grafton, *Resistance to Knowledge*, 20 ANN. REV. PLANT PHYSIOLOGY 34 (1969); *cf.* Platt, *What We Must Do*, 166 SCIENCE 1115 (1969).

9. Bumpass & Westoff, *The "Perfect Contraceptive" Population*, 169 SCIENCE 1177-82 (1970).

10. For a pessimistic prognosis see Djerassi, *Birth Control After 1984*, 169 SCIENCE 941 (1970), and Djerassi, *Prognosis for the Development of New Chemical Birth-Control Agents*, 166 SCIENCE 468 (1969).

11. *See generally* Hamilton, *The Need for Family Planning in North Carolina*, U.N.C. Newsletter, Sept. 1968, at 53.

security in times of stress and old age; (3) reciprocal affection; and (4) consumer utilities other than those already implied. The first category, stressed by Adam Smith, is of little significance in the United States today. The second and third are of great importance, and the fourth remains quite significant. Should categories two through four become less significant, the "demand" for children would shift downward. It is unlikely, however, that such diminution will take place. "Social security" meets the security requirements of the aged only in part, and the value of claims to "security" is destined to be steadily eroded by inflation flowing from an unholy trinity of oligopoly, trade union, and financially irresponsible government. Furthermore, as modern society becomes increasingly anomie ridden and conflict oriented, man will feel more and more impelled to turn to primary groups for psychic security and satisfaction. This tendency may be reenforced as amenities enter more increasingly into modes of living. It is probable, therefore, that the significance of the third and fourth "returns" will increase.

The counterpart to the benefits received from children—benefits accruing in the main to parents—consists in the costs involved in their production and conversion into full members of society. These costs range from prenatal care through support and education to provision with industrial, public, and domestic capital. Such costs vary widely with the actual yearly figure, rising as the child approaches entry into the labor force. Only some of the costs fall upon parents; other costs are likely to be shunted to others in the form of heightened taxes and nonpecuniary burdens.

It is by no means clear how much economic rationality underlies reproduction, but it is obvious that conduct will be affected only by costs that parents anticipate will fall upon them. The weight attached to these costs will be conditioned by the degree to which they are a factor in family planning and by the manner in which the potential parents expect real family income to rise. The rate at which future costs and income prospects are discounted may not, however, correspond closely to that at which "returns" from children are discounted.[12]

Family plans usually are susceptible of change through modification of the relative weights of pertinent incentives and disincentives, provided that these incentives and disincentives are *perceived* to be such; what is not perceived or internalized does not condition behavior. This is true even though family formation is not

12. In sum, a child may be viewed as resembling a durable good. *See* Spengler, *Values and Fertility Analysis*, 3 DEMOGRAPHY 109 (1966).

uniformly related to economic status.[13] Should the cost of reproducing and raising a child be raised by an *ad valorem* tax, for example, reproduction would be deterred in some degree. Similarly, were an *ad valorem* subsidy provided, the reduction of the cost of having children would tend to stimulate reproduction. Response to such economic incentives and disincentives, of course, tends to vary among population categories. Nevertheless, the manipulability of taxes and subsidies could thus supply governments with some control over reproduction.[14]

B. Control of Population Distribution

Control by the state of the distribution of population in space may assume a variety of forms. First, policies that significantly affect population distribution, though not so intended, could be coordinated with overall location-governing plans. Cases in point are highway and local transportation policies, tax and benefit structures, conditions affecting externalities, and so on. Secondly, a structure of constraints may be erected to compel location-affecting forces to generate desired distributions of population. Illustrative are zoning ordinances, housing codes, subdivision regulations, and, perhaps, the use of eminent domain to effect the transfer of land to agencies of the state charged with achieving appropriate patterns of population distribution. Thirdly, positive and negative economic incentives, mainly in the form of subsidies and taxes, may be introduced and modified as necessary to accelerate or decelerate particular migratory trends. Finally, since population is attracted to areas with satisfactory employment, good educational institutions, adequate housing, and various amenities, measures designed to generate and maintain these attractive forces are of great importance. The effectiveness of these controls will be conditioned by the degree of public awareness and by the other personal and economic constraints to which all locational choice is subject.

III. POPULATION TOTAL: PROSPECT AND OPTIMUM

The objective of optimum distribution of population in space will be easier to attain as population growth approaches zero. The relative number in need of redistribution will then decline, being fed almost

13. *See* Phillips, Votey, & Maxwell, *A Synthesis of the Economic and Demographic Models of Fertility: An Econometric Test,* 51 REV. ECON. & STATS. 298 (1969).

14. *See* Kangas, *Integrated Incentives for Fertility Control,* 169 SCIENCE 1278 (1970); Spengler, *Some Economic Aspects of the Subsidization by the State of the Formation of "Human Capital,"* 4 KYKLOS 316 (1950); Spengler, *Population Problem: In Search of a Solution,* 166 SCIENCE 1234 (1969).

solely by technological changes and economic demands rather than by natural increase. The population prospect, therefore, is highly significant to population distribution.

Until recently it was expected that the population of the conterminous United States would number around 300 million by the year 2000. This is about 100 million more than the present population. It also had been expected that the nation's population would continue to grow appreciably in the next century, perhaps to 500 million. The land requirements of a population of this size might encompass the 470 million acres presently classified as cropland.[15] It is now possible, however, that the population in the year 2000 will amount to somewhat less than 300 million. Barriers to birth control and abortion are declining and public knowledge of these techniques is increasing. Should reproduction average 2.45 children per woman, and net immigration average 400,000 per year, the country's population would number 281 million by 2000 and 336 million by 2020, at which time the population would be growing about eight-tenths of a percent per year—a rate sufficient, if continued, to raise the nation's population to about 770 million by the year 2100. On the other hand, since a considerable fraction of the children born are not wanted—one-eighth would be a conservative estimate—reproduction might average only about 2.11 children per woman, given highly efficient and universal contraception. This rate would suffice merely to replace the population. Accordingly, given this rate together with current immigration, the population would number only about 266 million by the year 2000 and 299 million by 2020. Given no net immigration,[16] together with a reproduction rate of 2.11, the population would number only 250 million by 2000, about 270 million by 2020, and become stationary at 276 million by 2037. In sum, it could result that the population of the continental United States will not greatly exceed 300 million.

Turning to the question of population optima as such, a population of 200 million would be sufficient—indeed more than sufficient—to give release to all population-oriented economies of scale attainable in the United States. It may follow, therefore, that a population of 300 million, according to economic criteria, would be in excess of optimum size; it would be more than needed to make average output as high as attainable, with given technology and investment, and, it would more than allow all families the utilities derivable from two to three children,

15. C. DANHOF, CHANGE IN AGRICULTURE: THE NORTHERN STATES, 1820-1870, at 10 (1969).

16. Should true natural increase descent to zero, opposition might develop to continuation of the present net immigration of 300,000 to 400,000 per year.

which, it is submitted, are as many as most qualified parents are capable of rearing optimally.

In order to avoid irrelevant controversy relating to the definition of population optima, it is preferable to express the problem in terms of a question: "Does net advantage flow from further increase in the population of a country, or a city, or a metropolitan region?" It is *not* helpful to ask questions such as: "Can further increase in population be accommodated?" At issue are the costs of population growth as well as any supposed advantages. Life and growth are exercises in double-entry bookkeeping, requiring an accounting of both costs and benefits, always with the object of finding out if, at the margin, costs or gains are the larger.[17]

Two circumstances may render observers relatively insensitive to the costs of population growth. First, they may overlook the costs of offsetting the increase in numbers and hence infer that the growth did not produce adverse effects. Some of these costs are quite immediate and some become manifest only in the longer run. Representative are the adverse effects resulting from the excessive use of production-increasing chemical fertilizers, dependence upon DDT or other persistent pesticides or herbicides, and pollution costs that accompany increasing use of both fossil fuels and nuclear energy and will surely render the biosphere less congenial to man. Some of these costs are, of course, attributable in a larger measure to an increase in the average material output rather than to an increase in numbers as such. Secondly, since some costs as well as some benefits associated with population growth are not very visible, the net effects of population growth may be incorrectly estimated.[18] Even if both the seen and the unseen effects are fully considered and at the aggregative level the benefits exceed the costs, distributional effects may make population growth undesirable; the benefits may flow to some elements in the population and the costs to other elements, with the result that some benefit while others suffer net costs. Accordingly, it may be said that even if the benefits exceed the costs, growth is not warranted unless the net beneficiaries of growth fully and satisfactorily compensate those upon whom the costs are incident.

17. Enke, *The Economics of Having Children*, 1 POLICY SCI. 15 (1970).

18. The costs and benefits associated with population growth each have their visible and invisible components. An increase in population may be described as advantageous if the resulting increase in total benefits exceeds the resulting increase in total costs. When, however, visible benefits, which usually approximate total benefits, exceed visible costs, population growth may appear advantageous even though total costs exceed total benefits. In sum, it is neglect of invisible costs that leads to misinterpretation of the net effect of population growth.

It is essential to the pursuit of acceptable population policy that *all* costs and *all* benefits, together with distributional effects, be taken into account. There is a need, therefore, for the establishment of complete national social and income accounts. Even then it is not easy to assess all the costs. What figure, for example, should be placed upon the anomie generated by life in crowded high-rise urban rabbit warrens masquerading as apartments?

IV. Population Distribution: Prospect and Optimum

The population of the United States, already very unevenly distributed in space, may become even more so if the prospective population increment of the next half-century crowds into a few megalopolises. In 1960, the population per square mile in cities of one million or more was 13,870, nearly 22 persons per acre; there were 5,885 per square mile in cities of 500 thousand to one million, about 4,400 per square mile in cities of 100 to 500 thousand, and between 2,000 and 2,800 in cities of 2.5 to 50 thousand. About 22 percent of the population occupied only 5,500 of the nation's 3,548,974 square miles of available land; 64 percent occupied 34,322 square miles, about one percent of the country's territorial extent. In interstate terms, about 55 percent of the population is now located in the ten most populous states, and only three percent in the ten least populous.

A. Prospective Distribution

Whatever the figure at which the country's population levels off—below or above 300 million—a very large fraction is destined to be urban. Despite the fact that the farm population declined by about five million during the last decade, the rural population remained fairly stable at about 54 million, of whom about 10.5 million lived in communities of less than 2,500. Thus the expected twenty percent further decline in farm population will not necessarily cause a corresponding decline in the rural population; it has not decreased in the last twenty years because the number of persons employed outside agriculture but living in rural communities has increased. If the nonurban population remains at its present level, the future urban fraction of the population will not rise above 85 percent, given a stable total population figure of 300 million. The urban population would then number around 250 million, about twice the 1960 level.

Current projections of population distribution suggest an increase rather than a decrease in sub-optimality of urban population

distribution. For example, J. P. Pickard foresees what he calls "almost unbelievable" urban masses of 5,000 square miles in the New York and Los Angeles regions, 2,000 square miles in the Chicago and San Francisco Bay areas, and 1,000 to 2,000 square miles in the Detroit, Southeast Florida, Washington, Dallas-Fort Worth, and perhaps several other areas.[19] He anticipates that by the year 2000, when about 242 million, or four-fifths of the country's population, supposedly will be living in urban regions, the 68 million living along the Atlantic Seaboard will average 1,050 per square mile, and most of the remainder will average more than 640 persons per square mile. In the Atlantic Seaboard Region, there will be available for all public, industrial, and private purposes about 0.64 of an acre per inhabitant, that is, about 28,000 square feet, roughly equivalent to a children's softball park. Elsewhere, this average will fall within a range of 30,000 to 43,500 square feet.[20]

It is doubtful, however, if recent population growth patterns can persist. Sooner or later some of the sources of attraction will have been exhausted. In some areas water shortages will develop, in others there will be an overcrowding of the sources of amenities, and in yet others diverse social costs consequent upon population concentration will emerge. Illustrative of these tendencies is the prospective emergence of water shortages within the next 30 to 50 years in the North Atlantic states, the Great Lakes regions, California, and several southwestern regions; within that interval daily water withdrawals will rise above the mean annual natural runoff of water.[21] In consequence, exposure to water pollution and its concomitants will be intensified.[22] Illustrative also is the overcrowding of recreational areas in coastal states where, it is expected, nearly three-fifths of the population will live by 1985, and where, in coastal counties, about two-fifths of the nation's factories are located.

19. *See* J. PICKARD, DIMENSIONS OF METROPOLITANISM—URBAN LAND INSTITUTE RESEARCH MONOGRAPHS NOS. 14 & 14a (1967); Pickard, *Is Megalopolis Inevitable?* 4 FUTURIST, Oct. 1970, at 151.

20. Resistance to these trends may develop. The Colorado Environmental Commission, for example, plans to limit the population of the 4 county Denver metropolitan area by surrounding it with a 35 mile wide greenbelt of parks and agricultural projects, thereby preventing the encroaching of satellitic populations.

21. U.S. WATER RESOURCES COUNCIL, THE NATION'S WATER RESOURCES 1-5, 24, 32 (1968).

22. 1 COUNCIL ON ENVIRONMENTAL QUALITY ANN. REP. ch. 3 (1970).

B. *Spatial Optima*

Current trends in population distribution[23] are of little assistance in a search for criteria of spatial optima. This is so because neither the benefits associated with optimum distribution, nor the costs associated with departure from it, are sufficiently incident upon those responsible for population movement. Likewise, the statistical correlation between average income and population size and density is not very meaningful.[24] The level of average income in each of the various states is dominated by its industrial and occupational structure and in some instances is influenced by its age and its racial composition—by conditions, in other words, that may affect population distribution but are not caused by it.[25] Furthermore, a continued diminution in interstate income differences may be expected to accompany the interstate flow of capital, migrants, skilled personnel, and know-how,[26] the maturation of the nation's economy, and the advance of its average income.[27]

Since it is expected that the rural population will remain fairly stable,[28] the reduction of inequality in spatial distribution of the nation's population becomes a matter of distributing the anticipated population increase of about 100 million among the nation's urban communities. The question of spatial optima, therefore, is closely linked to the question of optimum city size. A city may be said to be of optimum size when the long-run cost of enlarging it outweighs the advantages, if any,

23. Before there can be a reduction of inequality in the distribution of the nation's urban population, the number of cities—preferably those of optimum size insofar as this can be determined—needs to increase faster than the urban population. Between 1910 and 1960 the population increased faster than the number of cities. The number of cities rose by about 122%, from 2,262 to 5,028, while tbe urban population increased 71 million or about 170%. Hence, population per urban area rose from about 18,900 to about 22,300, or 18%, and the fractions in cities of over 500 thousand and 100 to 250 thousand, respectively, rose from 12.5% and 9.8%, to 16% and 12.4%.

24. Of the 10 states with the largest populations, 5 are included among the 10 with the highest average incomes, and only 2, Florida and Texas, fall outside the top 20 in average income. Of the 10 least populous states, only Nevada, Delaware, and Rhode Island fall among the top 12 in average income whereas the standings of the other 7 range from 23 to 37. Of the 10 most densely populated states, 7 fall among the 10 highest in average income, with the remaining 3 ranking among the top 15. Of the 10 least densely populated states, only Nevada falls among the top 10 in average income, and the others rank 18th to 39th.

25. *See* F. HANNA, STATE INCOME DIFFERENTIALS 1919-1954 (1959).

26. *See Id.* ch. 4.

27. *See* Williamson, *Regional Inequality and the Process of National Development: A Description of the Patterns,* 13 ECON. DEV. & CULTURAL CHANGE, July 1965, pt. 11. Interstate and interregional differences in average income have continued to manifest some tendency to decline, but a tendency to which there have been exceptions. *See* Bretzfelder, *Geographic Trends in Personal Income in the 1960's,* SURVEY OF CURRENT BUS., Aug. 1970, at 14.

28. *See* p. 532 *supra.*

of enlargement. There is no one optimum size, however, since the functions performed by any particular city vary with its type and position within a network of cities. The distribution of a nation's population among its cities is optimal when a change in distribution yields no advantage in excess of costs, given the existing urban pattern and allowing for the possibility of adding additional cities. Should the size of each city of a particular type be optimal, the interurban distribution of population would be roughly optimal, especially if the cities were optimally distributed over the nation's terrain.

The factors that determine the optimum size of a city are military, political, economic, and eudaemonic in character. From the military point of view, it is obvious that vulnerability to thermo-nuclear attack varies with the degree of population concentration. According to one estimate, if the nation's 50 largest cities were hit by nuclear warheads, 42 percent of the population and 55 percent of the industrial capacity would be wiped out.[29] Coastal cities are particularly vulnerable to submarine-launched missle attack. Any program designed to improve the distribution of population in space therefore needs to allow for military considerations, among them the desirability of moving the nation's capital to the center of the country.

Political considerations are also relevant in determining optimum size. Per capita costs of administration, together with effectiveness of government, may vary with the size of a community. Moreover, economic performance is a function of how effectively political power is exercised in at least four areas: (1) constraining diverse activities, such as crime and disorder, that are inimical to the effective exercise of economic power; (2) preventing abuses of economic power, such as monopolies; (3) checking sub-optimal distribution of economic activities over the urban and rural terrain; and (4) devising taxation or subsidy guidelines suited to make the composition of the net national product conform to the composition of an aggregate demand that reflects both privately and publicly determined wants. Political power, therefore, is complementary to economic power, serving to guard the latter against destructive forces of internal or external origin[30] and to steer it along paths supposedly more conducive to the nation's welfare.

The distribution of political and economic power differs in some respects. The exercise of both forms of power involves the making of ultimate decisions, the administrative execution of these decisions, and

29. U.S. NEWS & WORLD REP., Oct. 19, 1970, at 22.

30. *Cf.* T. PARSONS, THE STRUCTURE OF SOCIAL ACTION (1937).

sufficient provision both for feedback from points where decisions are incident and for the maintenance of sensitivity to feedback. Concentration of either type of decision-making power is thus limited by elongation of the line of command running from the making of a decision to its administrative execution. This elongation increases transmission leakages and results in the loss of effectiveness of command and adequacy of feedback. The differences arise from the fact that this loss is greater in the realm of political power than in that of economic power. In the realm of economic power there is much more scope for the use of data processing machinery in the correlation of diverse activities, reducing the degree to which requisite information flows through human links. In the realm of political power, on the other hand, there is less scope for automation and greater dependenee on human interaction, both among employees and between employees and the public at large. The flow of information, therefore, is more subject to leakage and distortion.[31] It may be plausibly argued, therefore, that the nature of political power in a democracy contributes to its dispersal in space even though many strategic decisions have been made centrally; administration entails many personal contacts, and the making of these contacts tends to become more difficult as communities grow larger. Likewise, economic decision-making and administration no longer need to be highly centralized because of modern methods of communication and coordination. Accordingly, if there are noneconomic advantages in dispersal, such as more satisfying life styles and more scope for goal achievement, economic activities can be appropriately dispersed.

Limitations on the size of an urban community flow in greater measure from the nature of political power than from the nature of economic power. A large community is an outcome of growth[32] at both the economic and political levels, but the economic factor has been overwhelmingly dominant in the past. A large modern city may be compared with the Macedonian empire, an unstable assembly of relatively stable subsystems rather than a stable, complex, hierarchic system evolved from stable, intermediate forms.[33] It is unstable because its development has not been dominated by an evolutionary process or by a goal-oriented and spatially bounded leadership of the sort that

31. H. SIMON, THE SHAPE OF AUTOMATION FOR MEN AND MANAGEMENT 26-52, 92-111 (1965).

32. For a discussion of form see Lynch, *The Pattern of the Metropolis,* 90 DAEDALUS, Winter 1961, at 79. For an evaluation of actual growth see Smolensky & Ratajczak, *The Conception of Cities,* 2 EXPLORATION IN ECON. HIST., Winter 1965, at 90.

33. H. SIMON, THE SCIENCES OF THE ARTIFICIAL 98-99 (1969).

underlies the growth and development of a nation state. For this reason, after an urban center passes some critical magnitude in size—a magnitude that is variable within limits—it becomes less subject to rational government. If this statement is true, it is advisable to limit city size and to subordinate the distribution of economic power in space to the distribution of political power—a subordination that is not likely to interfere noticeably, if at all, with the realization of economies of spatial distribution.[34]

It is essential that the city also be viewed as a societal apparatus.[35] One may, for example, synthesize four eudaemonic principles: (1) maximize "man's potential contacts with the elements of nature . . . with other people, and with the works of man"; (2) minimize the "effort required for the achievement of man's actual and potential contacts"; (3) optimize "man's protective space" in order to keep his contacts with men, animals, and objects free of undesirable "sensory or physiological contact"; and (4) optimize the "quality of man's relationship with his environment."[36] Any consideration of spatial optima must, of course, add such factors to the balance.

One also may view a city as the locus of two sets of flows, those confined within its perimeters and those connecting it with areas of activity outside its perimeters. The channels connecting a city with external areas carry man, vehicles, materials and products, solid waste, various pollutants, and information. The channels connecting any one part of a city with any other part carry essentially similar cargo, though in quite different proportions. The size of a city is conditioned by the nature of the cargo moving in and out of it and through it. As population, average output, and income rise, demand for the use of a city's channels rises, more than in proportion to the increase in population. Channel capacity is limited, and so is the capacity of a city to accommodate more and more channels without suffering an uncompensatible reduction in per capita welfare. While offsets to channel crowding vary with the activities in which particular cities specialize, the inflexibility of this capacity and the resulting costs at the margin eventually balance or exceed any gross gains derivable at the margin.[37]

34. *See, e.g.*, E. MISHAN, WELFARE ECONOMICS (1967); Kapp, *Environmental Disruption and Social Costs: A Challenge to Economics*, 33 KYKLOS 833 (1970).

35. *See* E. BANFIELD, THE UNHEAVENLY CITY (1970); J. JACOBS, THE ECONOMY OF CITIES (1970); J. MCCABE, LIGHTS AND SHADOWS OF NEW YORK LIFE (1970).

36. Doxiadis, *Ekistics, the Science of Human Settlements*, 170 SCIENCE 393 (1970).

37. Potential channel capacity may, however, be used with greater economy, as when the number of centers within a city is increased. This in turn may create greater economy in external

In light of the foregoing considerations, it is significant that both opinion surveys[38] and the progress of the nation's population between 1960 and 1970 suggest that most people do not prefer to live in extremely large cities. During the period, 14 of the 25 largest cities lost population, and 24 of the 66 largest metropolitan areas grew less rapidly than the nation. Moreover, about three-fourths of the growth in cities of more than 50 thousand took place in cities of 50 to 250 thousand.

These figures may serve as a conservative indicator of public opinion. Persons with a negative preference for very large communities, however, are not free to move if dependent for employment on firms situated within such communities. One cannot assume, therefore, that the migratory behavior of the employed reveals a great deal about their locational preferences, given a set of alternatives bounded by the current distribution of available employment.

If there is an optimum size for a particular city type at which marginal cost and marginal benefit coincide, why is this size likely to be exceeded? The answer lies in the fact that few if any decision-makers who settle in a city are able to internalize all the costs and advantages to which their settlement gives rise. Several conditions are jointly responsible for this disability. First, seldom if ever are there available collective indices in which all costs and all advantages associated with changes in size are appropriately aggregated. Secondly, since there is no single decisional focal point upon which all costs and all benefits are incident, it is unlikely that urban growth will cease when marginal cost and marginal benefit coincide. The second condition arises in part from the fact that a decision-maker—whether individual, firm, or governmental unit—generates technological as well as pecuniary costs that affect others. The decision-maker may thus find it advantageous to behave in ways that are disadvantageous in terms of city size. This disparity between cost and advantage is particularly striking in the case of business firms that move into an already established urban community. Such firms generate uncompensated costs that, if borne by the firms themselves, would have made the move unprofitable.[39]

V. THE WAY OUT

Optimizing population distribution entails a collective approach, whereas halting population growth, given that the annual population

flows. *See* Lave, *Congestion and Urban Location*, in REGIONAL SCIENCE ASSOCIATION, PAPERS 25, 133-50 (1970).

38. *See* N. HANSEN, RURAL POVERTY AND THE URBAN CRISIS 299-305 (1970).

39. For a discussion of congestion effects see Lave, *supra* note 37, at 137-39.

increment is the product of unwanted births and net immigration, probably entails only an individually oriented approach. Optimizing distribution, which involves considerations of national defense, amenities, parasitic growth, and employment availability, will consist mainly of locating a prospective increment of 80 to 100 million people, together with 32 to 40 million jobs; it will not entail major changes in the distribution of the nation's current 207 millions. The population and associated job increments need to be located principally in suitable parts of the twenty less densely populated states where only about one job in four now is located—that is, in the Mountain, Northwest, and South-Central States, together with Maine, Vermont, Mississippi, Washington, and Oregon. If there are not enough small communities in these areas to expand into cities of approximately 100 to 250 thousand, this deficiency can be corrected through the establishment of urban centers de novo, after the manner in which "New Towns," designed to provide both employment and residential opportunities, are established.[40] It is likely that optimum distribution will demand the establishnent of a number of these additional urban communities, together with avoidance of excessive concentration. These goals, however, will be extremely difficult to attain since more than one-half of the nation's population, births, and annual increments to the labor force are found in the densely populated states.

Since the distribution of the labor force, and hence of the nation's population, is determined in the main by the distribution of employment opportunities, the decisions of employers become of overwhelming importance. Of particular significance are the decisions of those who may be termed the nation's "key job makers"—some 750 large corporations and a variety of government installations. Those employers supply about 25 percent of all jobs and will supply a corresponding fraction of the estimated 15 million additional jobs required by 1980, and of the 32 to 40 million additional jobs anticipated over the next 35 to 50 years. It is these employers who, far more than most, can establish economic bases around which additional cities can be built.

New cities, of course, cannot be established by one or several "key job makers" acting alone. They cannot provide the needed public facilities, or residential structures, or contribute greatly to the financing of the ancillary economic activities that in the end may supply 75 percent or more of the city's jobs. This financing can be provided or facilitated,

40. Weiss, *New Town Development in the United States: Public Policy and Private Enterpreneurship*, 4 SAIPA, June 1969, at 185-97.

however, by public corporations and large private urban developmental corporations drawing on the extensive experience of "New-Town" builders and the behavioral findings concerning the costs of infrastructure.[41] It also may be advisable to provide for the regular accumulation of funds to permit replacement of *all* structures situated within urban areas when these have deteriorated to a certain level. Urban blight and decay, now characteristic of public as well as private facilities, may thus prove to be preventable through a proper allocation of the costs of orderly replacement.

Five types of constraints set limits on what "key job makers" can do. First, the range of locational options is conditioned by the existing structure and distribution of transportation facilities and by the *loci* and purposes of the decision-makers who determine the character and location of additional transport facilities. A national transport policy, designed to optimize population distribution over the country and within urban centers, is, therefore, essential. Yet, of the 32 billion dollars allocated to improvement of transportation this year, little seems intended to optimize the distribution of the nation's population other than by relieving essentially local pressures.[42] Secondly, interindustry linkages must be taken into account in plans for establishing an urban base.[43] Thirdly, a city is subject to limitations imposed by its component position in a network of cities; it is not an independent, self-sufficient unit. It is likely, however, to be possessed of much more autonomy than some urban network theory suggests.[44] Fourthly, the presence of scale economies reduces the number of units any one large corporation will establish under given conditions of demand. This number is susceptible of increase, however, through engineering research designed to reduce the size of minimum-cost plants. Increase in output per worker also may reduce the number of persons per plant. Finally, the economies that flow from the agglomeration of diverse activities, together with population, may affect the decisions of key job makers. Since increase in congestion tends to be associated with such agglomeration, the use of taxes to

41. *See* J. GLIEGE, NEW TOWNS: POLICY PROBLEMS IN REGULATING DEVELOPMENT (1970). For a discussion of the costs of infra-structure see Cameron, *Growth Areas, Growth Centers and Regional Conversion,* 17 SCOTTISH J. POL. ECON. 19, 21-26 (1970).

42. *See* READINGS IN URBAN TRANSPORTATION (G. Smerk ed. 1968).

43. *See* Streit, *Spatial Associations and Economic Linkages Between Industries,* 9 J. REGIONAL SCI. 177 (1969).

44. *See* Lampard, *The Evolving System of Cities in the United States: Urbanization and Economic Development,* in ISSUES IN URBAN ECONOMICS 81-140 (H. Perloff & L. Wingo eds. 1968); URBAN ECONOMICS 105-215 (W. Leahy, D. McKee, & R. Dean eds. 1970); Higgs, *Central Place Theory and Regional Hierarchies: An Empirical Note,* 10 J. REGIONAL SCI. 253 (1970).

impose the congestion costs on the business firms responsible will limit the extent to which a firm may profit by participating in congestion-producing processes.[45]

Since World War II, employment in private nonfarm industries has increased slightly faster in places under 50 thousand than in metropolitan areas; only in places of five to ten thousand was the rate slightly lower. This growth has taken place despite the disadvantages that may beset location in small communities, probably because the labor absorbed was already located in these small-town and rural areas, which were without attractive employment alternatives in agriculture. At least some of these towns may grow into larger urban communities. Even so, their growth throws only limited light upon the probability that larger places can be established de novo in less densely populated states with a correspondingly small labor force.[46] More dramatic modes of development may prove necessary, therefore, to attract workers from densely populated areas. Such a mode can be found in the 250 thousand inhabitant Minnesota Experimental City Project. According to the plan, it is regarded as an "instant city"—one taking a decade from start to substantial completion—"in which a coordinated application of social and physical know-how can be brought to bear and a *total* city realized as a working demonstration."[47] This type of approach, particularly if it includes limiting the size of the city and providing it with ample open space, makes possible what Aristotle described over two thousand years ago as the city's real purpose, to enable its residents to enjoy the good life.

VI. CONCLUSION

Of two potential population threats, too many people and too many people concentrated at points in space, the former is very likely to be resolved in the near future. The second problem, however, is being intensified. Even given full reliance upon incentives and disincentives incident upon individuals and firms, an optimum distribution cannot be achieved. Large-scale planning and collective intervention are required, and this fact is recognized by the federal government in its provisions for

45. For a discussion of congestion and related problems see Lave, *supra* note 37; Moore, *Congestion and Welfare—Comment*, 78 ECON. J. 157 (1968); Rothenberg, *The Economics of Congestion and Pollution: An Integrated View*, 60 AM. ECON. REV., May 1970, at 114.

46. *See* N. HANSEN, *supra* note 38, ch. 9; Haren, *Rural Industrial Growth in the 1960's*, 52 AM. J. AGRICULTURAL ECON. 431, 432, (1970).

47. UNIVERSITY OF MINNESOTA, EXPERIMENTAL CITY PROJECT, PROGRESS REPORT I-5 (1969).

urban development and the evaluation of the course of urbanization. Presumably, attention should be focused upon regional concentration, since concentration, if left to market forces alone, proceeds beyond the optimum point, particularly if forfeited leisure and other costs often omitted from aggregate indicators are included. At the same time, there may be ground for supporting an increase in regional concentrations within the less settled interior of the United States.[48] Policy along these lines would call for the equivalent of effective antitrust action against industrial, labor, and other coalitions that interfere with industrial mobility and thus foster concentration.

48. Kaldor, *The Case for Regional Policies*, 17 SCOTTISH J. POL. ECON. 337 (1970).