PROJECTING THE DISTRIBUTION OF POPULATION BY SUBAREAS OF THE URBAN COMMUNITY

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I think Congress should strike a special medal to be awarded to statisticians and demographers who venture estimates of the population of small areas. Some of us remember past population estimates and projections for the nation as a whole and offer embarrassed retrospective explanations. In small areas where the basic data components of an estimate are less reliable and where the evil hand of chance swings a more uncertain arc, our calculations are even more fraught with uncertainties. As yet, for example, the preparation of estimates of the size and composition of inmigrants to an urban area are still within the realm of art rather than science.

Within the past two decades, an additional difficulty has been added to our already heavy burden. Military service calls some of the young men of the population and by a complicated process redistributes them: some within the nation, and some abroad; some in concentrated accommodations, some in civilian quarters. Before I had the pleasure of reading the work of Siegel and Zitter, I participated in or witnessed many a session devoted to statistical projections in which the size of the military population was estimated in very much the same manner as the young men are selected for duty.

But despite all our misgivings, Frisan tells us that our instruments for estimating population change in small areas are perhaps sharper than we have thought. In any event, we now have available an impressive array of techniques, methods, sources of data, and even some significant theory. On the whole, therefore, aside from those areas that will experience a drastic change in regimen, it would appear that the margins of error may be sufficiently narrowed to permit the projections to serve a useful purpose.

Just as the force of circumstance demands the preparation of population estimates and projections for urban or metropolitan areas, be it for use by a public agency or a private firm, there has developed a growing demand for population data on subareas of the urban community. Although the public and private planners and the market analysts have frequently asserted that they would prefer data by census tract, they readily settle for a larger geographic unit, such as the planning analysis area or health area or a homogeneous group of tracts that they can label "a neighborhood."

It is understandable that efforts in this direction have been distressingly meager. Perhaps the best known are the gravity models prepared by the regional scientists and the distance-density formulae derived by Ernest Jurkat in which the distribution of the anticipated population is taken to be a function of existing population density and the distance from the core of the city, with modifications to allow for unusual features of the terrain or for natural impediments.

I should like to suggest that some future effort be devoted to an exploration of the problem of estimating the future population of subareas within a city through an analysis of the housing sub-markets which comprise these areas. At this point I do not have a formula to propose and my comments therefore are general and in the nature of an initial exploration.

The first step in such a series of calculations is the derivation of a projection of the population of the city or metropolitan area based upon anticipated employment opportunities. Although people may desire to locate in one area rather than another for a multitude of reasons, the existence of acceptable or desirable income earning opportunities is unquestionably the most important. There is no doubt, for example, that the population of areas which exert a locational pull because of natural advantages would be sharply reduced if inmigrants could not find employment.

The population projection must be translated into an estimate of the total housing requirement for the community. This is done by calculating the manner in which the population will arrange itself into households which we take to be equal to occupied dwelling units. The number of households may be derived by the technique suggested by Hodgkinson, or by the techniques developed by Glick or by Winnick, or by any other suitable method. This figure yields an estimate of the total housing requirement for the community. The difference that exists between this figure and the present number of dwelling units represents the likely volume of new construction, after due allowances are made for changes in existing stock and in vacancy ratio.

The second step in this process rests on the assumption that the characteristics of a population in any given area will be closely related to the type of housing accommodations available in that area. Let me pose several situations for

your consideration. These may constitute some of the items in the catalogue of subareas and the types of changes that may occur within them.

(a) Undeveloped or Sparsely Utilized Land

Land of this description is almost invariably found on the outskirts of the city or metropolitan area and, in fact, is even becoming more difficult to find in these locations. If the post-war patterns do not change substantially, we can with confidence anticipate that a major proportion of the new housing requirement will be met by the construction of single family homes in presently undeveloped areas, for since the end of World War II approximately 85 percent of all residential construction in the United States have been in units of this type. In a few scattered instances rental developments have also been erected in these areas. For the most part, these rental units have not been in high elevator structures, but in two- or three-story garden type accommodations. But in either event, the population of the new developments has been singularly homogeneous, a fact which warms the heart of the statistician, but saddens the sociologist.

For example, a recent survey of population and households in the Philadelphia SMA conducted by the Bureau of the Census for the Institute for Urban Studies revealed that the purchasers of recently constructed homes had the following characteristics: approximately three-quarters of the household heads were between 25 and 44 years of age; three-fifths earned over $6,000; and three-fifths of the households consisted of three or four persons. Almost one-half of all the households possessed all three characteristics. These figures apply to all new home purchasers. There was far less variation by subarea and by subdivision.

(b) Built-Up Areas in Which There is Little or No Change Anticipated in the Number or Characteristics of the Structures

The occupants of dwellings in areas of this type alter in number and in composition as a consequence of births and deaths and the aging of the population and of the successive stages through which the family cycle passes. Thus, if we think of an area that was a new subdivision a decade ago, we now find that the toddlers have entered high school, that some of the grandparents have gone to their reward, and that father is at least ten years older. The changes wrought by time are mitigated by the turnover of property in the intervening period, a fact that serves to keep the aggregate for the subarea from altering commensurately with changes in the resident families. But, by and large, we have observed that the newcomers to an area possess characteristics which corresponded quite closely with those of the resident group.

One of the most interesting population profiles is to be found among the occupants of the more distinguished (and more expensive) downtown apartment structures. Most cities of size possess a number of accommodations of this type, some of which are merely comfortable, while others are indeed luxurious. A few recent studies have shown that the population composition of the occupants of these accommodations constituted a readily distinguishable group. In fact, a recent report conducted by the Institute for Urban Studies relating to the city of Philadelphia showed surprisingly few deviations from the group pattern.

Field interviews revealed that 97 percent of the heads of households were over 35 years old; in 94 percent of the cases there were no children in the household; 96 percent enjoyed a family income of more than $5,000 a year. The employment pattern was similarly concentrated. Ninety percent either worked in center city or were not in the labor force. Over 80 percent of the respondents fit into the first three categories. Every respondent had at least one of the four characteristics.

By comparison, in the total metropolitan area 80 percent of the household heads are over 35; 50 percent have annual family incomes of more than $5,000; 50 percent have no children; and 33 percent work in center city or do not work. Only six percent, or 68,000 households, fit into all four categories. Thus, center city provides another illustration of a sub-market that draws a segment of the population with palpably distinct and readily identifyable characteristics.

(c) Existing Areas in Which the Housing Stock Undergoes Major Changes

Some sections of the housing inventory undergo sharp changes in quality within relatively short periods of time. In some cases, deterioration is experienced both in the physical nature of the accommodation and in the surrounding area. Frequently this is accompanied by the conversion of accommodations by subdivisions into quarters of smaller size or into rooming houses. Change of this sort is experienced during a period in which a large and rapid inmigration of population confronts an inflexible supply of housing. If the inmigrant population has a low income earning capacity, it will not be able to pay the rents or prices

commanded by accommodations of the size and quality available on the market. They therefore will be inclined to purchase smaller amounts of space at higher cost per square foot in the subdivided buildings. In a twenty-block area of the west side of Manhattan, for example, the population rose from 33,000 in 1950 to 39,000 in 1956 with virtually no new construction during that interval. In areas of this type, the population pattern alters sharply. Middle income families with children of school age tend to be reduced in number. The incoming population is likely to be a racial or national minority with a distinct demographic structure.

The extent of the inmigration in any particular area can be estimated by analyzing the composition of the housing stock. The large and well-kept units are likely to remain in the same use, for the rents they command (per room) equal or exceed the payments that can be made by the low-income groups. The units that are susceptible to conversion possess few amenities and can only be let at low rents. It is in these that the aggregate rent roll can be increased substantially by conversion to rooming houses. In the area noted above, brownstone and old-law tenement structures constituted virtually this entire category.

Conversion of housing need not necessarily imply deterioration of quality. In many instances physical alterations are undertaken to modernize and improve a structure. These changes range from superficial refurbishing to major reconstruction. Conversions of the latter type usually take place in the more expensive areas of the city in the sections surrounding the central core. It is in these areas that a sector of the upper income group of the population maintains its residence, and the area is therefore sought not only for the convenience and quality of location, but also because it is a "good address." With few variations the characteristics of the occupants of these structures resemble very closely the residents of the expensive downtown apartments described previously.

(d) Demolition of the Existing Stock and Succession of Uses

In our dynamic urban society, the face of the city is constantly changing. Many a residential structure is demolished and replaced by a new building. Very often the demolished structure is of low quality and, in fact, slum clearance may have been the reason for its destruction. On the other hand, the land may be so valuable in an alternative use that the acquisition and demolition of an existing structure, even of high quality, is justified in order to release the site from its previous use. In New York City the Hotel Marguery and the Ritz Carlton Hotel were demolished to make place for office buildings. In other instances, structures of quality were removed in order to provide land for public facilities, such as expressways, bridges, courthouses or schools.

In order to identify those areas that might be subject to demolition, it is necessary for the population analyst to study the real estate market. The demand for office space in New York, for example, provides an index of the rate of construction of new buildings and of the rate of demolition of property presently standing on potential office building sites. If these are residential structures, then we can of course expect a further decline in the resident population as land use in the area continues to change.

It is undoubtedly easier to estimate the changes that are expected to take place in an area slated for public renewal or redevelopment. In these cases the superseding use is stipulated in the plans of the governmental agencies and, in fact, may be dictated by a specific population policy. In other words, the renewal may be undertaken to provide accommodations for middle income families with children or to make available subsidized public accommodations for elderly low-income persons.

Summary

If the statistician is to explore the possibilities of utilizing changes in the housing market to assist him in estimating anticipated variation in the distribution and size of local population, he will of course seek to identify those variables that are strategic and that lend themselves to quantification. In view of the foregoing discussion, it would appear that experimentation with the following possible independent variables may prove fruitful:

1. Quality index of dwelling units
2. Age of dwelling units
3. Persons per room
4. Persons per dwelling unit
5. Dwelling units per structure
6. Persons per acre
7. Distance from center of city
8. Time of travel from center of city
9. Rent or value per dwelling unit
10. Rent or value per room
11. Ratio of the value of land to total of land and improvements

Experimentation with these factors may yield more than suitable techniques for estimating the population of subareas within a city. Without doubt, such endeavor will also serve to enhance our understanding of the nature and processes of neighborhood change.