

METROPOLITAN AREA POPULATION PROJECTIONS:
USE OF REGIONAL AND NATIONAL ECONOMIC FRAMEWORKS

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The topic of this session is small area population projections. As the title of this paper indicates, we believe there is an inter-relatedness between what happens in a local area and what is going on demographically and economically in the area's region and in the nation. Were we to suggest a procedure very limited in scope we might rightly be charged with a narrowness comparable to that of the farmer in Robert Frost's poem, "Mending Wall", who kept repeating "Good fences make good neighbors".

We view the problem of small area population projections within the local area context and also a broader (regional and national) but still very relevant context. Small area population changes reflect many influences. On the basis of our judgment, it appeared necessary to use both contexts if we were to include the primary influences determining population change.

Despite the complex sounding title, the conceptual key to the projection procedure can be summarized very briefly. Population projection at the national level may most accurately be estimated through assumptions covering future fertility and mortality rates. At subnational levels, the smaller the area the greater the probability that population change can be significantly affected by non-demographic factors. It is the central assumption underlying the population projection described in this paper that the key nondemographic factor is the one of job opportunity.

Thus, if a reasonable estimate of future jobs in an area can be projected, it is assumed that a dependable estimate of population may then be derived. Demographic analysis (fertility and mortality rates) could then follow in order to define population characteristics such as age and sex. Therefore, the major effort, in developing the procedure described in this paper was directed toward determining how best to estimate future economic developments in an area. From such estimates, employment opportunities could be derived and these were to be used as a basis for estimating population.

There are special situations in some local areas where neither the approach suggested in this paper nor the strictly demographic procedure would be completely satisfactory in projecting the population for small

areas. Such would be the case where an area attracted old and retired people or where an area served to provide domiciles (often called bedroom areas) for people who work in a neighboring area. In these cases, there might need to be some modifications of the procedure described in this paper.

In the next section of this paper, we outline some of the major assumptions and concepts underlying the projection procedure. That is followed by a description of the procedure, by the projections for several metropolitan areas and by some conclusions.

Major Assumptions

The major assumptions and concepts on which the projection procedure is based are, as follows:

1. The geographical unit to be used in developing the projections should be an integrated economic unit. For that reason, the standard metropolitan statistical area (SMSA) concept as defined by the Bureau of the Budget was used. The Bureau defines the SMSA as a county or group of contiguous counties containing at least one city (i.e., central city) of 50,000 inhabitants or more, or "twin cities" with a combined population of at least 50,000. In addition to the county, or counties, containing the central city or "twin cities", contiguous counties are included in the SMSA if they are essentially "metropolitan" in character and are socially and economically integrated with the central city.²

The Technical Committee on Area Definitions, established by the Bureau of the Budget, reviews the geographical definition of each SMSA at regular intervals to determine whether counties should be added or subtracted from existing SMSAs or whether an area not previously defined as an SMSA has become metropolitan in character - according to the criteria established by the Bureau of the Budget.

The geographical boundaries of an SMSA, therefore, are not fixed. They change as the economy of the area changes in size. Though most Federal agencies maintain statistical series

covering SMSAs on a fixed boundary basis (using the most recent set of boundary definitions and revising figures for past years accordingly), the procedure described in this paper does not follow that practice. The procedure rather deals consistently with metropolitan economies. It does this by using as the metropolitan area boundaries, those defined in each year of reference by the Bureau of the Budget. Therefore, historical data for metropolitan areas that are referred to in this paper reflect in each year the actual size of an area's economy (as defined by the Bureau of the Budget). As a result, geographical boundaries may differ from one year of reference to another. Projected data also reflect the actual size of an area's economy. We, however, have not defined the geographical boundaries for the projected years.

2. A set of national projections are needed if subnational projections of a realistic and reasonable character are to be developed. The national projections provide the framework which reflect explicit assumptions on patterns of consumption, technological and productivity trends, government and business expenditures, and assumptions on the kinds of government policies that may be forthcoming over the projected period.

3. The subnational projections need to be based on an assessment of the comparative advantages that each state or metropolitan area has over other states or areas. States are singled out here because, in the projection procedure to be described, single or combinations of states form the market or production region within which metropolitan area economic growth is gauged. The analytical regions are discussed in section (5) below. The state (regional) projections are consistent with and add up to the national projections (mentioned above in (2)). The projected variables within a state are consistent with one another, that is, they reflect a working out of probable comparative advantages. These state projections are primarily determined by industry employment trends which are influenced by specific industry changes in national industry employment and differential geographic shifts in industry employment. The state projections are, then, disaggregations of the national projections.

4. The metropolitan area projections are worked out within a market or production region. To accomplish this we use the state projections mentioned in (3) above. In moving from states to metropolitan areas we find that the metropolitan area projections are very sensitive to the geographical boundaries that establish the economic region to which the metropolitan area is related. The objective is to define a region in such a way that the major transactions of the metropolitan area being examined are included within the region's boundaries. This means that the region associated with the metropolitan area for which projections are being made may also include other metropolitan areas. Each of these may have a different region associated with it. This implies that the region defines the boundaries of the geographic area which is significant for the metropolitan area and not the relationship of the region to other regions or to the nation as a whole. The relevance of this is that the procedure for deriving analytical regions is not the result of a disaggregation of national totals but rather an aggregation into regions from core units (which for practical reasons are contiguous states).

In defining analytical regions we have associated a unique region with each metropolitan area. Ideally, we would have liked to identify separate regions for each industry in the metropolitan area.

Before describing our criteria for defining a region it is necessary to distinguish among three types of industries in the metropolitan area.

1) National industries. Industries which sell not only within a market defined by the boundaries of the region containing the metropolitan area, but also make substantial sales beyond these boundaries. These will usually be commodity industries.

2) Multi-state industries. Industries which sell primarily within a market defined by the boundaries of the region containing the metropolitan area with a more significant proportion of these sales being outside of the metropolitan area than within the area. These are also usually commodity industries.

3) Localized industries. Industries which sell primarily within a market defined by the boundaries of the region containing the metropolitan area with a more significant proportion of their sales being inside the metropolitan area than outside. These are usually noncommodity industries.

The criteria we used to define the region associated with each metropolitan area are:

(a) that it include the markets in the associated states comprising the region for the industries located within the metropolitan area.

(b) that it include the major sources of labor and material input for the industries located within the metropolitan area.

(c) that to the extent that there are industries with national markets in the metropolitan area, the region includes other metropolitan areas which have comparable national industries that compete for the national market with industries in the metropolitan area being considered. The region in this case is thought of as a production area.

5. The level of economic activity and of population growth in an area depends on the area's level of activity in certain "basic industries" and in the export component of localized industries.

Projection Procedure

The projection procedure used to estimate metropolitan area employment and population is described below. Before proceeding with that description let us summarize what we have said above.

We have stated that metropolitan area growth is primarily due to changes in levels of activity in basic industries and the export component of localized industries. That the changes in these levels reflect the working out of comparative advantages among metropolitan areas. That to estimate these changes requires working with an analytical region for each metropolitan area within a framework of national and regional projections.

Steps in the projection procedure were as follows:

1. Use of National Planning Association's National and Regional

Economic Projection Series.^{3/}

2. Delineation of market or production regions for each area.
3. Projection of change in levels of activity in basic industries and the export component of localized industries.
4. Projection of residentiary employment of localized industries.
5. Projection of population.
6. Review of initial estimates. Then, judgment used as basis for making changes and finalizing estimates.

2. Delineation of regions for metropolitan areas.

Analytical regions for each area consist of one or more states. These regions for the most part are an area's market region. They include the state or states that provide the market for a large share of the area's noncommodity and commodity exports. The regions were delineated through the use of numerous data sources. Some examples of these regions are presented in Exhibit A.

3. Estimation of basic industry employment and the export component of localized industries.

a. Basic industries employment.

Basic industries are defined to include agriculture, mining, construction, manufacturing, the Federal Government and state and local governments. This group includes industries that are primarily export oriented: agriculture, mining, a number of each area's manufacturing industries and Federal and State governments; industries that are growth generating because of their investment type or high wage characteristics; construction and nonexport oriented manufacturing; and industries that provide services that would facilitate area growth: local government industries.

The metropolitan area employment in each "basic" industry is projected by means of trend extrapolation of the metropolitan area's share in the analytical region's employment in each basic industry. This technique assumes that metropolitan area employment in basic industries is related to the exports from the metropolitan area to its analytical region. The major factor underlying the trend in the projected ratio is each metropolitan area's competitive position compared with other metropolitan areas in the same analytical region in respect to export of basic industry goods and services to the analytical region.

b. Export components of localized industries.

A metropolitan area's "localized" industries find their markets largely within the metropolitan area but a significant share of the sales of some of these industries may be made to residents of the rest of the region. To identify this export component, we develop localization coefficients. We measure the per capita share of employment in each localized industry in the metropolitan area and in the analytical region. Positive differences of the metropolitan area's ratio over the region's ratio (localization coefficients) multiplied by metropolitan area population provide estimates of export employment in these industries.

The export component of each industry is projected by working up the ratio of the export component in a specific localized industry to the region's nonmetropolitan employment in that localized industry. The trend of this ratio is extrapolated. The projected export employment is obtained by applying the projected ratio to the nonmetropolitan employment in the analytical region's localized industry for the projected year in reference. (The latter figure, in the actual operation of deriving employment estimates, is not available until the next step in the projection procedure is completed). The sum of employment in basic industries and in the export component of localized industries are together termed growth generating employment.

4. Projection of residentiary employment of localized industries.

Change in the residentiary employment of localized industries is judged, in the conceptual framework being described in this paper, to be determined by the change in the area's growth generating employment. The latter includes both export activity industries and selected other industries (construction and local government, for example). The rationale for this is that nationally and in metropolitan areas, there has been a shift toward noncommodity industries. This shift is projected to continue nationally and in our framework of projections it would therefore continue in metropolitan areas also.

The procedure for projecting the residentiary employment of localized industries is as follows: residentiary

employment in a localized industry is computed as a ratio of growth generating employment. This ratio is projected and is applied to projected growth generating employment to give projected residentiary employment in localized industries. 4/

5. Projection of population

The population of a metropolitan area is defined as a function of the relationship between the population-employment ratio of a metropolitan area and the comparable ratio for the analytical region. The projection of this relationship provides projected metropolitan area population. All terms other than that of projected population for the SMSA are known from either the work described above or from the available state employment and population projections.

The procedure outlined above provides a set of projections. These are reviewed and changes are made whenever judgment dictates that they are needed. This may be considered a shortcoming by those who seek some completely mechanized technique which will provide reasonable projections without requiring the final touch-up. We feel it is an advantage to bring to bear on the initial set of projections the experienced mind containing much additional economic intelligence which has not been programmed into the projection techniques.

Selected Metropolitan Area Projections

In Table 1 we present some of the projections from the metropolitan area volumes cited in footnote 3. In respect to population, of the ten areas presented, Boston's population is projected to grow at the slowest rate (.6% annual rate 1962-75) and Phoenix's at the fastest (3.2% annual rate).

Despite the projected slow rate of populations growth (and the projected relatively slow rate of employment growth at 1.4 percent per annum), Boston's economy is expected to continue to provide a very substantial number of job opportunities for its population and a significant increase in per capita income. In 1975, employment participation of Boston's population (employment divided by population) is expected to be 25 percent above the national average. Per capita personal income is expected to increase at just about the nation's average annual rate of increase. (Boston 2.5 percent; U. S. 2.6 percent).

Boston's projected slow population growth can be explained by its physical location - bordered by an ocean and by other well developed "little" economies and by its already well developed economic size and maturity.

Phoenix's projected faster growth rate in population (and employment at a 4.5 percent annual rate) reflects a situation somewhat opposite to that cited for Boston. A much newer economic area, Phoenix is situated in a fast growing state. Favored by an excellent climate, Phoenix is attractive to industry and to those seeking a place for retirement. It is also developing finance and trade services for its immediate environs in the state.

Very briefly, the above analysis has attempted to illustrate how economic projections (in this case primarily those of industry employment) are pivotal in developing small area population estimates. The presentation was necessarily over-simplified and I refer you to the data in the three volume study on metropolitan area projections developed by NPA for a more adequate description of the economic bases for population projections.

Conclusions

The projection procedure described in this paper is based on the assumption that job opportunities determine population locations. It attempts to provide a demographic and economic framework which community leaders and others can use as part of the information base they need for making policy decisions. The great advantage of the procedure is that it forces area projections to remain within the bounds of what we consider reasonable regional

control totals. Its chief shortcoming is that at present it provides limited detail about an area's economic and demographic circumstances. The National Planning Association plans to provide additional detail in the future as part of its Regional Economic Projection Series.

- 1/ Contributions to the methodology described in this paper were made by Sidney Sonenblum, Director of Research for NPA's Center for Economic Projections.
- 2/ For a detailed description of the criteria used in establishing the SMSA see "Standard Metropolitan Statistical Areas", U. S. Government Printing Office, Washington, D. C., 1964.
- 3/ National Economic Projection Series and Regional Economic Projection Series produced on a regular basis by NPA's Center for Economic Projections, Washington, D.C.
- 4/ The detailed mathematical formulation of the projection procedure is presented in Volume I of a three-volume report on metropolitan area projections. The report is titled: "Economic and Demographic Projections for Two Hundred and Twenty-Four Metropolitan Areas", Regional Economic Projection Series, Report No. 67-R-1, National Planning Association. The report was prepared by Dr. Joe Won Lee.

TABLE I. POPULATION AND EMPLOYMENT ESTIMATES FOR SELECTED METROPOLITAN AREAS

Metropolitan Area	Total Employment					Population				
	1950	1957	1960	1962	1975	1950	1957	1960	1962	1975
	(in thousands)									
Boston, Mass	983.1	1082.7	1145.9	1152.6	1382.5	2373.5	2473.2	2594.0	2638.5	2868.4
New York-N.E., N.J., N.Y., N.J. <u>1/</u>	5373.9	6103.1	6406.7	6439.0	7834.6	12955.5	14226.8	14809.1	15335.0	17344.6
Chicago-N.W. Indiana, Ill.-Ind. <u>1/</u>	2670.2	2913.9	2951.3	2969.8	3609.0	5521.7	6308.0	6828.1	6991.5	8749.2
Milwaukee, Wisconsin	406.3	493.2	506.0	514.1	697.4	874.9	1123.7	1201.0	1246.3	1604.9
Richmond, Virginia	158.7	179.0	190.8	200.9	267.3	329.9	384.6	410.8	458.2	565.8
Louisville, Ky.-Ind.	233.9	287.3	280.2	282.2	406.6	580.2	681.0	729.3	748.3	1017.7
Jacksonville, Florida	134.3	154.4	170.9	180.1	287.2	307.2	407.6	460.1	498.8	724.6
Phoenix, Arizona	118.1	188.4	233.8	252.2	447.8	337.7	548.6	675.4	775.8	1171.0
Los Angeles-Long Beach, Calif.	1764.6	2482.0	2647.2	2594.9	3929.3	4416.4	5984.9	6817.5	6377.0	8670.0
Seattle-Everett, Washington	296.4	378.1	424.9	467.3	598.6	737.5	874.2	1114.8	1149.3	1395.5

1/ Standard Consolidated Area

EXHIBIT A

Metropolitan Area

Boston, Mass
 New York - N.E., N.J., N.Y., N.J.3/
 Chicago - N.W. Indiana, Ill.-Ind. 3/
 Milwaukee, Wisconsin
 Richmond, Virginia
 Louisville, Ky. - Ind.
 Jacksonville, Florida
 Phoenix, Arizona
 Los Angeles-Long Beach, California
 Seattle-Everett, Washington

Analytical Region

New England, Middle Atlantic
 United States
 United States
 Wisconsin, Minnesota, Illinois
 Virginia
 Kentucky, Indiana
 Georgia, Florida
 Arizona
 Far West, Southwest
 Washington, Oregon, Idaho, Montana