**RESIDENTIAL DEMOGRAPHIC MULTIPLIERS: OVERVIEW and QUICK GUIDE**

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**RESIDENTIAL DEMOGRAPHIC MULTIPLIERS: OVERVIEW and QUICK GUIDE**

**I.DEMOGRAPHIC MULTIPLIER INTRODUCTION**

Residential demographic multipliers are the number and profile of people, including school-age and public-school children, found in different categories of housing (different structural types, sizes, values, and tenure, whether rent or own). For example, a larger (4-5 bedroom) single family detached unit might contain, on average, 3.3 persons, including 0.9 school age children (ages 5-17). 0.7 of which attend public elementary school and secondary schools.

The Center for Urban Policy Research (CUPR), an academic unit within the Rutgers University Edward J. Bloustein School of Planning and Public Policy (hereinafter Rutgers-Bloustein) makes available residential demographic multipliers for the 50 states in the United States (and Washington D.C. and Puerto Rico). This research was aided by the National Science Foundation. The demographic multipliers are derived by Rutgers-Bloustein from the 2017-2021 American Community Survey (ACS) -- the latest ACS release as of the time of the commencement of our research. The ACS is a primary source for place-based demographic information.

Rutgers-Bloustein makes available the updated demographic multipliers from the 2017-2022 ACS in multiple forms:

1. Separate demographic multiplier tables for each of the 50 states—available at (<https://rutgers.box.com/v/dmtables-50states>). That is most useful for analysts seeking specific demographic data for one or just a few states such as what is the household size of a 4-bedroom single-family detached (SFD) home or a 2-bedroom single-family attached (townhouse) in the two sunbelt states of Florida and Texas.

2. Demographic multiplier data base—available at <https://demographics-rutgers.streamlit.app/>. A database provides a useful efficient platform for multi-jurisdictional and otherwise larger scale -demographic analysis such as the household size (HS) of a 4-bedroom SFD in every state of the United States and the statistical confidence interval of this HS metric in all 50 states.

3. Demographic multiplier monograph— As opposed to the above two end products which focus on providing demographic multiplier data in as described different formats, the monograph is a comprehensive text on the subject. It presents the background to and context of demographic multipliers and details the different facets of this information and how the varied data can be optimally applied. For illustrative purposes, the monograph presents the multiple demographic subjects using New Jersey as a detailed example and contains the full array of demographic data for this state. This Garden state example is applicable to the 50 states.

Rutgers-Bloustein encourages analysts interested in the updated 50-state demographic multipliers to peruse the monograph on this subject as that is the most comprehensive presentation. That said, some analysts are most interested in data alone for their ready utilization will be more meaningful after perusal of the below quick tutorial on the applications and uses of the demographic multipliers. For related handy reference, technical definitions of the different components of the residential multipliers are presented at the conclusion of this guide.

**II. USES OF DEMOGRAPHIC MULTIPLIERS (DMs)**

There are numerous, important interlinked applications of demographic multipliers:

1. ***Fiscal Impact Analysis (FIA):***

DMs are used to calculate municipal and school costs, especially when utilizing the per capita FIA method to quantify the costs of growth. DMs may also be applied to calculate some growth-induced revenues.

1. ***Impact Fees:***

DMs are used to calculate proportional infrastructure costs and ensuing charges engendered by growth, such as growth-induced school children needing added school facilities

1. ***School Enrollment Projections:***

DMs applied to the anticipated residential development in a school district can refine school enrollment projections.

1. ***Public Staffing Analysis:***

DMs are used to calculate growth-induced need for public service employees (e.g. teachers), especially when public staffing is related to a population metric (e.g. teachers per 100 pupils).

1. ***Needs of Different Age Groups:***

DMs showing the age composition of household members provide critical data for age-specific population needs (e.g., pre-school versus seniors).

1. ***Market Studies:***

DMs that quantify the size and age and other profile of anticipated development provide important information for market studies

1. ***Public Policy Analysis***

DMs and their key input to fiscal impact analysis and other applications listed here, inform various public policy considerations. For example, with climate change and sea rise and attendant more frequent and harmful coastal and riverine flooding, governments at all levels have implemented property buyout programs in endangered locations. That policy raises the question of the public finance effects from buyouts and a critical way of studying these effects is through fiscal impact analysis and other studies calibrated by the DMs.

**III. Demographic Multiplier Components**

For each state, DMs are presented by Rutgers-Bloustein for two categories of age-related housing units.

*Newer (or Newer Built) Housing:*

Housing units built in each state over the period 2000-2021.

*All (or All Age) Housing*

Housing units built in any year, including both newer and older housing.

For both newer built and all housing, the following residential multipliers components are presented for each state.

1. *Household Size* (HS): Total persons per housing unit.

2. *Age distribution* of the household members organized into the following eight age categories: 0–4, 5–17, 18–34, 35–44,

45–54, 55–64, 65–74, 75+.

3. *Total school-age children* *(SAC*), or number of persons in the household of school age, defined as those 5 to 17 years old. (The SAC is the same as the number of household members in the age 5–17 category.)

4. *Total public school children* *(PSC),* or the SAC who attend public schools.

5. *The SAC and PSC by school level and grade group* organized as follows: elementary (kindergarten-grade 5), junior high school (grades 6–8), and high school (grades 9–12).

6. *Statistics*  Basic statistics are presented for three key demographic multipliers (HS, SAC and PSC) including sample size, dispersion of the data, confidence intervals, and error margin as percentage.

**IV. DEMOGRAPHIC MULTIPLIERS PRESENTED IN TABULAR FORM—QUICK GUIDE**

The 50-state demographic tables are organized as detailed in Table I-A-1. There are six tables (II-A-1 through II- A-6) for the “Newer” housing in each state (units built 2000–2021) and a parallel six tables (II-B-1 through II-B-6) for the “All Housing,” both newer and older. All twelve tables present varying demographic and statistical data as mentioned earlier and detailed in Table I-A-1 organized by the housing structural type (e. g., SFD versus SFA), size (number of bedrooms), tenure (own or rent), and housing value characteristics.

As indicated below, there are multiple (nine) housing-type and tenure combinations:

1--*Single-Family detached* (Combines Own and Rent tenure)

2--*Single-Family attached* (Combines Own and Rent tenure

3—*Smaller (2-4 unit) multifamily* (Combines own and rent tenure)

4—*Mid-size (5-49 units) multifamily* (Own tenure alone)

5-- *Mid-size (5-49 units) multifamily* (Own tenure alone)

6.—*Larger (50 or more units) multifamily* (Own tenure alone)

7.-- *Larger (50 or more units) multifamily* (Rent tenure alone)

8—*All housing* (all above housing types) (Own tenure alone)

9.-- *All housing* (all above housing types) (Rent tenure alone )

Further, the housing and the demographic multipliers are arrayed by a range of housing sizes from 0 (studio)–1 bedroom to the much larger 4-5 bedrooms, and an array of housing values. For Newer Housing built 2000–2021, there are three housing value groups as of 2021 in each state: “all values,” “below-median value,” and “above-median value.” For All Housing—Newer Built and older—there are four value groups as of 2021: All Values; and units priced at the first tercile of value (lower one-third); second tercile of value (middle one-third); and third tercile of value (upper one-third) for each state.

The analyst should consider the following quick guide in using the demographic multipliers presented in tabular form.

1. 1. *What demographic information is being sought with respect to time perspective?* For demographics on Newer Built housing (units built 2000– 2016), go to the II-A series of tables; for demographics on All Housing, both newer and older, go to the II-B series of tables. Each of these housing age cohorts with respect to the demographic multipliers has advantages and disadvantages; the newer built DMs showing the immediate demographic impact and all housing DMs quantify longer term effects. Ultimately, both age cohorts are informative, and both should be consulted.

2. *What specific type of demographic multiplier is sought?* This will vary, and Table I- A-1 is a good overall guide. For example, for total persons and persons by age, access Tables II-A-1 (Newer Built housing) and II-B-1 (All Housing); for school-age children by grade level, see Tables II-A-2 and II-B-2; and for demographic statistics, consult Tables 4 through 6 in both the II-A and II-B series.

3. *For what type of housing is the demographic information being sought?* Carefully consider the multiple specific characteristics of the housing being examined by housing type, housing size, housing tenure, and housing value according to the matrix shown in Table I-A-I to slot the appropriate demographic multipliers to consult. From the 1970s, when Rutgers–Bloustein researchers first started to provide planners and others with residential demographic multipliers, these multipliers have been differentiated by variations in housing unit type, size (number of bedrooms), tenure (own or rent), value (e.g., above- or below-median), and other characteristics, so it is very important in considering the demographic multipliers to be specific in exactly what type of housing is being considered.

For example, if the value of the housing being examined is unknown, then use the All Housing Value data; however, if the housing value is known, then it is optimal to slot to the appropriate below-median/above-median categories for the Newer Built housing or to the appropriate housing values by tercile for the All Housing group, as earlier described.

Analysts interested in the statistics of the demographic multipliers should consult tables II-A-4 through II-A-6 for the NEWER housing and tables II-B-4 through II-B-6 for ALL housing These tables show the following four statistics for three key multipliers—household size (HS), school-age children (SAC), and public school children (PSC).

1. *Sample size or N*, expressed in terms of the number of sampled households from which the HS, SAC, or PSC were derived.

2. *Standard error (SE)—*a measure of an estimate’s variability. The greater the estimated standard error in relation to the size of the estimate (HS, SAC, or PSC), the less reliable the estimate. Approximately 68 percent of the time, the sample estimate will be within one SE of the true population value; about 95 percent of the time, the sample estimate will be within 2 SEs of the population value; and about 99 percent of the time, the sample estimate will be within 3 SEs of the population value.

3. *Confidence Interval (CI)* quantifies the uncertainty in measurement by providing a range of values from low to high that has a specified probability (e.g. 99, 95, or 90 percent) of containing the true population value. Part Two presents the 90 percent CI.

4. *Error Margin as Percentage (EMP)* is computed for the 90 percent confidence interval as percentage of the estimated average. Statisticians “prefer” an EMP of 50 percent or less.

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**V. DEMOGRAPHIC MULTIPLIERS PRESENTED IN DATA BASE FORM—QUICK GUIDE**

While much of the information presented thus far also informs the demographic multipliers presented in a data base

form, it is instructive to describe further the demographic multiplier data base platform and illustrate its utilization. This data

base component of the Rutgers-Bloustein demographic multiplier study was created by Umer Farooq, a graduate student at

The Edward J. Bloustein School of Planning and Public Policy

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The data base structure and contents are detailed at [https://demographics-rutgers.streamlit.app/](https://nam02.safelinks.protection.outlook.com/?url=https%3A%2F%2Fdemographics-rutgers.streamlit.app%2F&data=05%7C02%7Cjfv51%40scarletmail.rutgers.edu%7C1aea94fd240b4642dcc608dd582c9f62%7Cb92d2b234d35447093ff69aca6632ffe%7C1%7C0%7C638763670846979458%7CUnknown%7CTWFpbGZsb3d8eyJFbXB0eU1hcGkiOnRydWUsIlYiOiIwLjAuMDAwMCIsIlAiOiJXaW4zMiIsIkFOIjoiTWFpbCIsIldUIjoyfQ%3D%3D%7C0%7C%7C%7C&sdata=sNWjoYzNTbl1CezECl7E6qaUBzpjeg8wI9N7up59xI4%3D&reserved=0).

**Definitions/ Comments**

**ACS**

American Community Survey. The ACS is a yearly survey of population and housing in the United States that is administered by the United States Census Bureau.

**Bedrooms (BR)**

**Housing Size**

The number of rooms that would be listed as bedrooms if the house or apartment were listed on the market for sale or rent even if these rooms are currently used for other purposes. A housing unit consisting of only one room is classified as having no bedroom (studio).

**Demographic Multipliers**

In this study, encompasses residential demographic multipliers—the number and profile of occupants in housing.

**Housing Age**

* ***Newer (or Newer Built)*** housing. In this study, refers to housing units built in the 50 states over the period 2000-2016.
* ***All (or All Age)*** housing. In this study, refers to all housing units built in the 50 states of any year. It includes both newer and older housing units.

**Housing Categories (Structure Type)**

* ***Single-family detached.*** A 1-unit structure detached from any other house, that is, with open space on all four sides. Such structures are considered detached even if they have an adjoining shed or garage. A one-family house that contains a business is considered detached as long as the building has open space on all four sides.
* ***Single-family attached.*** A 1-unit structure that has one or more walls extending from ground to roof separating it from adjoining structures. In row houses (sometimes called townhouses), double houses, or houses attached to nonresidential structures, each house is a separate, attached structure if the dividing or common wall goes from ground to roof.
* ***2–4 units (smaller multifamily).*** Units in structures containing 2, 3, or 4 housing units.
* ***5–49 units (mid-size multifamily).*** Units in structures containing 5 to 49 housing units.
* ***50+ units (larger multifamily).*** Units in structures containing 50 or more housing units.

**Housing Rent (Contract Rent)**

Contract rent is the monthly rent agreed to or contracted for, regardless of any furnishings, utilities, fees, meals, or services that may be included.

**Housing Rent (Gross Rent)**

Gross rent is the ***contract rent*** plus the estimated average monthly cost of utilities (electric, gas, water and sewer) and fuels (oil, coal, kerosene, wood, and the like) if these are paid by the renter (or paid for the renter by someone else). In this study, the monthly gross rents (converted to housing-unit value; see ***Housing Value***) are indicated in the Part II demographic tables.

**Household Size(HS)**

The total number of persons in a ***housing unit.***

**Housing Tenure (Ownership or Rent)**

A ***housing unit*** is occupied if it is either owner-occupied or renter-occupied. A housing unit is owner-occupied if the owner or co-owner lives in the unit, even if it is mortgaged or not fully paid for. All occupied housing units that are not owner-occupied, whether they are rented or occupied without payment of rent, are classified as renter-occupied.

**Housing Unit**

A ***housing unit*** may be a house, an apartment, a group of rooms, or a single room that is occupied (or, if vacant, intended for occupancy) as separate living quarters.

**Housing Value (Rent)**

For owner-occupied units, housing value is the census respondent’s estimate of how much the property (including the lot and additional buildings for non-condominium multi-unit buildings) would sell for if it were for sale. In this study, the value of a rented unit is estimated to be 110 times the monthly ***gross rent***. The housing value and rents are adjusted to 2021 values using the ACS adjustment factor for housing dollar. For Newer Housing in the 50 states (units built 2000–2016), housing value is categorized into tripartite classification: *housing priced below the median, housing priced above the median,* and *All Value housing*. Since in the 5-year ACS survey median values change from year to year, the classification is done relative to the year- specific median values. The above housing price terms are just as they are stated.

Housing priced below the median should *not* be confused with affordable or *subsidized housing.*. Housing priced above the median is *not* synonymous with what is sometimes referred to as market-rate housing (to contrast the market- rate from the affordable or subsidized categories). For all housing units in the 50 states (newer and older built units), housing value is categorized into a quadripartite classification: *All Value housing*, and then housing units arrayed by terciles (thirds) of value: *first tercile* (lower one-third), *second tercile* (middle one-third), and *third tercile* (upper one-third). The first tercile is *not* synonymous with either affordable housing or *subsidized* housing.

**Median Housing Value**

The median divides the value distribution into two equal parts: one-half of the cases falling below the median value of the property, and one-half above the median. Reported medians are based on 5-year ACS data on housing values using adjusted 2016 dollars.

**Public School Children (PSC)**

The ***school-age children (SAC)*** attending public school.

**Residential Multipliers**

These multipliers show the population associated with different ***housing categories*** as well as housing differentiated by ***housing value, housing size*** (bedrooms), and ***housing tenure***.

**School Age Children (SAC)**

The household members of elementary and secondary school age, defined here as those 5 through 17 years of age.

**Terciles (Housing Value)**

Terciles of housing value (for the All Age housing in the 50 states) are the statistics that divide the observations of housing value into three intervals, each containing 33.333 percent of the data. The first (lower one-third), second (middle one-third), and third (upper one-third) terciles of housing value are computed by ordering the housing values from lowest to highest and then finding the housing values below which fall one-third and two-thirds of the ***housing value*** data

**GUIDE TO the RESIDENTIAL MULTIPLIER STATISTICS (for HS, SAC and PSC)**

**1. Sample size or N, expressed in terms of the number of sampled households from which the HS, SAC, or PSC were derived.**

**2. Standard error (SE)10—a measure of an estimate’s variability. The greater the estimated standard error in relation to the size of the estimate (HS, SAC, or PSC), the less reliable the estimate. Approximately 68 percent of the time, the sample estimate will be within one SE of the true population value; about 95 percent of the time, the sample estimate will be within 2 SEs of the population value; and about 99 percent of the time, the sample estimate will be within 3 SEs of the population value.**

**3. Confidence Interval (CI) quantifies the uncertainty in measurement by providing a range of values from low to high that has a specified probability (e.g. 99, 95, or 90 percent) of containing the true population value. We present the 90 percent CI.**

**4. Error Margin as Percentage (EMP) is computed for the 90 percent confidence interval as percentage of the estimated average.11 Statisticians “prefer” an EMP of 50 percent or less.**