

## Documentation and Sources

### Definitions

**Areas:** For Virginia, data are provided for the state, 11 Metropolitan Statistical Areas, and 134 independent cities and counties referred to as jurisdictions.

**Metropolitan Statistical Area:** According to the U.S. Census, a Metropolitan Statistical Area is, “A geographic entity designated by the federal Office of Management and Budget for use by federal statistical agencies. An MSA consists of one or more counties.” In Virginia, MSAs consist of counties independent cities. (See downloadable file “Virginia Metropolitan Statistical Areas” for the jurisdictions contained within each of the 11 MSAs).

**Public Use Microdata Area (PUMA):** According to the U.S. Census, a PUMA is, “A geographic entity for which the Census Bureau provides specially selected extracts of raw information from a small sample of long-form census records. PUMAs, which must have a minimum census population of 100,000 and cannot cross a state line, receive a five-percent sample of the long-form records.” In Virginia, PUMAs consist of a varying number of geographically linked independent cities and counties.

**Large jurisdictions:** Large jurisdictions are defined as independent cities or counties having population of 65,000 or more. The U.S. Census American Community Survey provides annual sample data for large jurisdictions. In Virginia, there are 30 large jurisdictions (pre-2010, there were 28 large jurisdictions before the addition of James City County and York County).

**Medium jurisdictions:** Medium jurisdictions are defined as independent cities or counties having population between 20,000 and 65,000. The U.S. Census American Community Survey does not have annual data for medium jurisdictions due to confidentiality issues. However, the U.S. Census American Community Survey provides 3-year average sample data for medium jurisdictions as well as for the 30 large jurisdictions. In Virginia, there are 49 medium jurisdictions.

**Small jurisdictions:** Small jurisdictions are defined as independent cities or counties having population less than 20,000. The U.S. Census American Community Survey does not have annual data or 3-year average data for small jurisdictions due to confidentiality issues. However, the U.S. Census American Community Survey provides five-year average sample data for small jurisdictions as well as for the 49 medium and 30 large jurisdictions. In Virginia, there are 55 small jurisdictions.

**Consumer Price Index (CPI):** According to the Bureau of Labor Statistics, “The Consumer Price Index (CPI) is a measure of the average change over time in the prices paid by urban consumers for a market basket of consumer goods and services.” The CPI for all urban consumers, U.S. city average from the U.S. Bureau of Labor Statistics was used to estimate values. The one exception to using the overall CPI for all urban consumers, U.S. city average to estimate values was for median gross rent. To adjust median gross rent, the CPI from the special category of rent of primary residence under housing CPI for all urban consumers, U.S. city average was used.

CPI ratios were calculated and applied to a known number value for a particular year to estimate a number value for a year not yet available or to adjust an annual number to a quarter number. To get the CPI ratio used in estimating an annual number, the annual CPI for the year for which an estimated number was required was divided by the annual CPI for the year of the known number value. The resulting CPI ratio was multiplied by the known annual number value to get the estimated annual number. To get the CPI ratio for estimating an unknown number for a quarter, the CPI three-month average for that quarter was divided by the annual CPI of which the CPI three-month average was a part. The resulting CPI ratio was multiplied by the known annual number value to get the estimated quarter number.

**Households:** According to the U.S. Census, a household is, “A person or group of people who occupy a housing unit as their usual place of residence. The number of households equals the number of occupied housing units in a census.”

**Households with Incomes at or below 60% of median household income:** To estimate the number of households with incomes at or below 60% of median household income, the median household income was first determined using the most recent single year American Community Survey (ACS) data for the large jurisdictions and the five-year average ACS for medium and small jurisdictions and then adjusted to the current quarter using the CPI. Calculating 60% of the median income provided a threshold number. The table for household income from the most recent ACS single year for large jurisdictions and the five-year average ACS for medium and small jurisdictions was utilized to estimate the number of households under the established income threshold. The number of households for the income range category containing the value representing 60% of median income was estimated through interpolation and added to all the households in the income range categories below to get the number of households with incomes at or below 60% of median household income.

**Tenure:** According to the U.S. Census, tenure is, “The status of an occupied housing unit as either owner-occupied or renter-occupied.”

**Percent Owners:** Number of owners divided by the number of households.

**Percent Renters:** Number of renters divided by the number of households.

**Median Household Income:** The middle value of income for households (half of households have incomes below the median and half have incomes above the median).

Variations of median household income include:

**60% Median Household Income** =  $.6 * \text{median household income}$

**80% Median Household Income** =  $.8 * \text{median household income}$

**Median Household Income of Lowest Quartile of Households** = the middle value of income for households in the lowest quartile of households or the bottom 1/4 of households.

**Median Owner Income:** The middle value of income for owner households (half of owner households have incomes below the median and half have incomes above the median).

**Median Renter Income:** The middle value of income for renter households (half of renter households have incomes below the median and half have incomes above the median).

**Median Sale Price (Existing and New):** The middle value of the price paid at closing for residential homes including both new and existing homes as recorded through the realtor Multiple Listing Service (MLS). Zero value sales were excluded. Median Sale Price for the state and metropolitan areas were derived from aggregated jurisdiction data.

**Median Sale Price, Detached Units:** The middle value of the price paid at closing for detached units defined as single-family dwelling units that are free-standing and do not share a common wall with any other structure.

**Median Sale Price, Attached Units:** The middle value of the price paid at closing for attached units defined as dwelling units that are not free-standing and share a common wall with another structure (examples, duplex units, townhouses, condominiums).

**Median Owner Cost:** Median owner cost is the estimated monthly median cost to own or the middle value of the monthly cost to own. Median owner cost is based on the Principal, Interest, Taxes (PIT) payment required plus home insurance premium for the median unit sold in an area. It assumes the purchase of a home at the median sales price for new and existing units sold in an area over a particular time period, a 5% down payment, and a 30 year mortgage at a fixed interest rate (the state average mortgage interest rate including fees and assuming 5% down for a particular time period). The calculated cost for principal and interest is adjusted by adding the monthly cost for real estate taxes (for localities, the local real estate tax rate for a particular year adjusted to a monthly rate; for metropolitan areas and the state, an average of local rates weighted by the number of owners for a particular year adjusted to a monthly rate). In addition, the cost for principal and interest is adjusted by adding an estimated monthly cost for homeowner's insurance based on average premiums for Virginia provided by the National Association of Insurance Commissioners for various ranges of home values (assumed 80% of median sale price as the home value).

Median Owner Cost =  $(PMT(\text{Mortgage Interest Rate}/12,30*12,\text{Median Sales Price}*0.95)*-1) +$   
Monthly Taxes + Monthly Homeowner's Insurance.

Mortgage Interest Rate = Virginia state average interest rate including fees for a particular quarter was applied for all geographies. For the year rate, all quarters were averaged.

Median Sale Price as defined above.

Monthly Taxes = the monthly cost of real estate taxes based on the local real estate tax rate for a particular year (year rate was used for quarters within that year); for the state and metropolitan areas the local rate for a jurisdiction part of the greater geographic area was multiplied by the ratio of the number of owner households in the jurisdiction to the number of owner households in the greater area and then the results for each jurisdiction comprising the greater area were summed; the 2010 rate was assumed for 2011; source Weldon Cooper Center at UVa.

Monthly Homeowner's Insurance = the monthly cost of homeowner's insurance for a particular year or quarter. The monthly cost of homeowner's insurance was calculated based on the assumption that a home value apart from land was 80% of median sale price. For each year, NAIC provided an average annual premium for a range of home values (2008 was the most recent available data and was also used for 2009, 2010, and 2011). The midpoint of the home value range was divided by the average premium to get a rate. That rate was multiplied by 80% of the median sale price for the year or quarter within the year for which the premium applied and divided by 12 to get an estimated monthly homeowner's insurance premium.

**Median Renter Cost:** Median renter cost is based on median gross rent (including utilities) and is the estimated middle value of the monthly cost to rent. Median renter cost is the median gross rent reported in the American Community Survey (ACS) based on occupied housing units paying cash rent for all units regardless of number of bedrooms. For the state, MSAs, and large jurisdictions, the median gross rent is based on the one-year annual ACS sample data. The median gross rent for the year is adjusted by the CPI to estimate rent for a quarter. For medium and small jurisdictions, the median gross rent is based on the five-year average ACS sample data (the median gross rent for the most recent year is reported and other years/quarters are estimated using the rent CPI).

**Percent of Cost Burdened Households:** A household is considered cost burdened if paying over 30% of household income for housing. The percent of cost burdened households is the ratio of households paying over 30% of income for housing to the total number of all households. Households with zero or negative income were excluded from the calculation as were households with no cash rent.

**Household Cost of Commuting to and From Work:** The household cost for traveling to and from work excludes travel costs associated with shopping, recreation, or other purposes. The estimate for average commuting cost for households is calculated by aggregating the commuting costs of commuters in an area and dividing by the number of households. Commuting cost is calculated based on the following data components:

#### Mode of Travel

Cost is broken down by modes of travel including: car, truck van drove alone; car, truck, van carpooled; and public transportation. Due to lack of primary data and small numbers, workers commuting by motorcycle, taxi, bicycle, and walking are not included.

#### Average Commuting Distance by Vehicle Mode of Travel

#### *Average Time to and from Work*

Aggregate minutes traveled to work for each area by mode of transportation (car, truck, van drove alone; and car, truck, van carpooled) are divided by the number of workers to get an average aggregate minutes traveled. The aggregate minutes traveled are multiplied by 2 to reflect average

minutes to and from work. Minutes are converted to average hours traveled to and from work by dividing the average minutes by 60 (average commuting hours traveled per day).

#### *Average Speed in Miles Per Hour*

The average commuting miles per hour for each area is based on miles per hour for non-MSA areas and MSA areas of varying sizes in the NHTS. Virginia non-MSA jurisdictions are assigned the national non-MSA average commute speed. MSA's and jurisdictions within MSA's are assigned the national MSA average commute speed depending of the population of the MSA. Virginia is assigned an average commute speed based on a weighted average for Virginia jurisdictions.

The estimated daily average commute distance in miles for workers who drove and alone and for workers who carpooled for each area is calculated by multiplying the average time to and from work in hours by the average miles per hour commute speed. The annual average commute distance by area assumes 240 work days per year based on 52 weeks x 5 work days per week. It accounts for 2.5 weeks (15 work days) of vacation and 5 holidays. Multiplying the estimated daily average commute distance in miles for workers by 240 work days produces the average number of commute miles traveled per year per worker.

#### Average Vehicle Total Cost Per Mile

The average total cost per mile per vehicle is the sum of average fuel cost per mile, the variable cost per mile, and the fixed cost per mile.

#### *Average Fuel Cost Per Mile*

For those traveling by car, van, or truck, the per gallon cost of fuel for the Lower-Atlantic region, which includes Virginia, reported for each of the three months in the quarter is used to calculate a quarterly average price per gallon. The fuel economy or the national average miles per gallon for light duty vehicles which includes both short wheel base and long wheel base cars, trucks and vans, is also determined. The miles per gallon figure for vehicles is weighed respectively by the number of registered short wheel base vehicles and the number of registered long wheel base vehicles to get one average miles per gallon figure reflecting both types of vehicles. To get the average fuel cost per mile, the price per gallon is divided by the average miles per gallon.

#### *Variable Cost Per Mile*

Variable cost includes the cost per mile associated with maintenance and tires.

#### *Fixed Cost Per Mile*

An average vehicle life of 120,000 miles and 10 years, considered the legally-defined useful life of a vehicle by the EPA, and the purchase of a new vehicle that costs \$20,000 are assumed. It is important to use a reasonably-priced vehicle for the purpose of estimating the affordability of commuting rather than using average cost that includes luxury vehicles.

The fixed cost per mile includes both the fixed cost of owning and the fixed cost of operating a vehicle. 1) The average annual fixed cost of owning a vehicle is derived by calculating the net

present value (over 10 years) of the cost of purchasing a new \$20,000 vehicle plus sales tax and fees – title and registration – with a 3-year loan term at current car loan interest rates and dividing by 10.

2) The annual fixed cost of operating a vehicle is derived by summing the annual recurring costs including insurance, driver's license (over 10 years), registration renewal, inspection, vehicle local decal/license fee, and the average personal property tax (calculated by multiplying the current year tax on a \$20,000 vehicle by the residual of the annual Personal Property Tax Relief Act (PPTRA) percentage to get the taxpayer liability or the amount owed by the taxpayer, depreciating the current taxpayer liability over a 10-year period by mimicking the car value depreciation, summing the depreciated annual tax, and dividing by 10). The sum of the average annual fixed cost of owning a \$20,000 vehicle and the recurring annual costs of operating that vehicle are divided by 12,000 miles (the average annual mileage over the life of the vehicle) resulting in the average fixed cost per mile of owning and operating a \$20,000 vehicle.

#### Average Number of Commuters Per Vehicle

The average number of commuters per vehicle is based on the number of workers 16 and over who drive alone or carpool to work by car, van, or truck broken down by the number of workers in the carpool vehicle. A weighting factor reflecting the weighted average of commuters per carpool vehicle is determined and applied to carpool workers. A weighting factor of 1 is assumed for workers driving alone.

#### Commuting Cost Per Vehicle

The commuting cost per vehicle (for drove alone vehicles and again for carpool vehicles) is calculated by multiplying the average miles traveled per year per worker by the total average cost per mile per vehicle and then divided by the average number of commuters per vehicle.

#### Commuting Cost for Public Transit

The average commuting cost for those taking public transit uses the national average passenger fares for various modes of public transportation from the Federal Transit Administration's National Transit Database (fare revenues divided by trips). A weighting factor reflecting the weighted average of commuters by public transportation mode for each area from the American Community Survey is used to get an average cost for public transit. The average cost is multiplied by 2 to reflect round trip and by our assumed 240 work days to get an annual cost figure.

#### Annual Aggregate Commuting Cost for Commuters

For each area, commuting cost is weighted by the share of commuters in each mode of transportation (car, van, truck drove alone; car, van, truck carpoled; and public transit). Transportation cost for motorcycles, taxis, bicyclers and walkers is not included. The sum of the

annual aggregate commuting costs for the three transportation modes is used to get a total annual aggregate commuting cost.

#### Monthly Average Commuting Cost per Commuter

The annual aggregate commuting cost for commuters is divided by the sum of the number of commuters for each mode of transportation (car, van, truck drove alone; car, van, truck carpooled; and public transit) to get the average annual commuting cost per commuter and then divided by 12 to get the monthly average commuting cost per commuter.

#### Monthly Average Commuting Cost per Household

The total annual aggregate commuting cost for each area is divided by the number of households (from the most current single year or five-year average ACS data) to get the annual average commuting cost per household and divided by 12 to get the monthly average household commuting cost.

**Personalized Commuting Cost:** Personalized commuting cost estimates the annual and monthly commuting cost for a driver commuting by vehicle alone or sharing equally with a user-stated number of carpoolers. Based on user-entered round trip miles to work per commute, the personalized commuting cost calculator estimates annual commuting cost (monthly cost is determined by dividing annual cost by 12 months). Personalized commuting cost (annual) is calculated by multiplying the number of round trip miles to and from work for a commuter (entered by a user) by the cost per mile determined for a particular area (see section above *Average Vehicle Total Cost Per Mile*) and then multiplying the result by 240 (assumes the commuter works 240 days per year).

**Housing Affordability Index:** The Housing Affordability Index measures the affordability of the typical housing unit based on the typical household income. It is the percent of the median household income required to occupy the median dwelling unit. To calculate the housing affordability index for a particular geographic area, the annualized median cost to own (as defined above) was divided by the median household income and multiplied by the percent owners and the annualized median renter cost (as defined above) was divided by the median household income and multiplied by the percent renters. The two results were added together to get the overall housing affordability index. Variations of the overall housing affordability index include indexes based on 80% of median household income and 60% of median household income which are calculated by multiplying median household income by .8 and .6 respectively. Another variation is a housing affordability index based on the median household income of the bottom quarter of households.

**Housing Affordability Index at 80% of Median:** The Housing Affordability Index at 80% of Median Household Income is the percent of household income that is required to own or rent the typical house based on the typical household with income at 80% of the median household income for the area.

**Housing Affordability Index at 60% of Median:** The Housing Affordability Index at 60% of Median Household Income is the percent of household income that is required to own or rent the typical house based on the typical household with income at 60% of the median household income for the area.

**Housing Affordability Index at Median Household Income of the Bottom Quarter of Households:** The Housing Affordability Index at the median household income of the bottom quarter of households is the percent of household income that is required to own or rent the typical house based on the typical household with income at the median of the bottom quarter of households for the area.

**Housing Affordability Index for Sold Housing at the Median Owner Income:** The Housing Affordability Index for Sold Housing at the Median Owner Income measures the affordability of sold housing based on the typical owner income. It is the percent of the median owner income required to occupy the median priced sold unit. To calculate the housing affordability index for sold housing at the median owner income for a particular geographic area, the annualized median cost to own (as defined above) was divided by the median owner income.

**Housing Affordability Index for Sold Housing at the Median Renter Income:** The Housing Affordability Index for Sold Housing at the Median Renter Income measures the affordability of sold housing based on the typical renter income. It is the percent of the median renter income required to occupy the median priced sold unit. To calculate the housing affordability index for sold housing at the median renter income for a particular geographic area, the annualized median cost to own (as defined above) was divided by the median renter income.

**Housing Affordability Index for Rented Housing at the Median Owner Income:** The Housing Affordability Index for Rented Housing at the Median Owner Income measures the affordability of rented housing based on the typical owner income. It is the percent of the median owner income required to occupy the median priced rented unit. To calculate the housing affordability index for rented housing at the median owner income for a particular geographic area, the annualized median renter cost (as defined above) was divided by the median owner income.

**Housing Affordability Index for Rented Housing at the Median Renter Income:** The Housing Affordability Index for Rented Housing at the Median Renter Income measures the affordability of rented housing based on the typical renter income. It is the percent of the median renter income required to occupy the median priced rented unit. To calculate the housing affordability index for rented housing at the median renter income for a particular geographic area, the annualized median renter cost (as defined above) was divided by the median renter income.

#### **Housing + Commuting Affordability Index:**

The overall Housing + Commuting Affordability Index at median household income reflects the percent of income required to occupy the median housing unit (both sold and rental units) including the average

household cost of commuting to and from work. To calculate the housing + commuting affordability index for a particular geographic area, the annualized median cost to own (as defined above) plus the annualized average household cost to commute to and from work was divided by the median household income and multiplied by the percent owners and the annualized median renter cost (as defined above) plus the annualized average household cost to commute to and from work was divided by the median household income and multiplied by the percent renters. The two results were added together to get the overall housing + commuting affordability index. Variations of the overall housing + commuting affordability index include indexes based on 80% of median household income and 60% of median household income which are calculated by multiplying median household income by .8 and .6 respectively.

**Housing + Commuting Affordability Index at 80% of Median:** The Housing + Commuting Affordability Index at 80% of Median Household Income reflects the percent of income required to occupy the median housing unit (both sold and rental units) including the average household cost of commuting to and from work.

**Housing + Commuting Affordability Index at 60% of Median:** The Housing + Commuting Affordability Index at 60% of Median Household Income reflects the percent of income required to occupy the median housing unit (both sold and rental units) including the average household cost of commuting to and from work.

**Housing Price Index:** The Housing Price Index (HPI) measures the average price change of single-family house prices in repeat sales or refinancing of the same properties. Provided by the Federal Housing Finance Agency, it is a measure or indicator of appreciation of single-family residential properties. The HPI is based on all-transactions and is not seasonally adjusted. The HPI is available at the state, metropolitan area level, and non-metropolitan area level. If a jurisdiction is within a MSA, the index reported is the Index for that MSA; otherwise the jurisdiction index reported is the non-metropolitan area index (same for all jurisdictions not within an MSA).

**Number of Residential Building Permits:** The number of residential building permits is a measure of residential construction activity and is the number of non-commercial units permitted. Building permits are categorized by type of building (single-family and multi-family or more than one unit in the building). For multi-unit buildings, the data indicate the number of units permitted within the multi-unit structure. The information excludes permits issued for mobile homes, garages and other out-buildings, additions, and renovations.

**Inventory of Federally-Assisted Housing:** The number of federally-assisted rentals was compiled by the Virginia Housing Development Authority (VHDA) using data received from multiple agencies including HUD, USDA Rural Development, and local Public Housing Authorities (PHAs). The data may not match that provided directly by subsidy program administrators due to the necessity of reconciling minor data differences among various data sources--e.g., minor data differences among agencies where multiple subsidies are layered within the same property.

Generally, "Low-Income Project-Based" rentals serve households with income between 30% and 60% of area median income. The "Low-Income Project -Based" include those rentals assisted through the

following federal low-income housing project-based subsidies: 1) HUD Programs -- Public Housing, Section 8, Section 202, Section 236 and Section 221d3 BMIR; 2) USDA Rural Development Programs -- Section 515 Interest Credit; and 3) IRS Programs -- Low-Income Housing Tax Credits, and AMT Bonds.

Both the "Extremely Low-Income Project-Based" rentals and the "Extremely Low-Income Vouchers" serve households with income at or below 30% of area median income. The "Extremely Low-Income Project-Based" units are assisted through the following federal project-based rent or operating subsidies: 1) HUD Programs -- Public Housing Operating Subsidies; Section 8 and similar HUD rent subsidies; and Section 202 PRAC; and 2) USDA Rural Development Programs -- Section 515 Rental Assistance. The inventory also includes the number of tenant-based deep rental subsidies that are represented under the "Extremely Low-Income Vouchers".

The inventory only includes traditional apartment developments. The inventory does not include specialized housing with occupancy restricted to specific targeted populations (other than seniors) such as group homes, SROs, transitional housing, congregate housing, etc. Among the federal programs excluded are Section 811, HOPWA and McKinney Act Homeless programs. Also excluded are Section 202 and Section 8 developments that are restricted to disability occupancy (primarily group homes). In addition, the inventory does not capture units financed with HOME or CDBG funds unless those units also used other subsidy programs such as Low-Income Housing Tax Credits or AMT Bonds.

**Number of Loans Originated:** The number of loans originated (loans that have been issued or are on the books) by year is based on Home Mortgage Disclosure Act (HMDA) data as reported by financial institutions. The loans include all loan types (conventional, FHA-insured, VA-guaranteed, and FSA/RHS) and are for home purchase of owner-occupied, one to four family properties excluding manufactured housing.

**Median Loan Amount of Loans Originated:** The middle dollar value of originated loans as defined above.

**Number of Housing Units Sold:** The number of bought homes including both new and existing homes. The number of housing units sold for the state and metropolitan areas were derived from aggregated jurisdiction data. Variations include the number of detached units sold and the number of attached (includes townhouses, condos, and duplexes) units sold.

**Median Sale Price (Existing and New):** The middle value of the price paid at closing for bought homes including both new and existing homes from the realtor Multiple Listing Service (MLS). Zero value sales were excluded. Median Sale Price for the state and metropolitan areas were derived from aggregated jurisdiction data. Variations include the median sale price for detached units and the median sale price for attached units (includes townhouses, condos, and duplexes).

**Median Gross Rent:** The Median Gross Rent based on occupied housing units paying cash rent for all units regardless bedroom size from the U.S. Census American Community Survey was used (the annual one-year sample data for large jurisdictions and the five-year average sample data for medium and small jurisdictions).

For the large jurisdictions, the median rents for each quarter within a year were derived by adjusting the year median rent by the ratio of the quarter rent CPI (average of 3 months) for the estimated quarter and the rent CPI for the year.

For the medium and small jurisdictions, the rent reported in the five-year average ACS is for the most recent year. To determine median rents for a different year, the rent for the most recent year was adjusted by the ratio of the rent CPI for the estimated year and the rent CPI of the most recent year. Median rents for each quarter were derived by adjusting the most recent year median rent by the ratio of the quarter rent CPI (average of 3 months) for the estimated quarter and the rent CPI of the most recent year.

**Median Family Income:** Median Family Income as estimated by HUD includes the salary and wages of all family members and is used to determine eligibility for HUD subsidized programs based on family size and family income as a percentage of the median. The housing affordability indexes are based on household income, not median family income.

**Paycheck to Paycheck:** The paycheck to paycheck analysis is modeled after the paycheck to paycheck analysis offered by the National Housing Conference research affiliate, the Center for Housing Policy. This modified analysis compares the average income or wages of various occupations for an area to the minimum income needed to afford the typical sold housing unit or the typical rental housing unit in the area without spending more than 30% of income (the generally accepted definition of housing affordability). If the average income for a particular occupation is lower than the calculated minimum income signifying affordability, then workers in that occupation cannot afford the typical housing unit in the area.

The average income data from the Bureau of Labor statistics is only available for the state and for MSAs. For jurisdictions within an MSA, the occupation income reported is that of the MSA. For jurisdictions not within an MSA, the occupation income reported is the statewide non-metro average gross income for that occupation.

The minimum income is calculated separately for sold housing and rental housing. To calculate the minimum annual income needed to afford the typical sold unit in the area, the median monthly owner cost (as defined elsewhere in this document) is multiplied by 12 and the result divided by .30. To calculate the minimum annual income needed to afford the typical rented unit in the area, the median monthly rental cost (as defined elsewhere in this document) is multiplied by 12 and the result divided by .30.

**Assisted Rental Housing Needs:** The assisted rental housing needs analysis examines supply and demand of affordable rental housing in an area. The analysis compares the supply or the number of federally-assisted rentals in the area to the demand or the number of renters with incomes less than 60% of the area median who pay over 30% of income for rental housing. The supply number is derived from data provided by the Virginia Housing Development Authority and is the sum of the low-income project-based rentals, extremely-low income project based units, and extremely-low income vouchers (see Section on **Inventory of Federally-Assisted Housing** for detailed description). The demand number is

estimated using the U.S. American Community Survey data for the most current year (either ACS 1-year or 5-year data) for renters paying 30% or more of income for housing and using interpolation to calculate the number of those renters who have incomes less than 60% of the median household income.

**Maximum Affordable Housing:** Users may choose a Virginia county, independent city or MSA. The module automatically returns the maximum affordable payment/rent and the maximum affordable house purchase price for the jurisdiction median income, 80% of the median income, and 60% of the median income. The user may also enter an income level. The module will return the maximum affordable payment/rent and the maximum affordable house purchase price for the income entered.

The maximum affordable rent or mortgage payment is calculated assuming that a household can afford to spend up to 30% of household income on housing. This assumption is based on the HUD definition of a “cost burdened” household. The maximum home purchase price will also be calculated assuming that a household can afford to spend up to 30% of household income on housing. In addition this calculation assumes that the purchaser is able to make a down payment of 5% of the purchase price, will take a 30-year loan with an interest rate equal to averages for 30-year fixed mortgages published by Bankrate, make 360 payments, insure 80% of the assessed value of the property (at a rate equal to those reported by the National Association of Insurance Commissioners), and that annual property taxes are equal to the level reported most recently by the Weldon Cooper Center for each jurisdiction.

## Sources

**Consumer Price Index (CPI):** U.S. Bureau of Labor Statistics (All urban consumers, U.S. city average). For adjusting all measures except rent, the overall CPI was used. For adjusting rent, the special category under housing, rent of primary residence, was used.

**Households:** For the state, metropolitan areas, and large jurisdictions, the number of households was obtained from the U.S. Census American Community Survey for a particular year. For medium and small jurisdictions, the number of households was obtained from the most recent five-year average ACS sample data.

**Tenure:** For the state, metropolitan areas, and large jurisdictions, the number of owner households and the number of renter households were obtained from the U.S. Census American Community Survey for a particular year. For medium and small jurisdictions, the number of owner households and the number of renter households were obtained from the most recent five-year average ACS sample data.

**Median Household Income:** For the state, metropolitan areas, and large jurisdictions, median household income was obtained from the U.S. Census American Community Survey for a particular year. For medium and small jurisdictions, median household income was obtained the most recent five-year average ACS sample data.

**Median Owner Income:** For the state, metropolitan areas, and large jurisdictions, median owner income was obtained from the U.S. Census American Community Survey for a particular year. For

medium and small jurisdictions, median owner income was obtained from the most recent five-year average ACS sample data.

**Median Renter Income:** For the state, metropolitan areas, and large jurisdictions, median renter income was obtained from the U.S. Census American Community Survey for a particular year. For medium and small jurisdictions, median renter income was obtained from the most recent five-year average ACS sample data.

For a year where Census data are not yet available, the median owner income for the most recent year available is adjusted by the ratio of CPI for the year or quarter for which Census data are not yet available to CPI for the most recent year available.

Example:

Median household income 2<sup>nd</sup> quarter 2011=Median household income 2010\* (CPI 2<sup>nd</sup> quarter 2011/CPI 2010)

**Median Gross Rent:** U.S. Census American Community Survey (occupied housing units paying cash rent for all units regardless of number of bedrooms). For the state, MSAs, and large jurisdictions, the median gross rent is based on the one-year annual ACS sample data. The median gross rent for the year is adjusted by the CPI to estimate rent for a quarter. For medium and small jurisdictions, the median gross rent is based on the five-year average ACS sample data (the median gross rent for the most recent year is reported and other years/quarters are estimated using the rent CPI).

**Median Sale Price (Existing and New):** The median sale price at closing as reported by the Multiple Listing Service (MLS) was provided by the Virginia Association of REALTORS®. Zero value sales were excluded. Median Sale Price for the state and metropolitan areas were derived from aggregated jurisdiction data. Variations included the median sale price for attached units and median sale price for detached units (condos, duplexes, and townhouses).

**Median Owner Cost:** Virginia Association of REALTORS® (median sale price for sold units); Bankrate.com (mortgage rates); UVA Weldon Cooper Center (real estate tax rates); National Association of Insurance Commissioners (insurance rates).

**Median Renter Cost:** U.S. Census American Community Survey (occupied housing units paying cash rent for all units regardless of number of bedrooms). For the state, MSAs, and large jurisdictions, the median gross rent is based on the one-year annual ACS sample data. For medium and small jurisdictions, the median gross rent is based on the five-year average ACS sample data (the median gross rent for the most recent year is reported and other years are estimated using the rent CPI).

**Number and Percent of Cost Burdened Households:** U.S. Census American Community Survey. For the state, MSAs, and large jurisdictions, the number and percent of cost burdened households is derived

from the one-year annual ACS sample data. For medium and small jurisdictions, the number and percent of cost burdened households is derived from the three-year and five-year average ACS sample data.

**Housing Affordability Indexes:** Virginia Association of REALTORS® (MLS median sale price for sold units); Bankrate.com (mortgage rates and car loan <http://www.bankrate.com/funnel/graph/Default.aspx?cat=8&ids=45,45&state=VA&d=1095&t=MSLine&eco=-1>); UVa Weldon Cooper Center (real estate tax rates, personal property tax which is the taxpayer liability amount based on applying the residual of the annual Personal Property Tax Relief Act (PPTRA) percentage to the total tax, and local vehicle decal/license fees); National Association of Insurance Commissioners (insurance rates both for houses and vehicles); U.S. Census American Community Survey (tenure, median household income, median owner income, median renter income, median gross rent for all units, number of households, mode of transportation to work, number of workers who did not work from home, travel time to work,); U.S. Census Public Use Microdata (low-income estimates); the U.S. Department of Transportation's National Household Travel Survey (NHTS) 2009 (average commuting speed to work); Energy Information Association's (average price per gallon, Lower-Atlantic Region, quarterly estimate based on monthly numbers) Bureau of Transportation Statistics, national, 2010 (average miles per gallon and variable costs of owning and operating a vehicle); the Federal Transit Administration's National Transit Database [http://www.ntdprogram.gov/ntdprogram/pubs/national\\_profile/2010NationalProfile.pdf](http://www.ntdprogram.gov/ntdprogram/pubs/national_profile/2010NationalProfile.pdf) (average national fares for public modes of transportation; Environmental Protection Agency [http://www.epa.gov/otaq/regs/ld-hwy/cap2000/fact\\_sheet.pdf](http://www.epa.gov/otaq/regs/ld-hwy/cap2000/fact_sheet.pdf)) (estimated life of vehicle); <http://www.dmvnow.com> (costs of purchasing a vehicle); Commissioner of Revenue in Virginia jurisdictions for information missing from the UVa Weldon Cooper Center for local personal property taxes based on a \$20,000 vehicle – this is the taxpayer liability amount calculated by multiplying the residual of the annual Personal Property Tax Relief Act (PPTRA) percentage for a locality by the total tax on a \$20,000 vehicle – and for annual local decal/license fee); and Virginia Tech Center for Housing Research (index design).

**Personalized Commuting Cost:** Bankrate.com (car loan rates) <http://www.bankrate.com/funnel/graph/Default.aspx?cat=8&ids=45,45&state=VA&d=1095&t=MSLine&eco=-1>); UVa Weldon Cooper Center (personal property tax which is the taxpayer liability amount based on applying the residual of the annual Personal Property Tax Relief Act (PPTRA) percentage to the total tax, and local vehicle decal/license fees); National Association of Insurance Commissioners (insurance rates for vehicles); Energy Information Association's (average price per gallon, Lower-Atlantic Region, quarterly estimate based on monthly numbers) Bureau of Transportation Statistics, national, 2010 (average miles per gallon and variable costs of owning and operating a vehicle); Environmental Protection Agency [http://www.epa.gov/otaq/regs/ld-hwy/cap2000/fact\\_sheet.pdf](http://www.epa.gov/otaq/regs/ld-hwy/cap2000/fact_sheet.pdf) (estimated life of vehicle); <http://www.dmvnow.com> (costs of purchasing a vehicle); Commissioner of Revenue in Virginia jurisdictions for information missing from the UVa Weldon Cooper Center for local personal property taxes based on a \$20,000 vehicle – this is the taxpayer liability amount calculated by multiplying the residual of the annual Personal Property Tax Relief Act (PPTRA) percentage for a locality by the total tax on a \$20,000 vehicle – and for annual local decal/license fee); and Virginia Tech Center for Housing Research (calculation estimate).

**Housing Price Index:** Federal Housing Finance Agency ( go to [www.fhfa.gov](http://www.fhfa.gov) , downloadable data, Quarterly Index Data, All-Transactions Indexes, and download States, Metropolitan Statistical Areas, and State Non-metropolitan Areas).

**Number of Residential Building Permits:** Weldon Cooper Center, UVa and the U.S. Census.

**Inventory of Federally-Assisted Housing:** The Virginia Housing Development Authority (VHDA) compiled this inventory from data received from multiple agencies including HUD, USDA Rural Development, and local Public Housing Authorities (PHAs). This data may not match that provided directly by subsidy program administrators due to the necessity of reconciling minor data differences among various data sources--e.g., minor data differences among agencies where multiple subsidies are layered within the same property.

**Number of Loans Originated:** Federal Finance Institute Examinations Council.

**Median Loan Amount of Loans Originated:** Federal Finance Institute Examinations Council.

**Number of Units Sold:** Virginia Association of REALTORS®

**Median Family Income:** U.S. Department of Housing and Urban Development.

**Paycheck to Paycheck:** The paycheck to paycheck analysis is modeled after the paycheck to paycheck analysis offered by the National Housing Conference research affiliate, the Center for Housing Policy. We are indebted to the Center for Housing Policy for creating the national *Paycheck to Paycheck* housing affordability analysis. Visit their website at [www.nhc.org/chp/p2p/](http://www.nhc.org/chp/p2p/).

Occupation annual average income: U.S. Bureau of Labor Statistics.

Minimum income not to exceed spending over 30% of income for housing is based on area housing cost.

Median Owner Cost: Virginia Association of REALTORS® (median sale price for sold units); Bankrate.com (mortgage rates); UVa Weldon Cooper Center (real estate tax rates); National Association of Insurance Commissioners (insurance rates).

Median Renter Cost: U.S. Census American Community Survey (occupied housing units paying cash rent for all units regardless of number of bedrooms). For the state, MSAs, and large jurisdictions, the median gross rent is based on the one-year annual ACS sample data. For medium and small jurisdictions, the median gross rent is based on the five-year average ACS sample data (the median gross rent for the most recent year is reported and other years are estimated using the rent CPI).

**Supply of Federally-Assisted Rental Housing:** The Virginia Housing Development Authority (VHDA) compiled the inventory from data received from multiple agencies including HUD, USDA Rural Development, and local Public Housing Authorities (PHAs). This data may not match that provided

directly by subsidy program administrators due to the necessity of reconciling minor data differences among various data sources--e.g., minor data differences among agencies where multiple subsidies are layered within the same property. The supply is the sum of the low-income project-based rentals, extremely-low income project based units, and extremely-low income vouchers.

**Demand or Qualified Low-income Renters in Need of Affordable Housing:** U.S. American Community Survey 1-year and 5\_year estimates (household income by gross rent as a percentage of household income and median household income multiplied by .6 as the threshold amount). The demand is the estimated number of renters with incomes below 60% of median household income who pay 30% or more of income for housing created/wp/our-testimonials/ by the Virginia Center for Housing Research using interpolation.

**Maximum Affordable Housing**

Virginia Association of REALTORS® (MLS median sale price for sold units); Bankrate.com (mortgage rates); UVa Weldon Cooper Center (real estate tax rates); National Association of Insurance Commissioners (insurance rates for houses); U.S. Census American Community Survey (median household income, median gross rent for all units).