

Overview of Socioeconomic Forecasting

Planning for regional transportation services requires an understanding of current and forecast demographic and socioeconomic characteristics across geography and time. A region's transportation system influences its growth and development, while the type and location of growth in turn influence travel choices. Given this connection, the Baltimore Regional Transportation Board (BRTB) strives to coordinate land-use planning and transportation decisions among local, regional and state partners.

The Cooperative Forecasting Group (CFG), a subcommittee of the BRTB, develops a set of population, household and employment estimates and forecasts at the jurisdiction and small area levels of geography for transportation planning purposes. CFG members develop forecasts for their own jurisdictions, which are then summed up to the regional totals.

The CFG forecasts are a key part of the development of the upcoming Long-Range Transportation Plan (LRTP), *Resilience 2050*. *Resilience 2050* will include a list of planned major federally funded capital projects that the region expects to implement from 2028 to 2050 as well as analysis of the potential impacts associated with these projects. This requires a forecast of population, households and employment extending through the year 2050.

The BRTB endorsed the most recently approved forecasts, the Round 10 Cooperative Forecasts, in July 2022. This round of forecasts includes 2020 census data, impacts of the pandemic in employment estimates and an expansion of the forecast to 2050 to account for the

planning horizon of *Resilience 2050*.

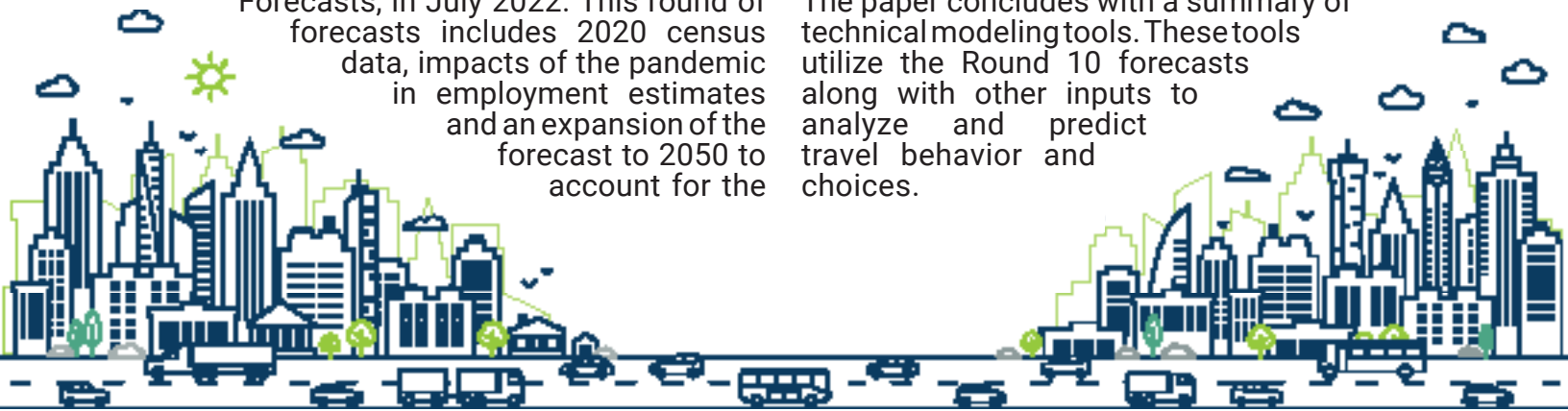
While population in the Baltimore region continues to grow, it is forecast to do so at a slower rate than in previous years. According to decennial census data, the region grew by 460,000 persons (19.4%) in the 30-year period between 1990 and 2020. The Round 10 dataset projects the region to grow by 360,000 persons (12.6%) in the 30-year period from 2020 to 2050.

The region's growth in households is forecast to outpace population growth over the forecast horizon, with growth of 15.0%, while average household size is anticipated to decrease from 2.53 in 2020 to 2.48 in 2050, which could affect the average number of trips taken by each household. The employment forecasts indicate regional growth of approximately 375,000 jobs from 2020 to 2050 (25.5%).

Analyses of the forecasts among jurisdictions reveal differences in growth expectations within the region. For example, Anne Arundel County and Howard County are forecast to be important drivers of future growth in the region, together accounting for over half of regional population growth (51.3%) and just under half of forecast employment growth (45.7%).

The paper concludes with a summary of technical modeling tools. These tools utilize the Round 10 forecasts along with other inputs to analyze and predict travel behavior and choices.

Watch for our upcoming white paper on regional demographic growth trends and expectations.



Socioeconomic Forecasting

Introduction

The regional transportation system influences the location of growth and development. Similarly, the type of growth and location of growth influence travel choices. Recognizing this connection between transportation and land use, the BRTB strives to coordinate land use planning and transportation decisions among municipal, county, regional and state partners. A vital part of this coordination is the work of the Cooperative Forecasting Group (CFG).

The Cooperative Forecasting Group

The purpose of the CFG, a subcommittee of the BRTB, is to develop a set of population, household and employment estimates and forecasts at the jurisdiction and small area levels of geography for transportation planning purposes. The data set is utilized at BMC as an input to the travel demand model and for air quality conformity testing, and is available to federal, state and local government agencies, as well as the general public.

The CFG forecasts are a key part of the development of our upcoming Long-Range Transportation Plan (LRTP), *Resilience 2050*, as travel demand modeling and air quality analysis are important components of the LRTP. *Resilience 2050* will include a list of planned major federally funded capital projects that the

region expects to implement from 2028 to 2050 as well as analysis of the potential impacts associated with these projects. This requires a forecast of population, households and employment extending through the year 2050.

The CFG was created in 1978, and its membership includes representatives from local government members of the BRTB, with personnel from the Maryland Department of Planning and staff from BMC participating in the group's deliberations. The group utilizes a "bottom-up" approach that is driven by the input of the local government representatives comprising the CFG. The CFG members develop the estimates and forecasts for their own jurisdictions, and these individual forecasts sum "up" to the regional totals.

Generally, local planning agencies that comprise the CFG develop their own forecasts of population, households and employment based upon known development activity, local comprehensive plans, adopted zoning maps and regulations and an inventory of residential holding capacity. In order to maintain consistency across jurisdictions in the development of employment estimates and forecasts, the group agreed upon a methodology for the formation of base-year employment that combines wage and salary employment data from the Bureau of Economic Analysis with self-employment data from the U.S. Census Bureau. Utilizing the same method and sources ensures that all jurisdictions are incorporating the same definition of employment in the creation of

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the known base-year estimates, from which the forecasts are produced. The base year is 2020. The bottom-up approach utilized by the CFG helps to ensure that the forecasts, and the regional LRTP that relies upon the forecasts, are consistent with the growth management policies and procedures of BRTB member jurisdictions.

pandemic brought with it several challenges – not the least of which was the inclusion of “pandemic impacts” upon employment in the regional and jurisdictional job counts (particularly for base-year 2020).



New in Round 10

Outside of the efforts involved in the development of a typical forecast update, a variety of additional factors needed to be addressed in the latest BRTB endorsed forecast dataset, called Round 10. These included: the COVID-19 pandemic; the creation of a new jurisdiction level base-year employment methodology; the incorporation of new decennial census data; the creation of a new TAZ structure; and the inclusion of a new base-year and horizon year.



Planning for Round 10 and the beginning of the data development process began in the spring of 2020 as the pandemic was taking hold. It can be challenging to measure the scale of the impacts of an event like this in real time, particularly with any degree of spatial granularity. And the employment data sets that the CFG utilizes in the development of base-year employment (including from the Bureau of Labor Statistics and the Bureau of Economic Analysis) have lags in data release of six months to a year. Reconciling the Round 10 development schedule with data availability that supported the inclusion of pandemic impacts was a challenge, but the group accomplished the task with a little creativity.

The Pandemic

The last adopted forecast was Round 9A – a round update adopted by the BRTB in July of 2020. While Round 9A was endorsed after the COVID-19 pandemic began, it included none of its impacts – as development of the dataset was complete by January of 2020, a few months before the onset of the pandemic and the associated closures. From the perspective of Round 10 development, the



New Methodologies

Given the timing of the pandemic and the draft schedule for the LRTP update, it was of particular importance that the next adopted forecast data set address the economic realities presented by the pandemic in 2020. Faced with a dilemma posed by the release dates of state and federal employment data and the Round 10 development schedule,

New in Round 10

- Impacts of the pandemic
- 2020 Census data
- New methodologies
- Expanded time horizons

the group adopted an adjusted methodology for base-year jurisdiction level employment that closely mimics the original method for the estimation of wage and salary employment (which accounts for approximately 95 percent of total employment). At the same time, the group made an adjustment to how the self-employment component of total employment was calculated, opting to use a more conservative estimate based upon data from the American Community Survey. At the regional level, the new method results in total employment that is approximately 9% lower than employment totals yielded by the previous method. For this reason (among others, including pandemic impacts on employment), the employment levels in this round are NOT comparable to those of previous rounds.

Other changes in the Round 10 forecasts include an adjustment to the base-year from 2015 to 2020 (based upon the availability of new decennial census data), and the extension of the horizon year to 2050 in order to meet requirements of *Resilience 2050*. Also, with the release of updated census geography in January of 2021 came the task of updating the region's Transportation Analysis Zone (TAZ) structure. TAZs are the unit of geography used to model travel behavior in the travel demand model. They are generally constructed using the Census Block Group unit of geography, although Census Blocks were utilized in some cases where the size or shape of a Block Group was inconsistent with modeling needs. TAZs for the region are updated once every ten years, shortly after census geographies are updated. BMC staff and CFG membership

collaborated in an effort to develop an updated TAZ structure, which was based upon the most recent Census geography available. This is an important task, as having the TAZ structure align as closely as possible with Census geography allows CFG membership to access demographic data from the Census Bureau for these small areas, which can help to inform modifications to forecast datasets throughout the course of the decade.

2020 Decennial Census

Also new during the development of Round 10 was the availability of block level demographic data from the 2020 Decennial Census. The decennial census provides the most reliable small area demographic data available, and CFG membership began to incorporate this data into their Round 10 development work upon the release of the block-level 2020 redistricting data file (PL 94-171) in August of 2021. The incorporation of the redistricting data allowed CFG membership to recalibrate their jurisdictional and small area base-year estimates to this federal source, from which population and household data are forecast.

Inputs and Outputs

The Round 10 forecasts provide the spatial location and concentration of population, households and employment throughout the Baltimore region. These serve as key inputs to the region's activity-based travel demand model. Transportation planners use this model to simulate individuals' work and non-work travel patterns. Output from the travel demand model helps to identify regional transportation needs and informs the decisions the BRTB makes about potential LRTP projects during the development of *Resilience 2050*.

Round 10 Forecasts

On July 15, 2022, the BRTB endorsed the Round 10 forecasts developed by the CFG. The Round 10 forecasts replace those of Round 9A, which the BRTB endorsed in July 2020. Figures 2, 3 and 4 on the next page show summary tables for Round 10 population, household and employment forecasts at the jurisdiction and region levels. The Round 10 forecasts are available for download from the BMC website [here](#).

Population Trends

For context and comparative purposes, Figure 1 displays historical population growth trends in the Baltimore Region, along with Maryland and the United States, from 1990 through 2020.

The chart indicates that while growth has been positive across each ten-year period for all jurisdictions, the rates of growth have declined for all jurisdictions for each successive

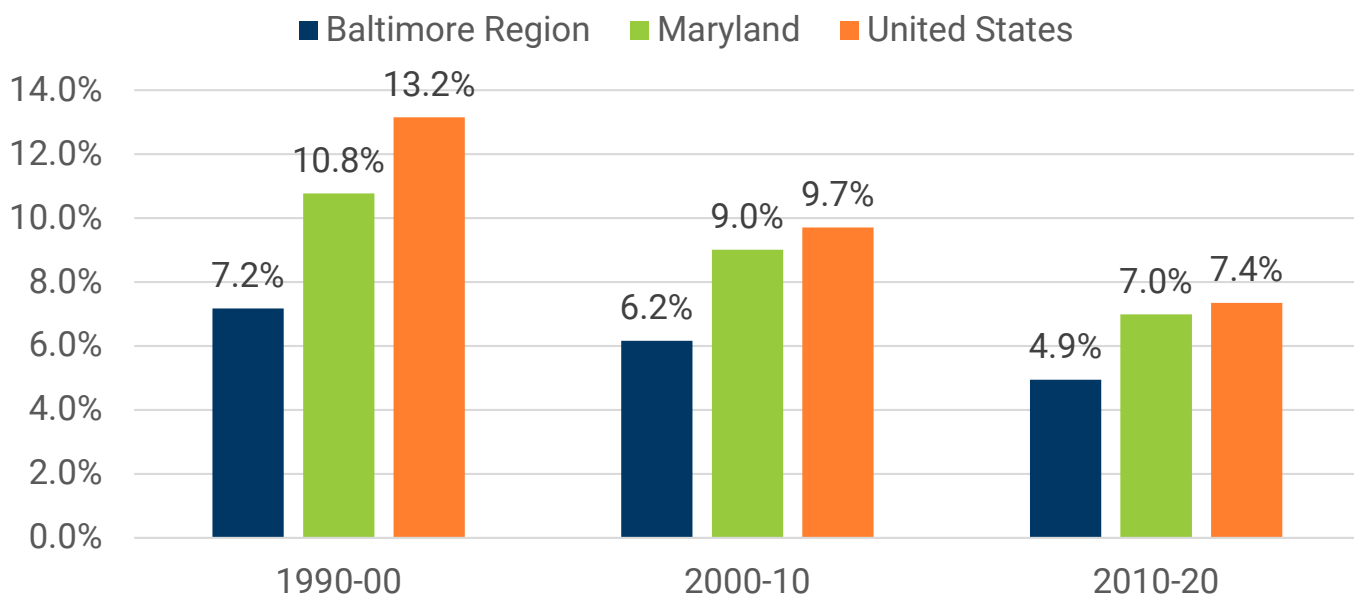
decade. And while the ten-year growth rates are consistent in ranking, the gaps between them have diminished in each decade from 1990 to 2020. Population growth rates are slowing across each geography, and the rates of growth have been converging over the time period.

Population Forecasts

At the regional level, the Round 10 2020 population is estimated at 2,848,932. Over the course of the 30-year period from 2020 to 2050, the forecasts indicate that the region will grow by nearly 360,000 persons (or about 12.6%). The region is expected to grow by 12,000 residents per year, at an annual growth rate of 0.4%.

Figure 5 illustrates the Round 10 jurisdiction level population growth expectations. The chart is ranked by 2050 population, with 2020 population in lighter blue, and 2020-2050 numeric growth in darker blue (the sum of which equals 2050 population). The percentage at the end of each bar represents the percent growth in population from 2020 to 2050.

Figure 1 - Ten-Year Population Growth Rates by Area (1990-2020)



Source: U.S. Census Bureau; IPUMS NHGIS, University of Minnesota, www.nhgis.org.

Figure 2 - Round 10 Population Forecasts

JURISDICTION	2020	2030	2040	2050	NUM CHG 2020-2050	PCT CHG 2020-2050
Anne Arundel County	592,695	646,214	677,424	694,235	101,540	17.1%
Baltimore City	585,708	596,393	599,216	609,776	24,068	4.1%
Baltimore County	854,523	876,726	909,000	934,521	79,998	9.4%
Carroll County	172,891	179,140	183,956	188,357	15,466	8.9%
Harford County	260,924	277,819	293,569	308,810	47,886	18.4%
Howard County	332,317	363,987	393,641	414,820	82,503	24.8%
Queen Anne's County	49,874	54,935	56,667	57,032	7,158	14.4%
Baltimore Region	2,848,932	2,995,213	3,113,473	3,207,550	358,618	12.6%

Figure 3 - Round 10 Household Forecasts

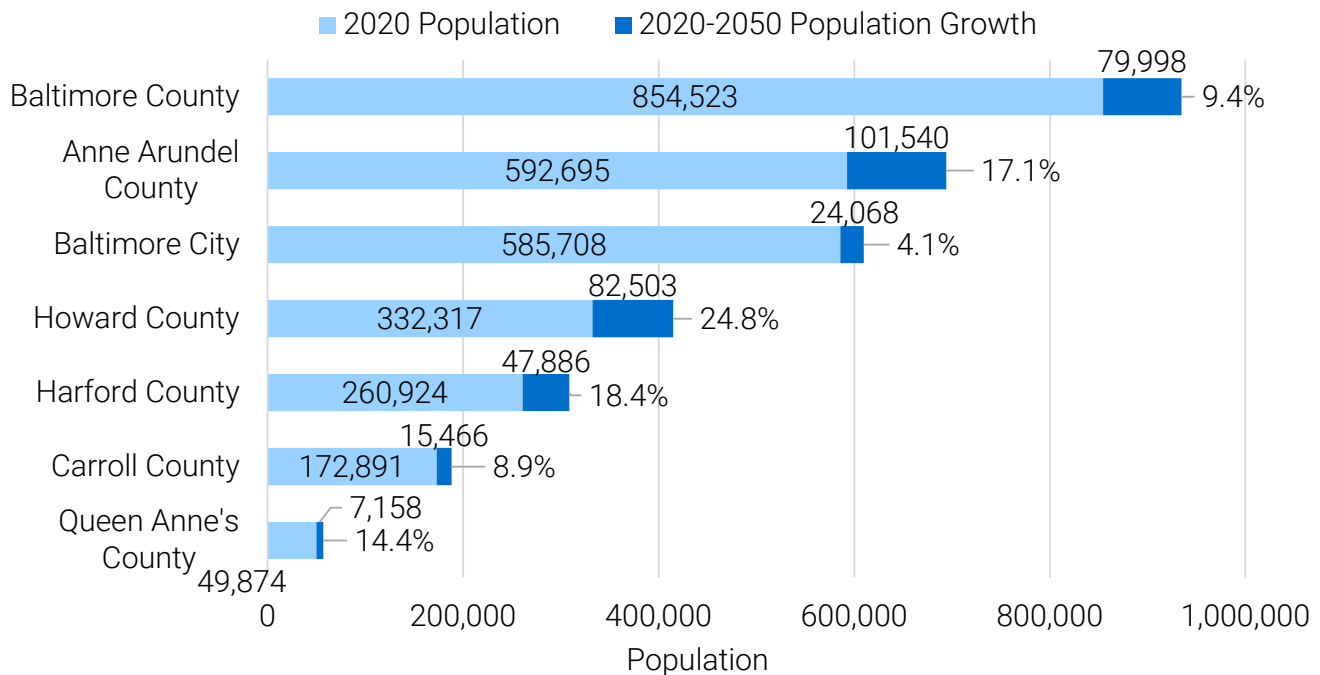
JURISDICTION	2020	2030	2040	2050	NUM CHG 2020-2050	PCT CHG 2020-2050
Anne Arundel County	219,971	236,781	251,583	260,349	40,378	18.4%
Baltimore City	251,479	260,583	264,323	271,532	20,053	8.0%
Baltimore County	329,955	338,408	351,261	361,428	31,473	9.5%
Carroll County	63,050	65,595	67,701	69,704	6,654	10.6%
Harford County	98,282	105,719	113,319	120,919	22,637	23.0%
Howard County	118,781	133,334	147,881	159,721	40,940	34.5%
Queen Anne's County	19,240	21,223	21,892	22,033	2,793	14.5%
Baltimore Region	1,100,758	1,161,643	1,217,960	1,265,686	164,928	15.0%

Figure 4 - Round 10 Employment Forecasts

JURISDICTION	2020	2030	2040	2050	NUM CHG 2020-2050	PCT CHG 2020-2050
Anne Arundel County	340,555	389,833	419,012	451,505	110,950	32.6%
Baltimore City	365,047	396,188	430,379	450,996	85,949	23.5%
Baltimore County	398,693	425,058	434,620	444,251	45,558	11.4%
Carroll County	62,814	65,821	68,809	71,789	8,974	14.3%
Harford County	100,748	120,560	141,273	162,499	61,751	61.3%
Howard County	185,600	203,284	231,970	245,600	60,000	32.3%
Queen Anne's County	16,562	17,125	17,375	17,700	1,138	6.9%
Baltimore Region	1,470,019	1,617,869	1,743,438	1,844,339	374,320	25.5%

Source: Local Jurisdictions; Cooperative Forecasting Group. Anne Arundel County data includes the City of Annapolis.

Figure 5 - Round 10 Population Forecasts by Jurisdiction (2020-2050)



Source: Local Jurisdictions; Cooperative Forecasting Group.

The largest numeric increase is expected in Anne Arundel County, where an additional 102,000 persons are forecast. The 2020 decennial census marked the first time that Anne Arundel County's population surpassed that of Baltimore City. While the Baltimore City population has been in

decline for decades, Round 10 indicates slow, yet positive growth expectations for the jurisdiction, with population growth of 4.1% forecast from 2020 through 2050. The largest percentage increase in population is forecast in Howard County, where population is expected to grow

Figure 6 - Population Growth Comparison (30-year Historical Trend and 30-year Forecast)

JURISDICTION	NUMERIC GROWTH		PERCENT GROWTH	
	1990-2020 (Census)	2020-2050 (CFG)	1990-2020 (Census)	2020-2050 (CFG)
Anne Arundel County	161,022	101,540	37.7%	17.1%
Baltimore City	-150,306	24,068	-20.4%	4.1%
Baltimore County	162,401	79,998	23.5%	9.4%
Carroll County	49,519	15,466	40.1%	8.9%
Harford County	78,792	47,886	43.3%	18.4%
Howard County	144,989	82,503	77.4%	24.8%
Queen Anne's County	15,921	7,158	46.9%	14.4%
Baltimore Region	462,338	358,618	19.4%	12.6%

Source: U.S. Census Bureau (Decennial Censuses); Local Jurisdictions; Cooperative Forecasting Group.

by 24.8% from 2020 to 2050. The two jurisdictions with the largest numeric increases in population (Anne Arundel County and Howard County) are located in the southern portion of the region, bordering the Washington, D.C. region.



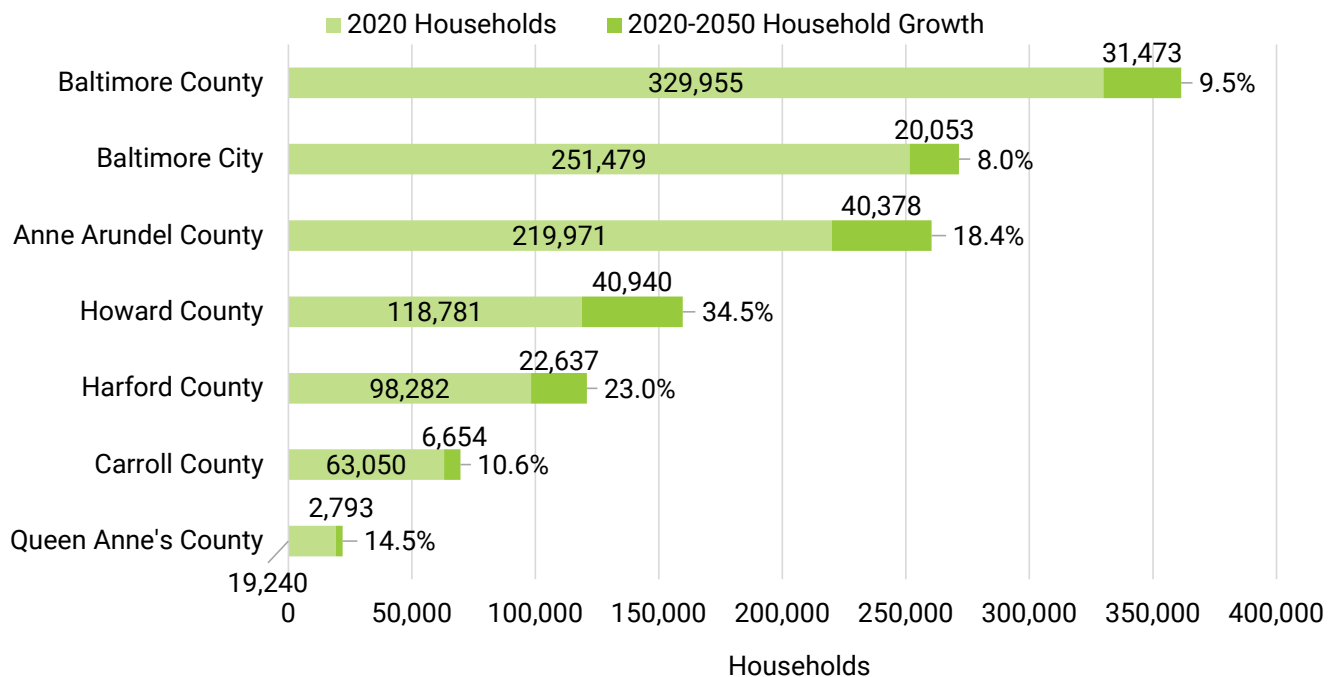
Household Forecasts

While household and population growth are correlated, the relationship between these datapoints can vary for a variety of reasons (including the composition of the population and the type of housing unit, among other factors), and can shift over time. At the regional level, the

The forecast 30-year (2020-2050) regional growth rate of 12.6% is substantially lower than the region's historical 30-year (1990-2020) growth rate of 19.4%. The forecast 30-year numeric growth falls short of the historical trend by about 104,000 persons (22.4%). The observation of slowing population growth expectations at the regional level holds true for each of the region's component jurisdictions, with the exception of Baltimore City. Figure 6 provides 30-year numeric and percentage population growth comparing historical trend to the Round 10 forecast for the region and jurisdictions.

Round 10 2020 estimate for households was 1,100,758. Over the course of the 30-year period from 2020 to 2050, the region is expected to grow by nearly 165,000 households (or about 15.0%). On an annual basis, the region is expected to grow by 5,500 households per year (an annual growth rate of 0.5%). Figure 7 illustrates the Round 10 jurisdiction level household growth expectations.

Figure 7 - Round 10 Household Forecasts by Jurisdiction (2020-2050)



Source: Local Jurisdictions; Cooperative Forecasting Group.

Figure 8 - Round 10 Average Household Size by Jurisdiction (2020-2050)

JURISDICTION	2020	2025	2030	2035	2040	2045	2050
Anne Arundel County	2.63	2.66	2.67	2.65	2.64	2.63	2.61
Baltimore City	2.26	2.23	2.22	2.21	2.20	2.19	2.18
Baltimore County	2.52	2.52	2.52	2.52	2.52	2.52	2.52
Carroll County	2.68	2.68	2.67	2.66	2.65	2.65	2.64
Harford County	2.64	2.63	2.61	2.59	2.57	2.55	2.53
Howard County	2.77	2.74	2.71	2.67	2.64	2.61	2.58
Queen Anne's County	2.57	2.57	2.57	2.57	2.57	2.57	2.57
Baltimore Region	2.53	2.53	2.52	2.51	2.50	2.49	2.48

Source: Local Jurisdictions; Cooperative Forecasting Group.

The 30-year rate of growth for households exceeds that of population at the regional level, as well as for each of the region's component jurisdictions, translating to a decline in average household size. Average household size refers to the household population divided by the number of occupied housing units. Variation in average household size across geography and time can provide an indication of differences in population and household composition. Variations in household size can have wide-ranging social and economic impacts, with resultant effects upon travel patterns.

Figure 8 summarizes the Round 10 regional and jurisdiction level average household sizes from 2020 through 2050.

Figure 8 shows that at the regional level, the average household size is anticipated to decline from 2.53 to 2.48. Within the region there is some variation in average household size. For example, in 2020 the lowest average household size was in Baltimore City (2.26), and the highest was in Howard County (2.77). While all jurisdictions in the region expect a decline in average household size, Howard County has the largest change from 2020 to 2050, declining from 2.77 to 2.58 over the time period. Average household size has an effect upon transportation (and travel demand modeling),

as larger household sizes tend to produce more trips than smaller or single-person households.

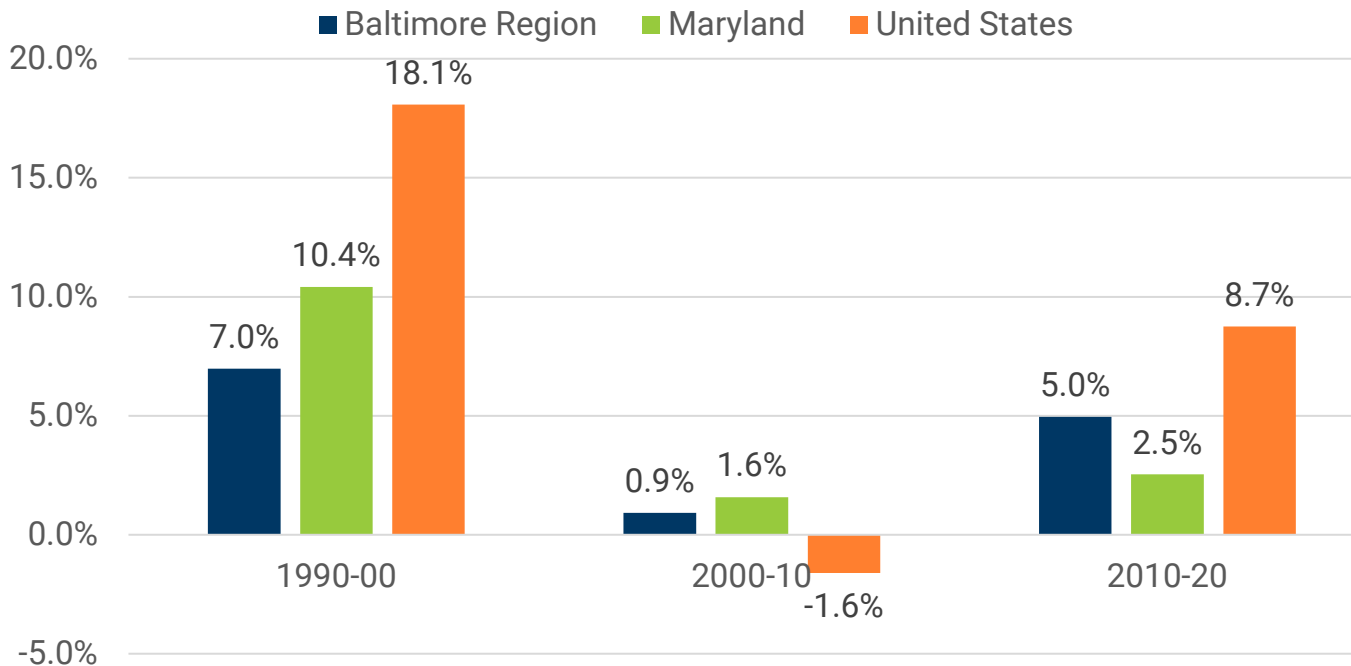
Employment Trends

For context and comparative purposes, Figure 9 displays historical employment growth trends in the Baltimore Region, along with Maryland, and the United States from 1990 through 2020.

Historical employment growth trends are more erratic than the population trends. While all geographies (region, state, and nation) showed significant positive growth in the 1990s, employment growth in the 2000s was marred by the housing crisis and the Great Recession. During this period, the Baltimore region and Maryland were able to maintain positive (albeit greatly reduced) job growth, likely buoyed by the presence of federal government and related employment – while the nation showed a decline.



Figure 9 - Ten-Year Employment Growth Rates by Area (1990-2020)



Source: Bureau of Economic Analysis, Wage and Salary Employment (CAEMP25N Full-Time and Part-Time Employment).

The data indicates that in the 2010s, the Baltimore region's recovery from the recession (at least as measured by employment growth) outpaced that of the state - but was lower than that of the nation as a whole. These differences were partially driven by pandemic impacts and the dissimilarities in industry mix and growth rates between jurisdictions. For example, the region experienced stronger growth than Maryland in several industries including finance and insurance, management of companies and enterprises and professional, scientific and technical services. At the same time, the nation showed positive growth in several industries in which the region experienced decline, including the manufacturing, retail trade and information sectors.

Employment Forecasts

At the regional level, the Round 10 2020 employment is estimated at 1,470,019. Over the course of the 30-year period from 2020 to 2050, it is expected that the region will experience growth

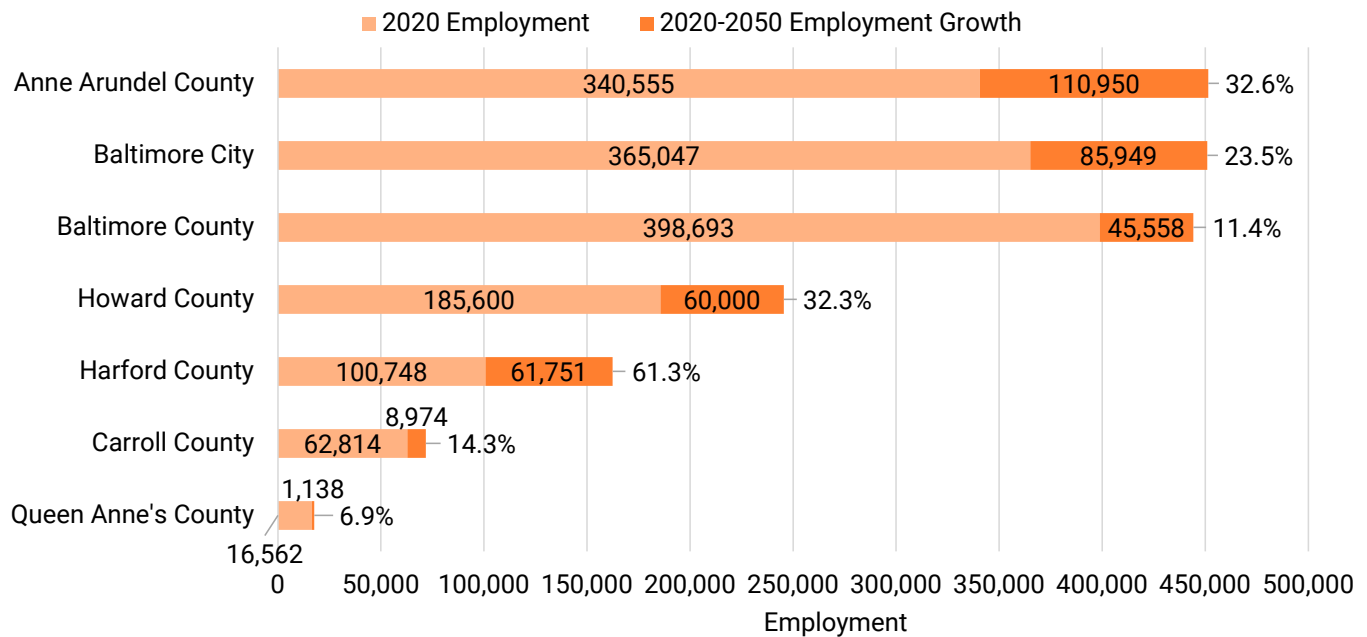
of nearly 375,000 jobs (or about 25.5%). On an annual basis, the region is expected to grow by 12,500 jobs per year, at an annual rate of 0.8%.

Figure 10 illustrates the Round 10 jurisdiction level employment growth expectations.

The largest numeric increase in employment is expected in Anne Arundel County, where an additional 111,000 jobs are forecast. For base-year 2020, Anne Arundel County is ranked third in terms of total employment. By 2050, the forecast job growth moves Anne Arundel County to the first rank, ahead of both Baltimore City and Baltimore County. In year 2050, it is anticipated that Anne Arundel County, Baltimore City and Baltimore County will each account for approximately 25 percent of regional employment (just under 75 percent, cumulatively).

The largest percentage increase in employment is expected in Harford County, where jobs are expected to grow by 61.3% from 2020 to 2050. The next two fastest-growing jurisdictions (in terms of

Figure 10 - Round 10 Employment Forecasts by Jurisdiction (2020-2050)



Source: Local Jurisdictions; Cooperative Forecasting Group.

job growth), Anne Arundel County and Howard County, border the Washington, D.C. region.

Technical Tools

As mentioned previously, a primary use of the cooperative forecasts is as a direct input into the region's activity based travel demand model, as the forecasts highlight the distribution of population, households and employment across geography between 2020 and 2050. However, the forecasts are also used as supporting data in the development of a variety of technical tools funded by the BRTB that help to predict travel behavior and choices. This section provides a more detailed description of several of the technical tools utilized in our region's modeling efforts.

The analysis of future travel behavior and choices assists in learning and

understanding transportation capacity needs leading to the planning and adoption of the LRTP. Various tools help the BRTB to gain a clearer understanding of demographic trends, goods and services movement, residential average weekday travel and mobile source emissions.

Household travel behavior and choices are analyzed by estimating household and person characteristics in the Baltimore region. Person characteristics such as being a student, worker or retired senior influence why you travel (school, work, or non-work), when you travel (during or outside of traditional commuting times) and where you travel (school/university, employment center or retail activity center). Household characteristics such as motor vehicle availability also influence the way you travel. For example, persons in households with few or no vehicles available may choose to bike or ride transit more frequently.



As detailed previously, the BRTB endorsed Round 10 Cooperative Forecast includes estimates of households, population and employment.

Software programs help to transform the Round 10 aggregate household and population counts into a database of individual records containing estimated household and person characteristics. It is important to emphasize that these databases are estimated rather than containing information on actual individuals or households. The household database contains a record of each estimated household along with household characteristics such as number of persons and workers in the household, income, vehicle availability and other variables. The person database contains a record of each estimated person along with person characteristics such as gender, age, work status (part time, full time, non-working student, non-working adult or retired/senior), household database identification and other variables.

BMC staff use several software programs to complete this work. Specifically, the software pOPTICS and PopGen were developed to transform the aggregate counts of population and households in the Baltimore region into a rich database of individual records with estimated household and person characteristics.

The Round 10 forecasts and software programs forecast demographic data in 5-year increments starting in 2020 and extending through 2050. The pOPTICS spreadsheet contains gender and age estimates for the region in 5-year increments, with population totals for each 5-year period drawn from the Round 10 forecasts. The United States Census Bureau and the State of Maryland vital statistics annual reports form the baseline

data for pOPTICS. These data sources were used to estimate the primary components for the pOPTICS population change spreadsheet: births, deaths and net migration. The pOPTICS spreadsheet “steps” through the horizon years in five-year increments from 2020 to 2050. The population is divided into 18 age group cohorts (0-4, 5-9, 10-14...85+). As the spreadsheet steps from one horizon year to the next, the population is transitioned from one cohort to the next. As an example, persons aged 40-44 in 2020 are aged by 5 years to ages 45-49 in the 2025 horizon year. Deaths and migrations are calculated using cohort-specific survival and net migration rates. Births (0-4 age cohort) are estimated by applying cohort-specific birth rates to the estimated female cohort population.

Gender and age cohort population estimates from pOPTICS and estimates of households by the number of persons and workers are used in the software application PopGen. The PopGen application uses the US Census Bureau American Community Survey (ACS) Public Use Microdata Sample (PUMS) database. PUMS data contains individual survey records from the ACS that allow users to create custom estimates and tables that are not available through the ACS. The PopGen software uses individual PUMS records along with inputs from pOPTICS, household estimates and workers to create an estimated database of households and persons in households for the entire Baltimore region.

The household and household person information can be used in various demographic analyses. As an example, the declining trend in the number of persons per household is forecasted to continue as a result of decreasing births and the aging of the population.



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PopGen can be used to explore estimates of average household size through time. Households with no children and no workers are estimated to grow the fastest as “baby boomers” continue transitioning from working to retired seniors. The change in household composition (majority of households without children and growing share of households without workers) affects the number of trips taken by households. Households without children travel less compared to households with children. Retired seniors travel less and at different times of the day compared to workers.

The BRTB also maintains a regional travel model known as InSITE. InSITE consists of a freight modeling system and person travel activity model. The freight modeling system relies on input data from the US Department of Transportation (USDOT) Freight Analysis Framework (FAF) in estimating commodities exchange between Baltimore and other regions. Demographic data and warehouse locations are used to estimate where long-distance commodities are produced and/or received. The model also includes a local freight component that estimates freight activity, schedules for the pick-up and drop-off of goods and service calls for heavy, medium and commercial vehicles.

The InSITE travel model’s main component is a person activity travel model. BMC conducts a household travel survey approximately every 10 years. This survey collects demographic data and travel choices from individuals in the Baltimore region. This data, in turn, is used to develop model components estimating person travel behavior and choices for the InSITE model. A wide variety of household characteristics and travel choices are estimated including the number of vehicles available and trips taken. For each trip, the model estimates

the purpose (work, shopping, recreation, meal, personal business and other), destination, departure time and travel mode (drive alone, shared ride, transit, bike/walk, etc.). InSITE enables the analysis of trips by various person and household characteristics. For example, the mode of travel (drive alone, shared ride and transit) can be stratified by household income or departure time can be stratified by working and non-working adults.

The model also simulates the highway or transit path taken for each trip from origin to destination. This data enables BMC staff to estimate the performance of the highway and transit system. Highway characteristics estimated include the number of vehicles on a particular roadway segment, congestion levels, vehicle miles traveled, and vehicle miles traveled per person. Transit characteristics estimated include the number of people riding particular routes, ridership on the entire transit network, the number of people using certain bus stops and transit stations, transit travel time, and the number of transfers required.

Finally, demographic data and the InSITE model are vital for air quality analysis for the Baltimore region. The Baltimore region does not meet National Ambient Air Quality Standards for ground level ozone. As a result, the Environmental Protection Agency (EPA) requires the BRTB to analyze the impacts of its plans and programs on air quality in the Baltimore region. Ultimately, the anticipated emissions from implementing projects in the short-range Transportation Improvement Program and long-range LRTP are compared to set emissions budgets. In order to receive approval from the EPA, the estimated emissions from implementing projects in these plans must be less than or equal to budgets set by the Maryland Department of the Environment.