



New York Metropolitan Transportation Council

NYMTC 2050

Socioeconomic and Demographic (SED) Forecast

Draft 2050 Socioeconomic & Demographic Forecasts Report

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Disclaimer

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Submitted by:



THE Louis Berger Group, INC.



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Glossary of Abbreviations

ACS – American Community Survey conducted by the U.S. Census Bureau

ASDR – Age-specific death rate

ASFR – Age-specific fertility rate

BLS – U.S. Bureau of Labor Statistics

CAGR – Compound annual growth rate

CC – Cohort component model used for population forecasting

CES – Current Employment Statistics program overseen by the U.S. Bureau of Labor Statistics

CMR – Crude migration rate

COG – Regional council of governments

CPS – Current Population Survey conducted by the U.S. Bureau of Labor Statistics

DCP – New York City Department of City Planning

FWG – Forecasting Working Group

GDP – Gross Domestic Product

JTW – Journey to Work commuting data from the American Community Survey conducted by the U.S. Census Bureau

LBG – The Louis Berger Group, Inc.

MPO – Metropolitan Planning Organization

NAICS – North American Industry Classification System

NJTPA – North Jersey Transportation Planning Authority

NYBPM – New York Best Practices Model

NYMTC – New York Metropolitan Transportation Council

PUMS – Public Use Microdata Sample from the American Community Survey conducted by the U.S. Census Bureau

QCEW – Quarterly Census of Earnings and Wages conducted by the U.S. Bureau of Labor Statistics

RPA – Regional Plan Association

SAE – State and Area Employment data from the Current Employment Statistics program overseen by the U.S. Bureau of Labor Statistics

SED – Socioeconomic and demographic

TAZ – Transportation Analysis Zone

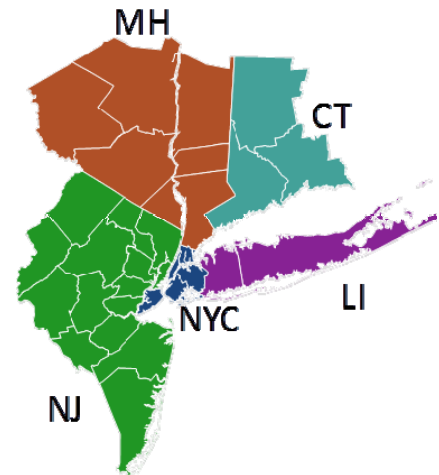
1.0 INTRODUCTION

The New York Metropolitan Transportation Council (NYMTC) is a regional council of governments (COG) that is the metropolitan planning organization (MPO) for New York City, Long Island and the lower Hudson Valley. NYMTC provides a collaborative planning forum to address transportation-related issues, develop regional plans and make decisions on the use of federal transportation funds. Socioeconomic and demographic (SED) forecasts are crucial components in the development of regional transportation plans, air quality analysis for transportation conformity and making decisions on the use of these funds. In order to produce the 2050 SED forecasts, NYMTC retained the services of The Louis Berger Group (LBG), in collaboration with the New York City Department of City Planning (DCP), to create population, employment, labor force, and household forecasts for the region at the county level, and to develop a tool that allocates the county-level SED projections down to the Transportation Analysis Zone (TAZ) level. The SED forecasts are for the 31-County Forecast Region in New York, New Jersey, and Connecticut as shown in Figure 1.

For the purposes of general discussion, the 31-County Forecast Region is segmented into five subregions as shown in Figure 1 that also provides a description of the counties comprising each subregion:

FIGURE 1: 31-COUNTY FORECAST REGION & SUBREGIONAL GEOGRAPHY

New York City	Long Island	Mid-Hudson	New Jersey	Connecticut
Bronx Kings New York Queens Richmond	Nassau Suffolk	Dutchess Orange Putnam Rockland Sullivan Ulster Westchester	Bergen Essex Hudson Hunterdon Mercer Middlesex Monmouth Morris Ocean Passaic Somerset Sussex Union Warren	Fairfield Litchfield New Haven



This document presents the baseline results of the forecasting effort outlined above and also includes a brief description of the methodological approach used to generate the forecast as well as a summary-level discussion of the resulting forecast outputs. The list of SED variables included in this long range forecasting effort includes:

- Population
- Employment
- Labor Force
- Households

2.0 OVERVIEW OF FORECASTING PROCESS

Figure 2 provides a high-level summary of the general forecasting process and relationships between the four variable outputs – population, employment, labor force, and households – (blue text in Figure 2). Although each of the four variables will be discussed separately in more detail, the following is a brief summary description of each element depicted in Figure 2.

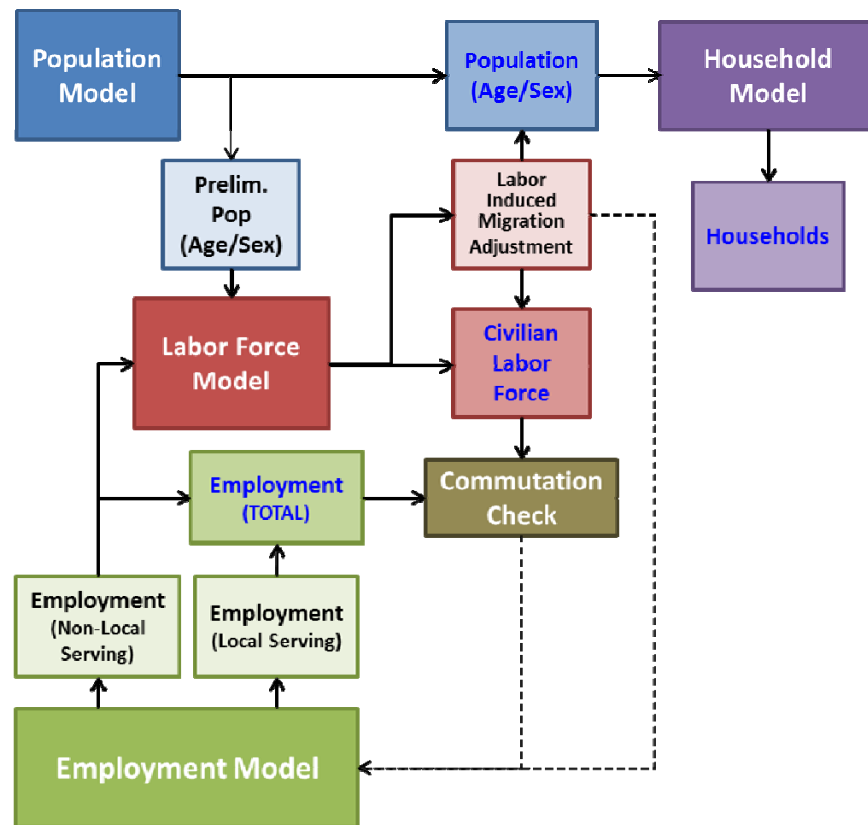
Population forecasts were generated using a disaggregated cohort component forecasting approach that accounts for changes in population through the application of age specific rates of both natural increase (births and deaths) and net migration. Age-specific rates of natural increase were derived from historical (1990-2010) vital statistics records obtained from the various state departments of health while rates of net migration are obtained from a survival analysis conducted over the same 1990-2010 historical time period. For the New York City forecast only, an extensive additional land use analysis was used to adjust the population projection generated from the cohort component model.

Employment forecasts were generated from a set of national and regional employment forecasts obtained from different third party sources, including Global Insight and Moody's. A range of alternative county level employment forecasts (by industry) were developed by applying different shift-share ratios implied by various combinations of national and regional employment scenarios described by the third party sources. Final employment estimates were ultimately derived by applying a forecast averaging approach to the resulting spread of outcomes.

Although Figure 2 shows that labor force estimates are an intermediate input in the population forecast process, both labor force and household forecasts are ultimately products of the population forecast. Both forecasts are generated by applying age-specific labor force participation and household formation (headship) rates to the age profiles obtained from the population forecast.

For each five-year interval in the 2010-2050 forecast horizon, initial forecasts of both future population and employment change were first generated by the respective models. The regional labor demand implied by the employment forecast for basic/non-local serving industries, was evaluated against corresponding regional labor supply implied by the preliminary population projections, and any imbalances between the two were addressed through a labor induced migration adjustment to the population forecast. The resulting final migration rates and/or commutation flows (implied by the geographical distribution of employment and labor force) were used to evaluate the reasonability of the employment forecasts and to suggest refinements as necessary.

FIGURE 2: SED FORECASTING PROCESS OVERVIEW



The development of the forecasts was guided by members of NYTMC's Forecasting Working Group (FWG). The FWG is comprised of multi-state, multi-agency stakeholders who review work products related to the development of SED forecasts. FWG member insight and feedback were used to inform and temper the mechanical and computational processes underlying the four models highlighted in Figure 2. Following a discussion of key trends, the rest of this document discusses the four resulting variables outlined above and provides additional detail on the forecast results and methodological approaches employed.

Possible transportation capacity constraints were not considered in the development of the forecasts, for if such constraints were an input to the process, the forecasts would then mask any further transportation capacity needs by lowering the forecast values. This effect would “blind” the planning process and render it unresponsive to potential future regional needs.

3.0 KEY TRENDS

The following section outlines broad trends in employment and population that were used as the basis in the forecasting process. The employment trends focus on regional and subregional history, taking the broader national trends into account. On the population side, key trends in population, fertility, mortality, migration and households are discussed as they are the primary model inputs. The implications of the following trends are elaborated in the methodology section for each model below in Sections 4-6.

3.1 Employment

3.1.1 National Employment

At the national level, employment growth is driven by Gross Domestic Product (GDP) trends – which are highly cyclical in nature – and labor productivity trends, which have more persistent structural trends. The recent swings in national employment (since 2008) have been largely driven by rapid changes in GDP growth. The “Great Recession” was initially triggered when the collapse of the housing bubble led to a severe contraction in consumer spending. The national unemployment rate quickly spiked to 10 percent in 2009 as businesses – unsure of the future sales potential – shed nonessential jobs. Since 2009, employment levels have slowly recovered, and the national unemployment rate (as of November 2014) stands at 5.8 percent.

Amidst this most recent cycle, national employment has continued to evolve according to long-standing productivity trends. For decades, technology and automation have contributed to structural employment declines in industries dealing with the extraction, manufacturing, handling, or transportation of physical goods. Across metros, the national labor force has adapted by moving to service-based sectors which have shown stable consumer demand – and yet where it is difficult to automate work due to the need for physical proximity (such as health care and education) or creativity (such as information and professional services).

These two broad trends form the basis of the national employment forecasts used in the present forecasting exercise for the NYMTC 31-County Forecast Region. National employment is expected to grow in sectors with strong or stable demand growth – and where employment is difficult to automate or outsource. These trends indicate that the following North American Industry Classification System (NAICS) sectors¹ are expected to account for the vast majority of national employment growth through the forecast period:

- *Health care & social services (NAICS 62)*
- *Administrative, support, & waste management services (NAICS 56)*
- *Professional, scientific, technical services (NAICS 54)*
- *Retail trade, accommodation, & food services (NAICS 44-45 & 72)*

3.1.2 31-County Region Employment

Looking at the 31-County Region, employment growth is expected to be strongest in sectors with strong national growth (as described above) and where the region can maintain or increase its competitive advantage relative to the rest of the country. This competitive advantage can be roughly measured by looking at the 31-County region’s share of national payroll employment by industry. Figure 3 shows these shares of national payroll employment, ranked by their 2012 value. Also shown in the figure is the region’s share of U.S. population, which helps illustrate which industries have high and low shares of U.S. employment.

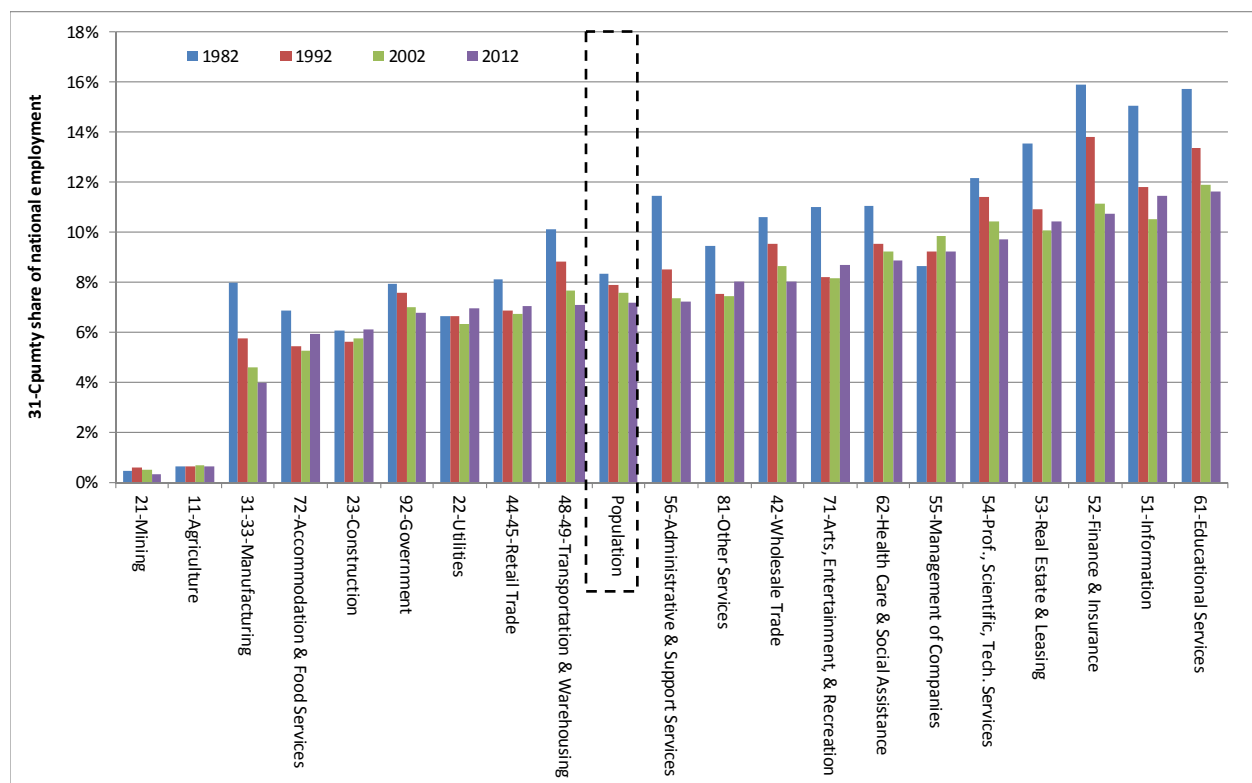
Industries far to the left of population in Figure 3 have a very low share of U.S. employment. In particular, regional agriculture and mining employment is a negligible share of national employment, and manufacturing’s share is both low and rapidly shrinking. Industries on the far right of Figure 3 have a high share of national employment. These industries – including education, information, finance and

¹ Please see appendix for a complete list and explanation of NAICS sectors

insurance, and professional and technical services – are those where the region currently maintains a competitive advantage. They serve as New York’s export base (to the rest of the country and world), and are therefore the region’s economic “engine”. Since these industries are dependent on demand from the rest of the U.S., future regional employment depends on the national trends discussed above.

Finally, industries near the middle of Figure 3 are those where the region’s 2012 share of national employment is similar to its share of population. This includes transportation, wholesale, and administrative support services – for which the region share of U.S. employment has declined faster than population. Also near the middle are sectors that tend to be population-serving, such as government, utilities, retail, and other services. For these sectors, regional employment has maintained a relatively stable relationship with regional population.

FIGURE 3: 31-COUNTY REGION SHARE OF NATIONAL PAYROLL EMPLOYMENT BY SECTOR, 1982–2012



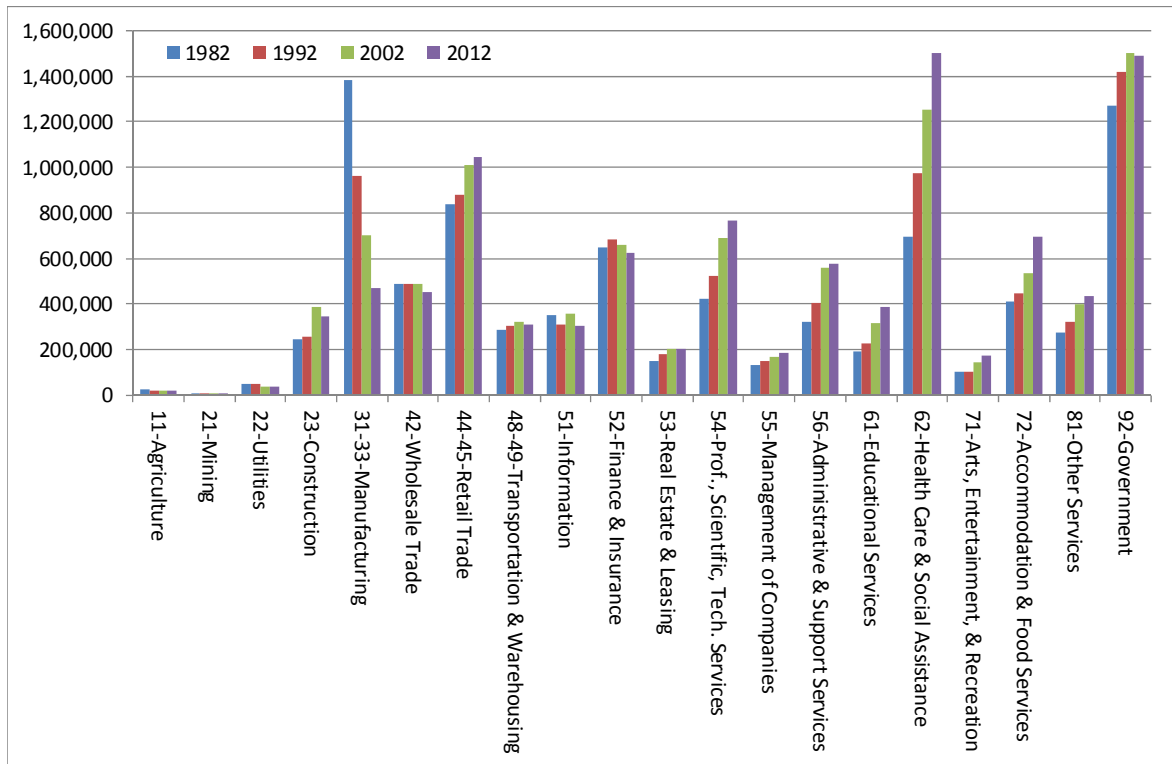
Source: Bureau of Labor Statistics (BLS) Quarterly Census of Employment and Wages (QCEW)

Figure 4, shows regional payroll employment trends by sector. Regional employment growth generally resembles national employment growth, with adjustments for growing or declining regional shares. As with the national picture, the region has made the largest employment gains in health care, professional, and administrative services since 1982. Accommodation and food services have also generated noticeable employment growth, spurred by gains in both national employment levels and the region’s share. In contrast, the rapid decline in regional manufacturing employment can be seen as the product of declining national jobs compounded by a declining regional share.

Looking forward, regional payroll employment growth will be most strongly influenced by just a handful of sectors that (a) are projected to generate large national employment gains, or (b) form a disproportionate share of the regional economy. Seventy percent of national employment growth between 2014 and 2023 is expected to come from just four sectors (NAICS sectors shown in

parentheses): construction (23); professional services (54); administrative services (56); and health care and social services (62). To these, we can add four sectors with large current employment levels: retail (44-45); finance and insurance (52); accommodations and food services (72); and government (92). Together, these eight sectors account for more than 70 percent of 2012 regional payroll employment. Because of their importance, Figure 5 examines recent trends in regional employment share more closely.

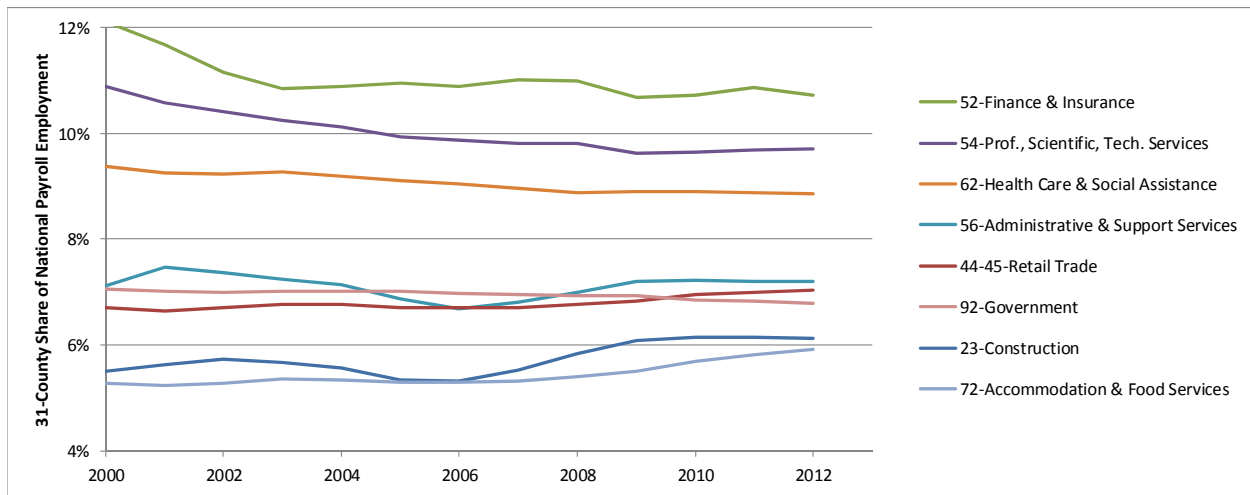
FIGURE 4: 31-COUNTY REGION PAYROLL EMPLOYMENT TRENDS, 1982–2012



Sources: Bureau of Labor Statistics (BLS) Quarterly Census of Employment and Wages (QCEW)

The eight sectors profiled in Figure 5 generally fall into three categories. Starting from the bottom, construction and accommodations each have a slightly growing share of national employment. In the middle, retail, government, and administrative support services have had a remarkably constant share. At the top, financial services, professional services and health care services each show a slightly declining share.

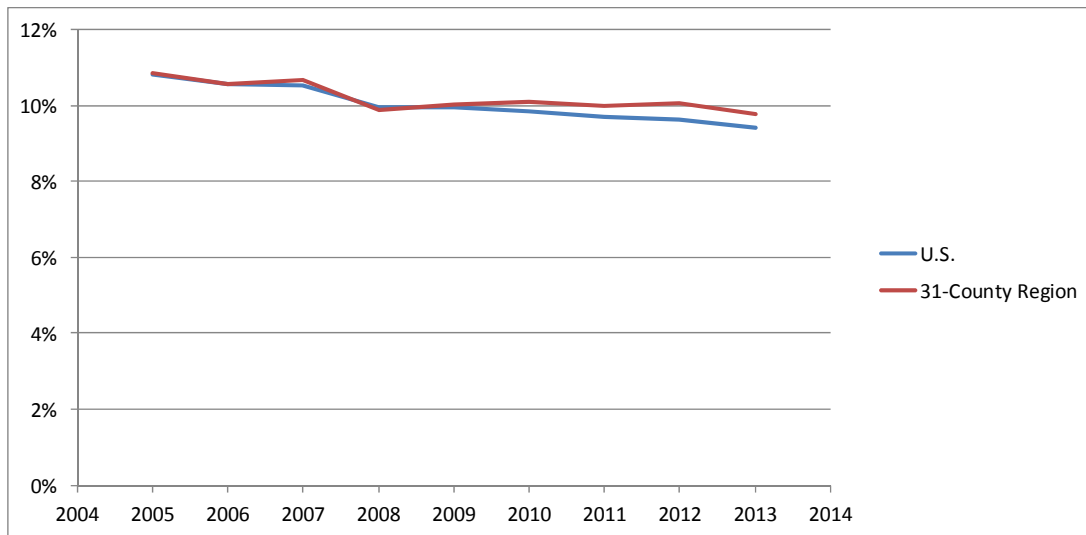
FIGURE 5: 31-COUNTY REGION SHARE OF NATIONAL PAYROLL EMPLOYMENT IN KEY SECTORS



Sources: Bureau of Labor Statistics (BLS) Current Employment Statistics (CES) and Quarterly Census of Employment and Wages (QCEW)

3.1.2.1 Self-Employment

Figure 6 shows an eight-year history of self-employment rates in the U.S. and 31-County Region, as measured by the American Community Survey (the most accurate source on this topic at the sub-state level). Self-employment is defined to include incorporated and unincorporated self-employed, as well as unpaid family workers. The self-employment rate is defined as self-employment (as just defined) divided by total employment (payroll plus self-employed). Figure 6 reveals two main trends. First, the self-employment rate in the region is currently only slightly above the nation (9.8 percent versus 9.4 percent), but has mirrored national trends very closely since 2005. Second, although regional self-employment rates declined slightly from 2005 to 2008, they have since been highly stable, averaging just above or below 10 percent. Taken together, these trends do not suggest a clear upward or downward trend; thus, as will be discussed further below, self-employment forecasts are made based on application of current self-employment rates (by industry) to forecasted payroll employment (by industry).

FIGURE 6: SELF-EMPLOYMENT TRENDS IN THE U.S. AND 31-COUNTY REGION, 2005–2013

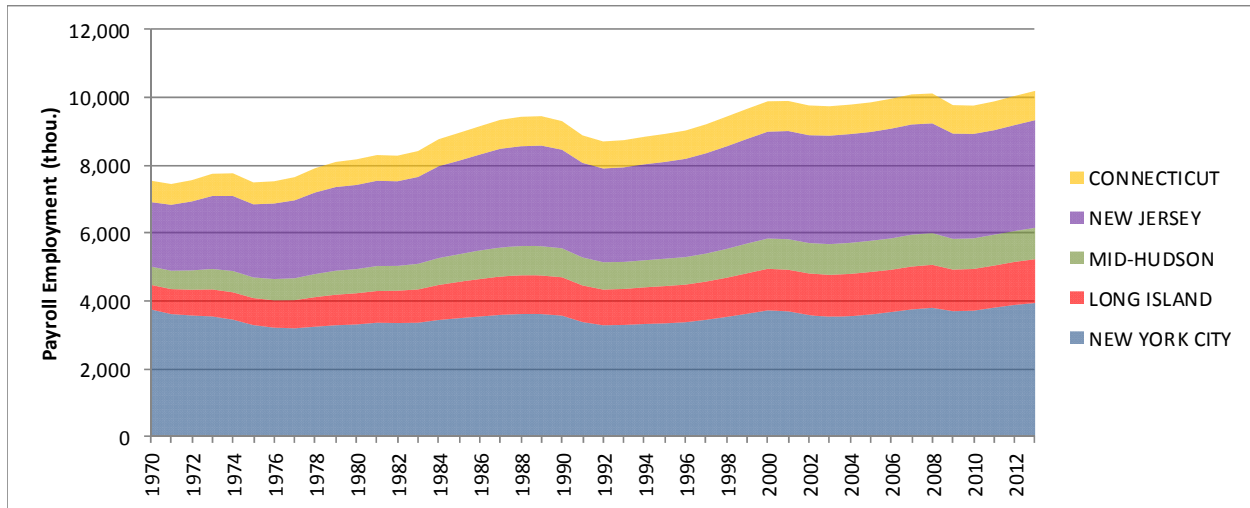
Source: American Community Survey (ACS)

3.1.3 Subregional Trends

3.1.3.1 Employment Levels

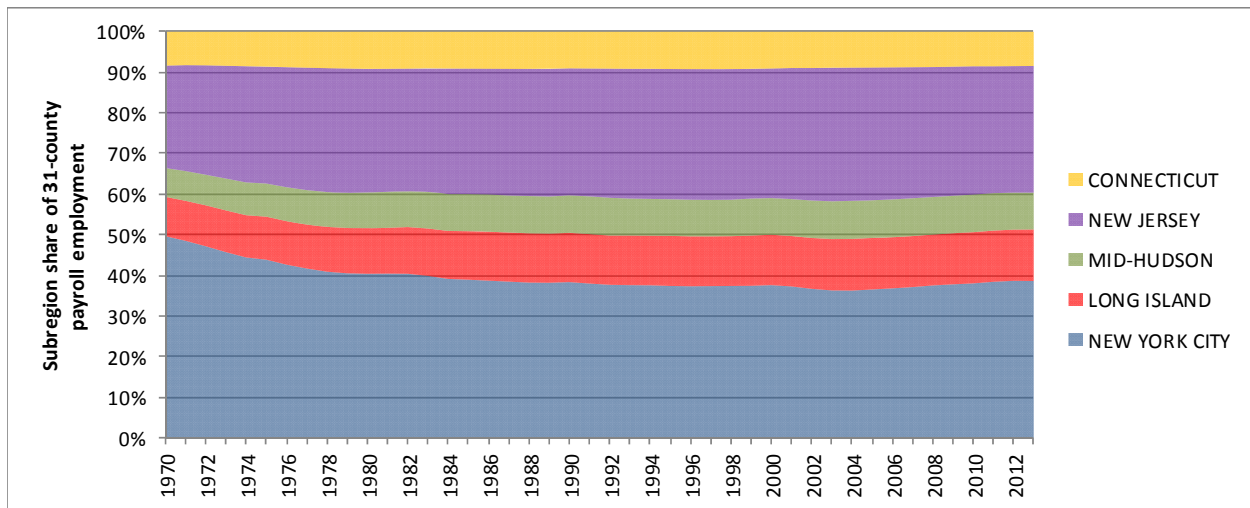
Figures 7 and 8 show annual workplace payroll employment by subregion for the years 1970 to 2013. The first of these shows employment in absolute numbers, with payroll employment change made up of change in each of the five subregions. The latter shows subregional employment converted into percentages of total regional employment. According to these figures, New York City's share of total regional payroll employment declined through the 1970s and the 1980s, leveling off around the early 1990s. Since that time, the trend has reversed somewhat, with New York City's five boroughs increasing its share of regional payroll employment. Note that this trend continued through the most recent business cycle. Although total employment levels changed dramatically over the period 2007–2013, the inner core has continued to increase its share of regional employment.

FIGURE 7: SUBREGIONAL DISTRIBUTION OF REGIONAL PAYROLL EMPLOYMENT, 1970–2013



Source: Bureau of Labor Statistics (BLS) Quarterly Census of Employment & Wages (QCEW)

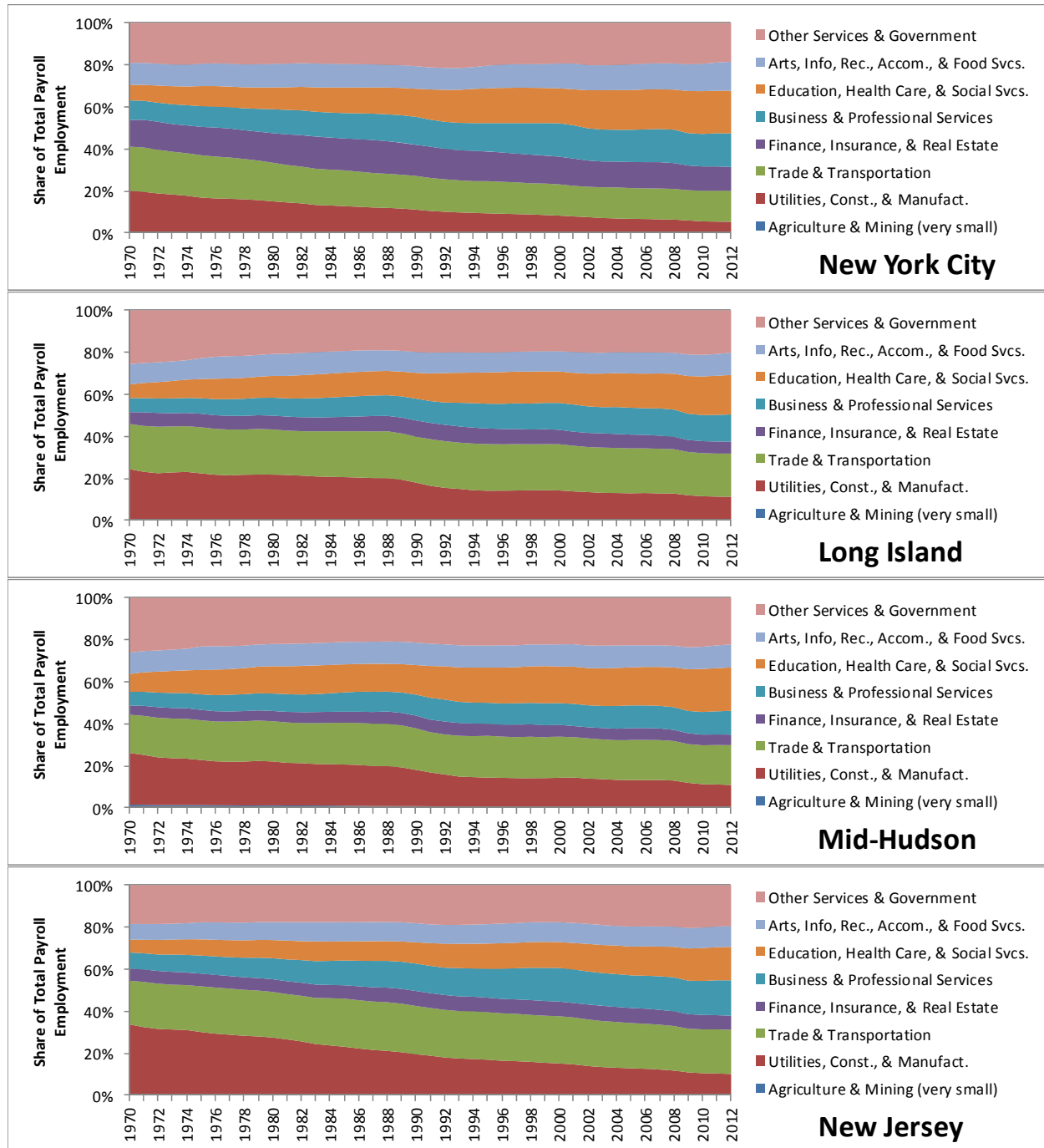
FIGURE 8: SUBREGIONAL PERCENTAGE OF REGIONAL PAYROLL EMPLOYMENT, 1970–2013

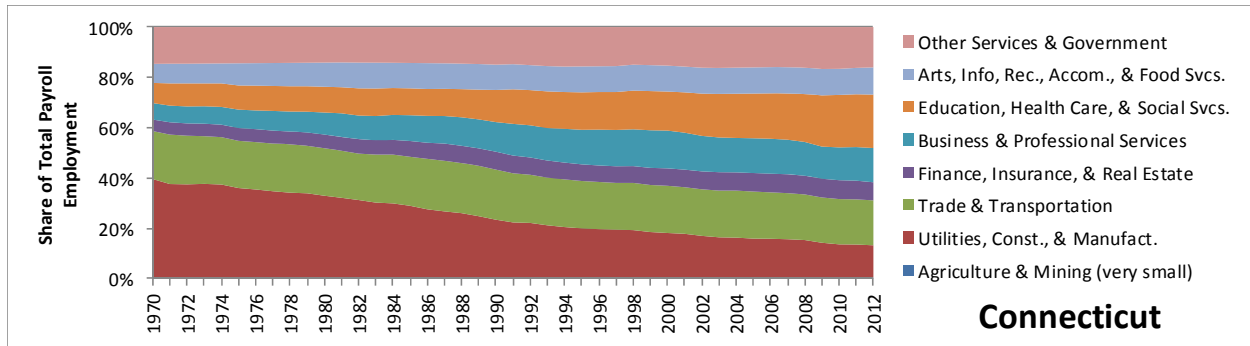


Source: Bureau of Labor Statistics (BLS) Quarterly Census of Employment & Wages (QCEW)

Looking more closely, Figure 9 shows how the region's changing employment mix has played out across each of the five subregions. Although all subregions have displayed a noticeable decline in heavy industry (utilities, construction, and manufacturing), offset by gains in education, health care, and social services, this figure also reveals some of the stable industry concentrations by subregion. These include New York City's large relative concentration of finance, insurance, and real estate, Long Island's large share of the region's transportation jobs, and New Jersey's and growing share of business and health care services.

FIGURE 9: EMPLOYMENT MIX FOR EACH SUBREGION, 1970–2012



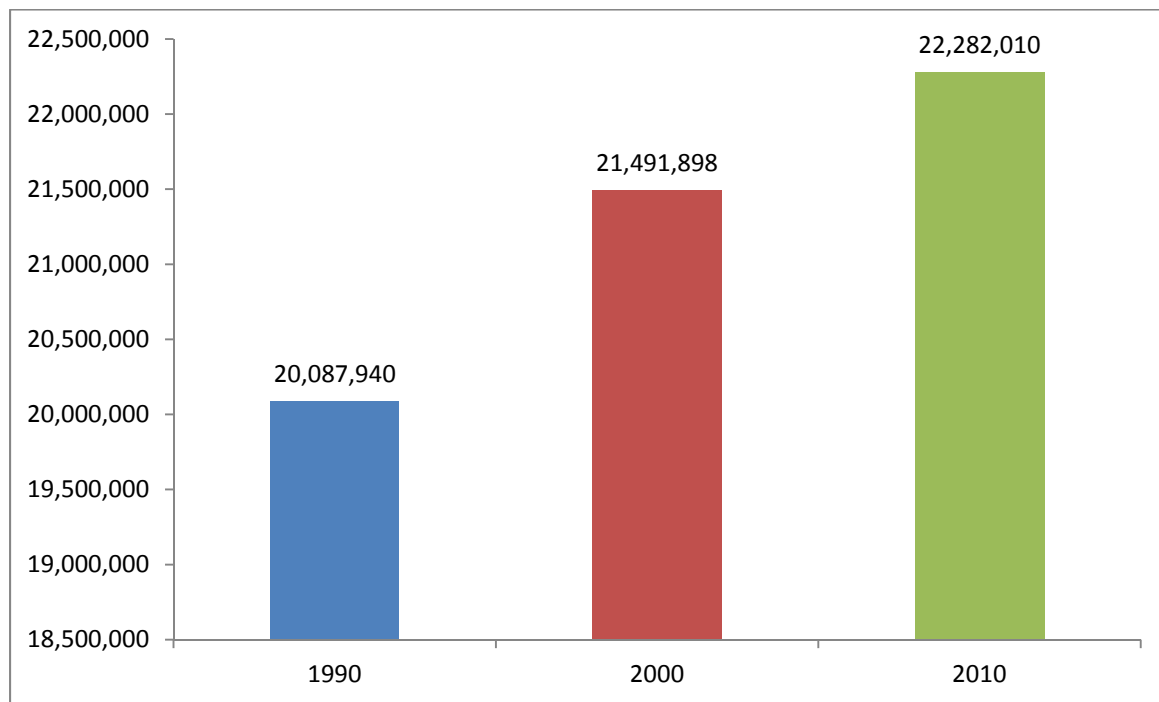


Source: Bureau of Labor Statistics (BLS) Quarterly Census of Employment & Wages (QCEW)

3.2 Population

3.2.1 Population & Age

Across each of the five subregions, population growth has remained steady since 1990. Census data shows that New York City, Long Island, Mid-Hudson, New Jersey and Connecticut have all had positive population growth, likely driven by steady employment opportunities in the region. New Jersey has seen the largest increase in population over the past 20 years, rising 14 percent between 1990 and 2010, followed by Mid-Hudson (13 percent). The remaining subregions – New York City, Long Island and Connecticut – all increased by nine percent. The bulk of these increases, however, took place between 1990 and 2000, with more moderate increases over the past decade (Figure 10 and Table 1). The large increase in New Jersey has been driven by strong growth in Somerset, Ocean and Middlesex Counties, with only Essex County showing sluggish growth between 1990 and 2011. On Long Island, the population of Nassau County has remained relatively stable, with Suffolk County accounting for the bulk of the subregion's growth. In the five boroughs of New York City, Staten Island witnessed the strongest rates of growth between 1990 and 2010.

FIGURE 10: 31-COUNTY REGION POPULATION, 1990–2010

Source: 1990, 2000, and 2010 Census; DCP adjusted NYC values for 1990 and 2010

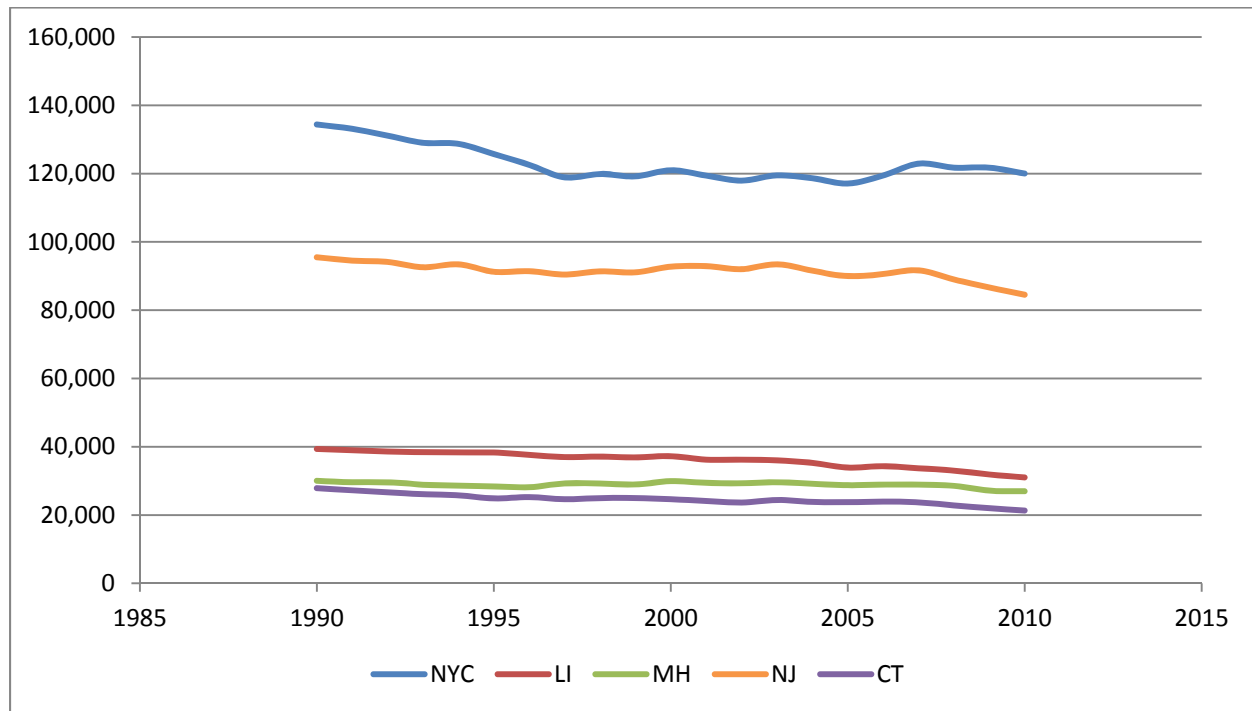
TABLE 1: POPULATION GROWTH RATE, 1990–2010

	Population			Growth Rate		
	1990	2000	2010	1990-2000	2000-2010	1990-2010
NYC	7,567,347	8,008,278	8,242,624	6%	3%	9%
Long Island	2,609,212	2,753,913	2,832,882	6%	3%	9%
Mid-Hudson	2,025,972	2,179,189	2,290,851	8%	5%	13%
New Jersey	6,079,453	6,661,750	6,946,420	10%	4%	14%
Connecticut	1,805,956	1,888,768	1,969,233	5%	4%	9%
31-County Region	20,087,940	21,491,898	22,282,010	7%	4%	11%

Source: 1990, 2000, and 2010 Census; DCP adjusted NYC values for 1990 and 2010

3.2.2 Births & Fertility

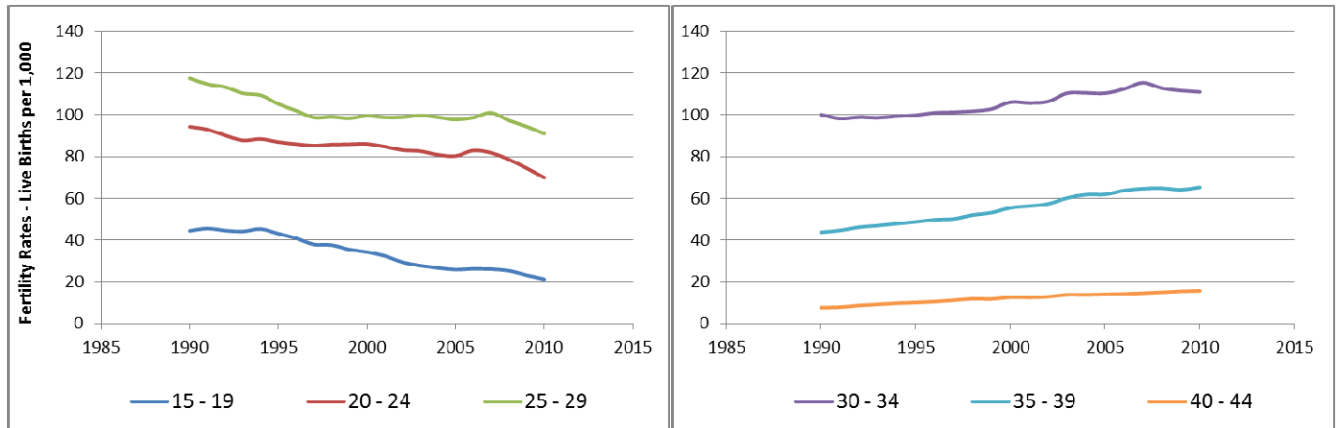
Although generally stable, the number of births has been gradually declining across the 31-County-Region since 1990 (Figure 11). In NYC, there was a relatively sharp drop between 1990 and approximately 1997, which has since leveled off with the overall drop between 1990 and 2010 being just -0.7 percent. The fastest relative drop over the past 20 years was in Long Island, where births dropped by 16.7 percent, followed by Connecticut at 13.5 percent. New Jersey and Mid-Hudson saw declines of 8.7 percent and 10 percent, respectively.

FIGURE 11: BIRTHS BY SUBREGION, 1990–2010

Source: New York, New Jersey, Connecticut State Departments of Health

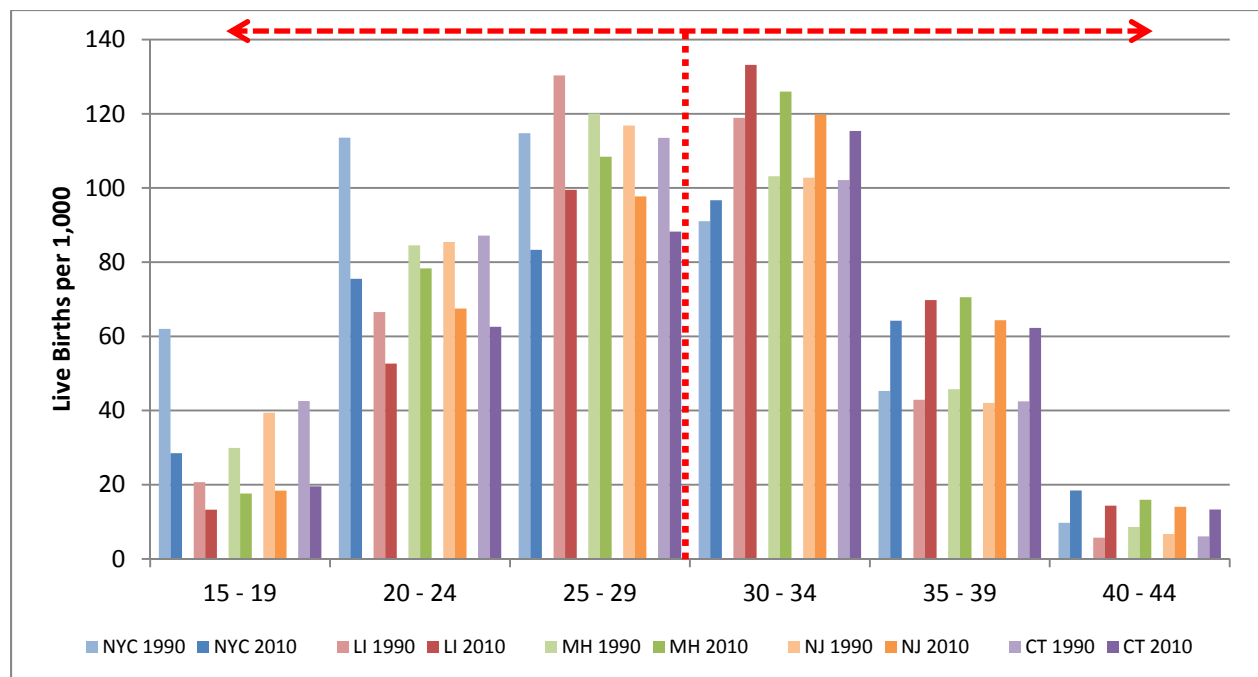
The trends in Figures 12 and 13 generally show that fertility rates between 1990 and 2010 (defined as live births per 1,000 women) have declined in the younger age cohorts (below 30) and appear to have increased in older age cohorts (over 30) across the 31-County Forecast Region. In other words, the trend demonstrates that since 1990, women have been deferring childbirth and starting families later than in previous periods. These trends are consistent across each subregion, with notable declines in New York City and Connecticut for the 15-19, 20-24 and 25-29 cohorts. For the 35-39 cohort, in particular, each subregion has experienced considerable growth. The implications of these trends for the future fertility rates are discussed in Section 5.3.

FIGURE 12: FERTILITY RATE, 31-COUNTY REGION, 1990-2010



Source: New York, New Jersey, Connecticut State Departments of Health

FIGURE 13: FERTILITY RATE, SUBREGION, 1990-2010

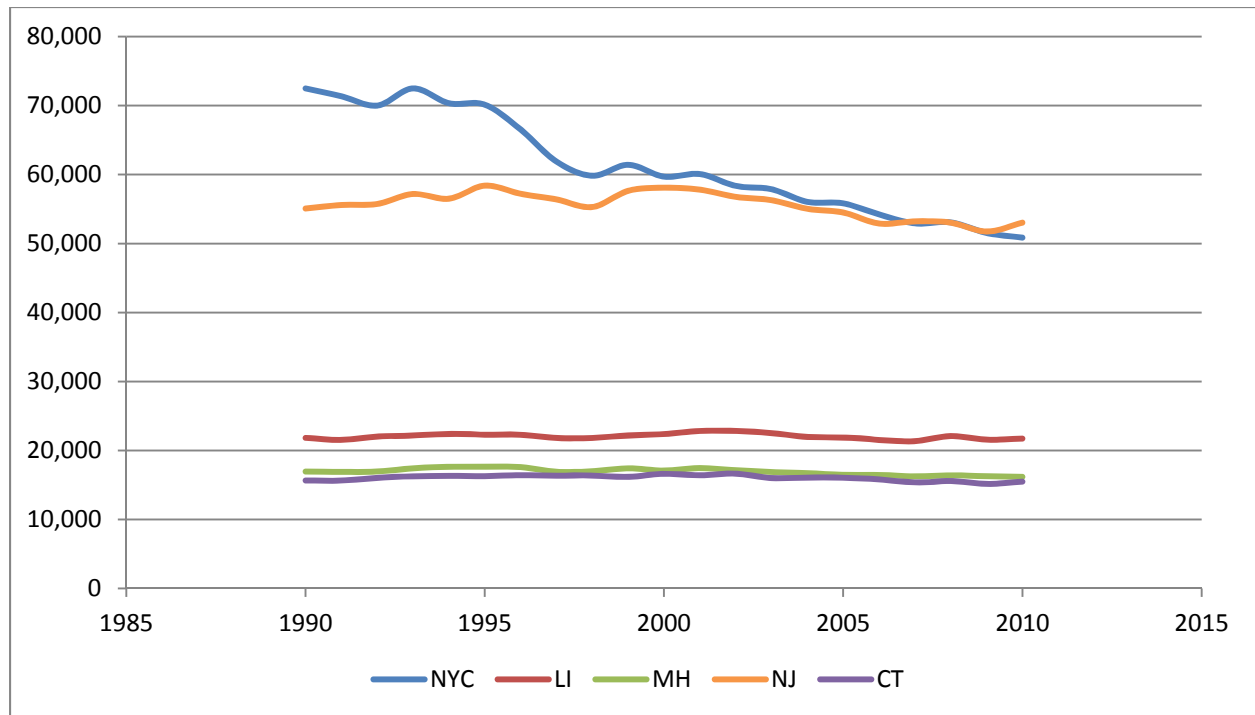


Source: New York, New Jersey, Connecticut State Departments of Health

3.2.3 Mortality

The trend in number of deaths per year (Figure 14) varies by subregion. In Long Island, Mid-Hudson and Connecticut, the trend has been relatively stable since 1990. While the number of deaths on a county basis fluctuates widely, deaths have dropped slightly on a subregional basis over that time frame. New Jersey has experienced fluctuations since 1990, with the overall drop being approximately 5 percent between 1990 and 2010. Annual deaths in New York City have dropped significantly since 1990, falling by nearly 30 percent since 1990; all five boroughs have seen drops over the time frame.

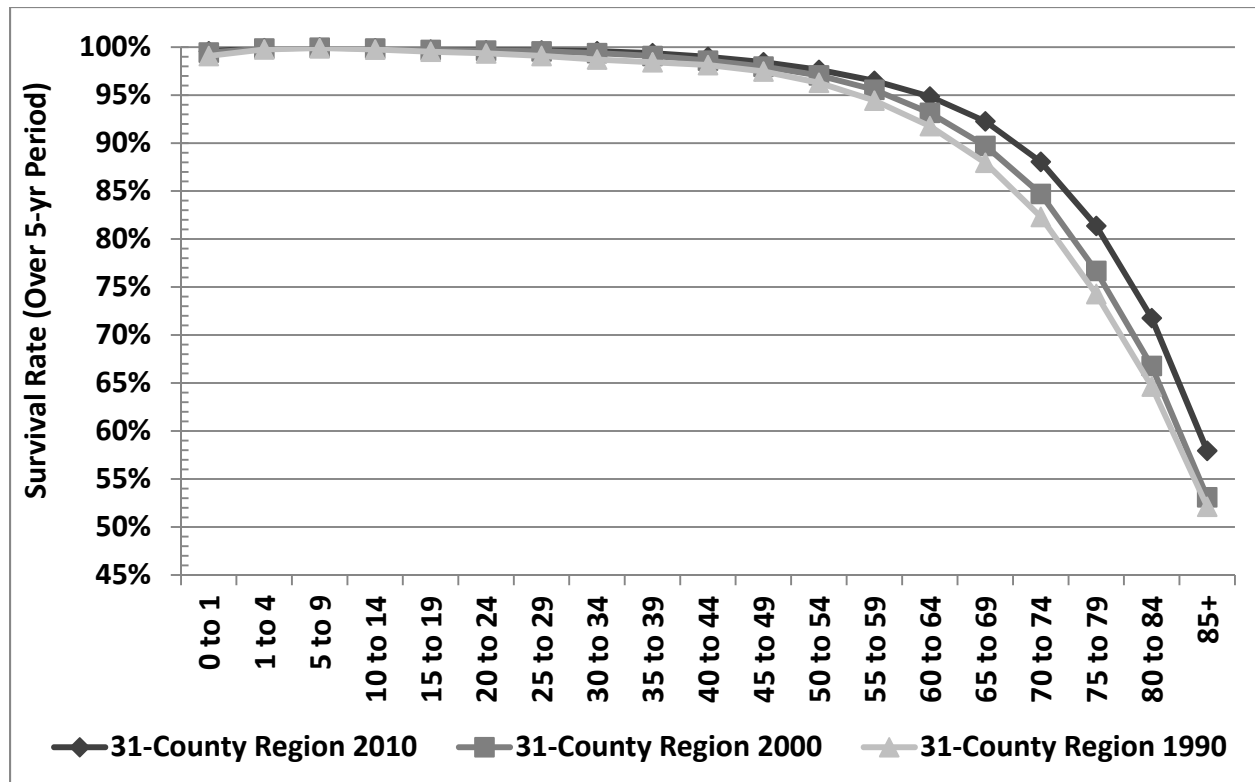
FIGURE 14: DEATHS BY SUBREGION, 1990-2010



Source: New York, New Jersey, Connecticut State Departments of Health

Generally flat mortality statistics (or falling in the case of NYC) in the face of growing populations imply a declining rate of death. Life tables, generated from age-specific death rates, are used to represent mortality experience of a population in terms of age-specific life expectancy and survival rates. Since 1990, the trend in survival rates and life expectancy has been in the positive direction, a product of improvements in standards of living, lifestyle, health care, and other factors. While there was relatively little improvement in the survival rate between 1990 and 2000, the survival rate for those 65 and over increased substantially between 2000 and 2010 (Figure 15). Of particular note is the increased rate of survival for those over 80 between 1990 and 2010.

FIGURE 15: SURVIVAL RATE, 31-COUNTY REGION, 1990-2010

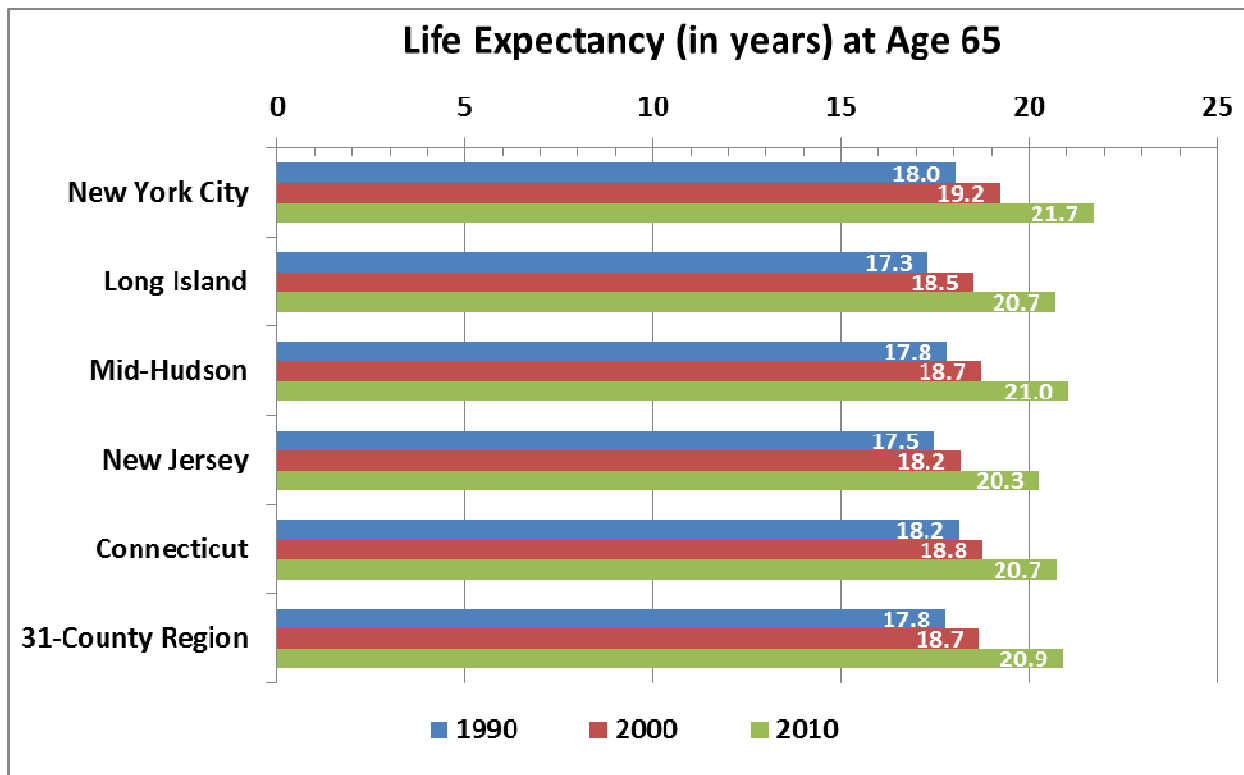
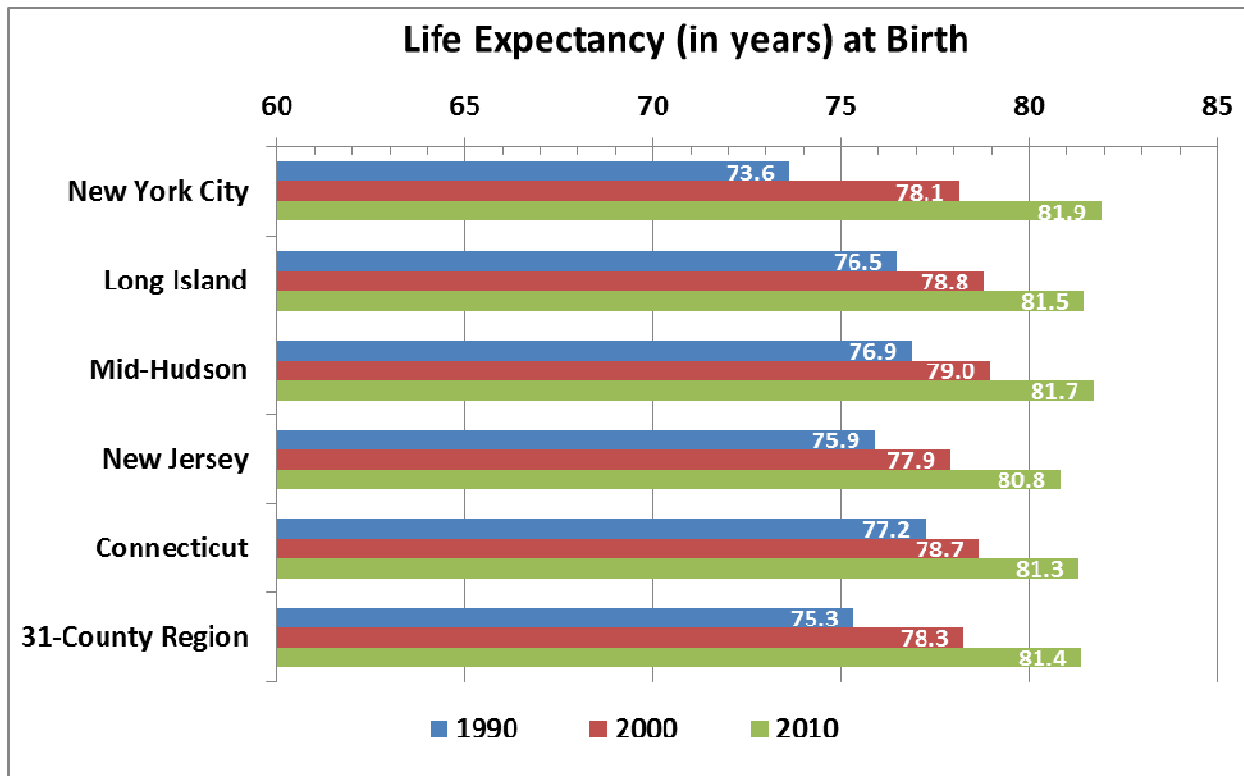


Source: New York, New Jersey, Connecticut State Departments of Health

Figure 16 highlights the improvements in life expectancy across the 31-County region. New York City's life expectancy at birth rose from 73.3 in 1990 to 81.8 in 2010, the largest jump across all subregions. These improvements were driven in part by a reduction in deaths attributed to HIV/AIDS, homicide, as well as drugs and alcohol. New York City's campaign to "to combat the incidence of and mortality from HIV/AIDS" was an effective tool that contributed to gains in life expectancy.² Each subregion's life expectancy at birth increased from under 77.5 in 1990 to over 80.8 in 2010. At age 65, the trend in life expectancy is equally positive, particularly marked between 2000 and 2010, with the largest gains over the 20 year span occurring between 2000 and 2010.

FIGURE 16: LIFE EXPECTANCY BY SUBREGION, 1990–2010

² Preston, S.H., & Elo, I.T., Anatomy of a Municipal Triumph: New York City's Upsurge in Life Expectancy. *Population and Development Review*. 2014.

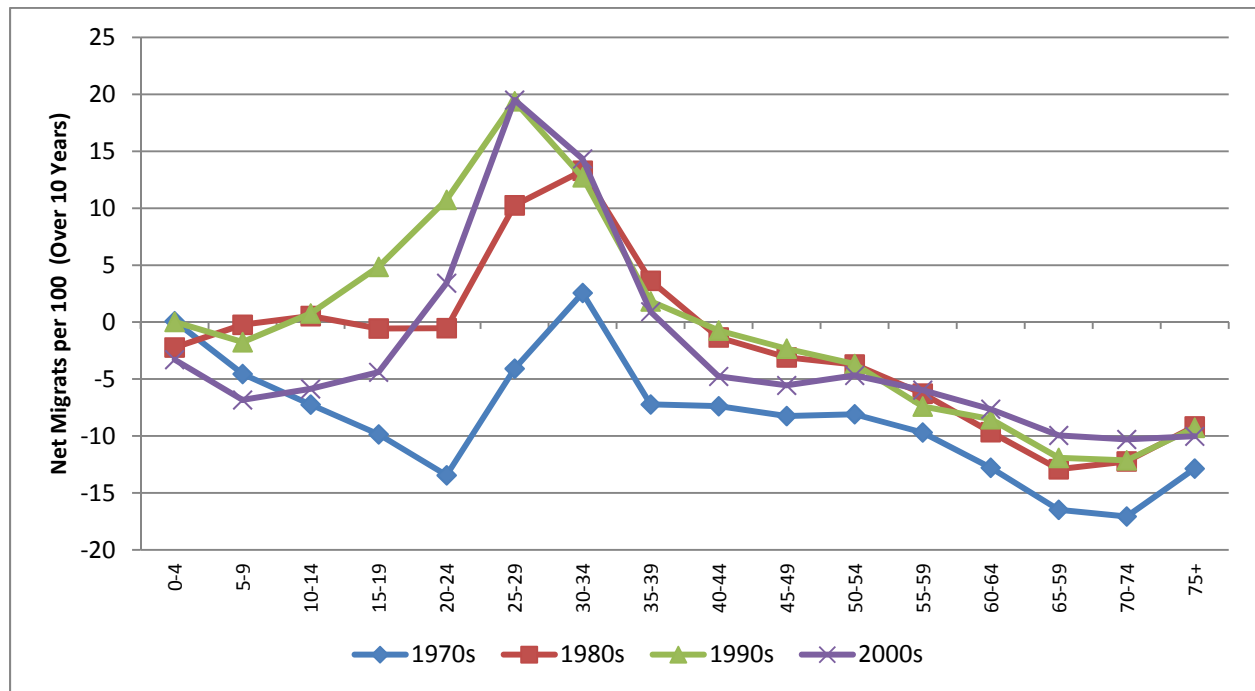


Source: New York, New Jersey, Connecticut State Departments of Health

3.2.4 Migration

Although Figure 17 shows that there is a generally consistent pattern of age-specific net migration rates across the aggregated 31-County Forecast region, the figure also shows that there are wide fluctuations in individual age-specific rates of net migration, and that these rates do not show a directional trend over time. There is a general pattern of net in-migration for the age-groups spanning ages 25-39, and net out-migration beginning once those in the region reach age 40 (Figure 17).

FIGURE 17: NET MIGRATION, 31-COUNTY REGION 1970-2010



Source: <http://www.netmigration.wisc.edu/>

Historic crude migration rates (CMR) are estimated for the subregions as a whole, by taking the number of net migrants and dividing by the corresponding historic census population. These values are then multiplied by 100 arrive at CMRs per 100, as is the case with the age-specific net migration rate. CMRs provide a useful summary of the overall migration picture for all age groups. The historic CMRs (Table 2) demonstrate a level of volatility in migration that reflects the scattered fluctuations of individual age-specific rates described above. Even after taking into account rapid suburban growth following World War II, each subregion has experienced periods of positive and negative CMRs, leading to the conclusion that there is no definitive trend in net migration.

TABLE 2: HISTORIC CRUDE MIGRATION (CMR) PER 100, 1950–2010

Geography	HISTORIC							
	Crude Migration Rates (CMR)							
	'50-'60	'60-'70	'70-'80	'80-'90	'90-'00	'00-'10	Max	Min
New York City	-10.5	-6.4	-16.6	-0.8	-1.7	-5.7	-0.8	-16.6
Long Island	82.7	18.1	-3.9	-3.7	-0.3	-1.6	82.7	-3.9
Mid-Hudson	18.1	11.7	0.9	0.9	0.7	-0.4	18.1	-0.4
New Jersey	10.2	7.5	-4.7	0.1	3.2	-1.0	10.2	-4.7
Connecticut	11.5	7.3	-2.6	0.5	-1.3	0.4	11.5	-2.6
31-County Region	4.7	2.9	-8.7	-0.7	0.3	-2.6	4.7	-8.7

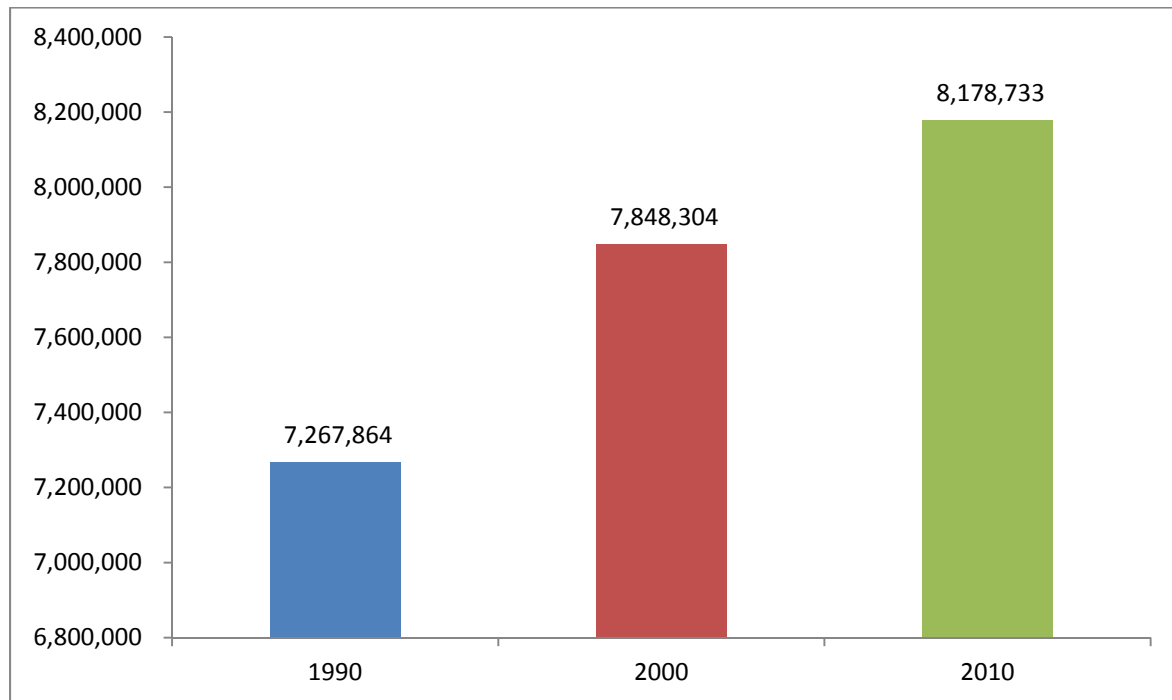
Source: <http://www.netmigration.wisc.edu/>; U.S. Census

3.2.5 Households and Headship

Similar to population, the number of households in the 31-County Region experienced a faster pace of growth between 1990 and 2000, as compared to 2000 to 2010 (Figure 18). Overall, the number of households rose 12.5 percent between 1990 and 2010, with a compound annual growth rate of 0.59 percent. Headship rates are the ratio of household heads to number of households; in other words it is the probability that a person in a particular age group is a head of household. Aggregated at the 31-County Region (Figure 19), age-specific headship rates have generally declined since 1990 for all age groups. The drop is most noticeable for those over 60.

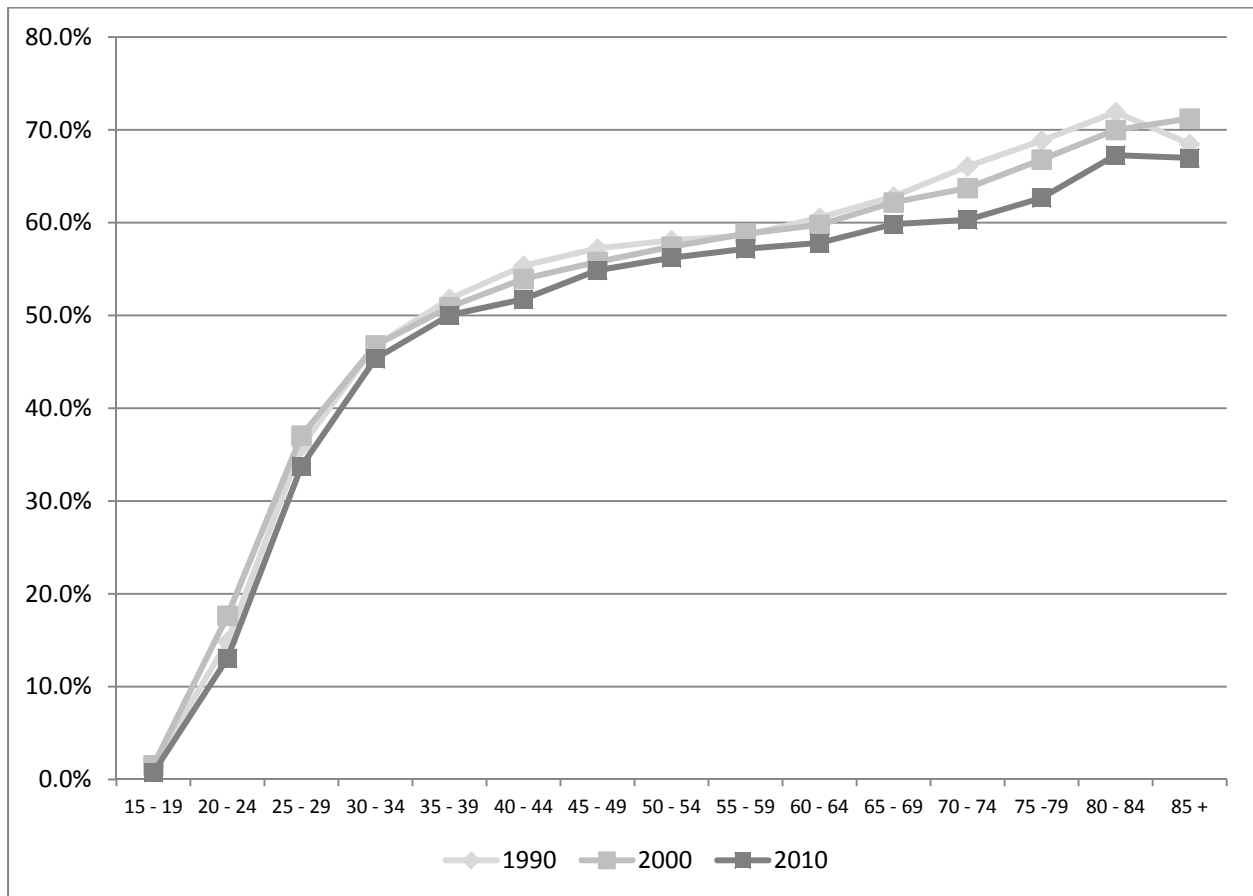
In general, the relationship between headship rates and household size (described below) is inverse; the larger the headship rate, the smaller the average household size. This is due to the notion that as more individuals start their own household, there are less people to join households, driving down the size. That logic, however, does not apply to the 31-County Region's recent history as both headship rates and average household size are declining. A possible explanation for this disparity is that the older cohorts are experiencing the most significant decline in headship rates, and these cohorts are more likely to have smaller households, regardless of headship rate trends.

FIGURE 18: 31-COUNTY REGION HOUSEHOLDS, 1990–2010



Source: 1990, 2000, and 2010 Census; DCP adjusted NYC values for 2010

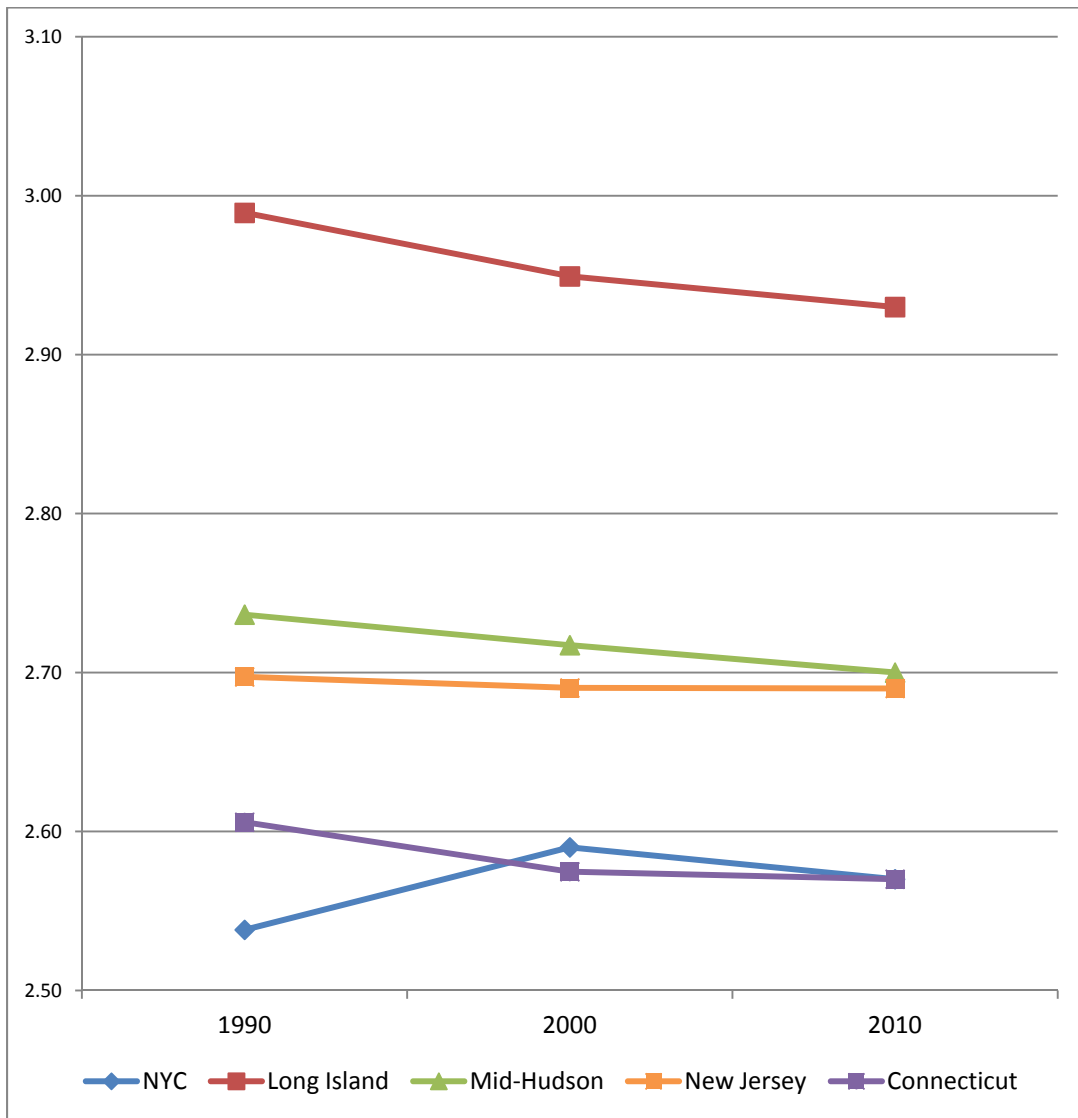
FIGURE 19: 31-COUNTY REGION HEADSHIP RATES, 1990–2010



Source: 1990, 2000, and 2010 PUMS

Since 1990, average household sizes have been declining gradually across the region, with the exception of New York City (Figure 20). While the four subregions outside New York City experienced declines or stagnating average household sizes between 1990 and 2000 and 2000 to 2010, New York City's average household size increased between 1990 and 2000, before dropping slightly between 2000 and 2010. Long Island experienced the largest overall drop, dipping two percent between 1990 and 2010. Mid-Hudson and New Jersey experienced relatively small declines over the 20 year span.

FIGURE 20: AVERAGE HOUSEHOLD SIZE, 1990–2010



Source: 1990, 2000, and 2010 U.S. Census

4.0 EMPLOYMENT FORECASTS

In the 31-County Region, total employment is projected to grow by about 2.3 million jobs between 2010 and 2050. As shown by the total employment forecast summary in Table 3, this growth is driven primarily by a continuation of the current cyclical rebound – through about 2017 – followed by a resumption of more moderate long-run growth trends. Note that Table 3 employment includes both payroll and self-employment.

TABLE 3: TOTAL EMPLOYMENT FORECAST SUMMARY*, 2010–2050

Employment Levels	2010	2015	2020	2025	2030	2035	2040	2045	2050
New York City	4,529,643	4,904,770	5,017,008	5,074,498	5,124,229	5,182,523	5,244,981	5,303,237	5,364,758
Long Island	1,227,881	1,304,882	1,343,833	1,365,486	1,386,575	1,413,274	1,440,404	1,468,363	1,497,188
Mid-Hudson	962,986	1,012,275	1,045,449	1,069,096	1,091,902	1,118,093	1,144,663	1,172,322	1,201,123
New Jersey	3,352,815	3,541,938	3,687,618	3,746,703	3,800,475	3,891,880	3,983,470	4,066,131	4,151,423
Connecticut	952,682	996,545	1,031,729	1,047,865	1,069,812	1,093,898	1,121,373	1,149,051	1,178,811
31-County Totals	11,026,007	11,760,411	12,125,636	12,303,648	12,472,992	12,699,669	12,934,892	13,159,104	13,393,301

Avg. Annual Growth Rate	2010	2015	2020	2025	2030	2035	2040	2045	2050
New York City		1.6%	0.5%	0.2%	0.2%	0.2%	0.2%	0.2%	0.2%
Long Island		1.2%	0.6%	0.3%	0.3%	0.4%	0.4%	0.4%	0.4%
Mid-Hudson		1.0%	0.6%	0.4%	0.4%	0.5%	0.5%	0.5%	0.5%
New Jersey		1.1%	0.8%	0.3%	0.3%	0.5%	0.5%	0.4%	0.4%
Connecticut		0.9%	0.7%	0.3%	0.4%	0.4%	0.5%	0.5%	0.5%
31-County Totals		1.3%	0.6%	0.3%	0.3%	0.4%	0.4%	0.3%	0.4%

* Total Employment includes payroll employment, self-employment, and unpaid family work

4.1 Employment Forecast Results

Table 4 provides a more detailed picture of the regional distribution of projected employment growth. This again shows the strong cyclical rebound from 2010 to 2020 across all subregions, and that the rebound has been strongest in New York City. Between 2010 and 2020, the New York City subregion is projected to gain about 500,000 jobs – accounting for roughly half of all jobs gains in the 31-county region in that period. Looking at Table 4, Manhattan alone is projected to account for about 20 percent of all job gains between 2010 and 2020. Note that the strength of the cyclical rebound in NYC is largely a continuation of recent trends. Between 2010 and 2014, NYC is estimated to have already gained approximately 320,000 jobs. Thus, the 1.7 percent average annual growth projected for NYC between 2010 and 2015 is largely historical – meaning that the 2014 value validates well against available 2014 data (limited to the monthly State and Area Employment series from the Bureau of Labor Statistics), and that only 2015 is a pure forecast.

Outside of NYC, the cyclical rebound has been only slightly less robust. As shown in Table 3, the period 2010 to 2015 is projected to yield annual employment growth rates of between 0.9 percent and 1.3 percent for all outer regions. After 2020, employment gains are expected to moderate back towards longer-run historical growth trends, with outlying areas expected to grow slightly faster than the urban core. Here, New York City is projected to grow about 0.2 percent per year, with much of that growth expected in Brooklyn and Queens.

The rest of the region is expected to grow at about 0.5 percent per year past 2020, with New Jersey accounting for the largest share. Moreover, total employment growth in the New Jersey subregion between 2010 and 2050 is projected to be about 800,000 jobs – only slightly less than for New York City. Together, Long Island, Mid-Hudson, and Connecticut are projected to add about 735,000 jobs between 2010 and 2050. Across all subregions outside of NYC, Nassau and Suffolk counties (Long Island), Fairfield County (Connecticut), and Bergen and Hudson counties (New Jersey) are each projected to add more than 100,000 jobs between 2010 and 2050.

TABLE 4: TOTAL EMPLOYMENT FORECAST, 2010–2050

	2000	2010	2020	2030	2040	2050	1990-2010			2010-2050		
							Difference		CAGR	Difference		CAGR
FORECAST REGION	11,246,277	11,026,007	12,125,636	12,472,992	12,934,892	13,393,301	-220,270	-1.96%	-0.20%	2,367,294	21.47%	0.65%
Bronx County	346,623	380,917	425,439	438,554	452,145	465,591	34,294	9.89%	0.95%	84,674	22.23%	0.67%
Kings County	787,042	823,738	945,808	969,844	998,422	1,027,032	36,696	4.66%	0.46%	203,295	24.68%	0.74%
New York County	2,609,571	2,489,495	2,711,763	2,770,045	2,833,150	2,900,950	-120,076	-4.60%	-0.47%	411,455	16.53%	0.51%
Queens County	706,035	709,096	784,688	792,521	804,849	811,754	3,062	0.43%	0.04%	102,658	14.48%	0.45%
Richmond County	121,590	126,397	149,309	153,264	156,416	159,430	4,807	3.95%	0.39%	33,032	26.13%	0.78%
New York City Total	4,570,861	4,529,643	5,017,008	5,124,229	5,244,981	5,364,758	-41,218	-0.90%	-0.09%	835,115	18.44%	0.57%
Nassau County	597,226	591,002	643,851	657,136	679,278	703,103	-6,224	-1.04%	-0.10%	112,101	18.97%	0.58%
Suffolk County	611,661	636,879	699,981	729,440	761,126	794,085	25,219	4.12%	0.40%	157,205	24.68%	0.74%
Long Island Total	1,208,886	1,227,881	1,343,833	1,386,575	1,440,404	1,497,188	18,995	1.57%	0.16%	269,306	21.93%	0.66%
Dutchess County	120,638	121,400	130,131	136,884	144,389	152,822	761	0.63%	0.06%	31,422	25.88%	0.77%
Orange County	144,626	150,982	160,532	170,935	182,260	194,693	6,356	4.39%	0.43%	43,711	28.95%	0.85%
Putnam County	26,032	28,455	30,687	30,937	31,072	31,323	2,423	9.31%	0.89%	2,868	10.08%	0.32%
Rockland County	118,355	116,614	131,160	139,244	147,337	155,730	-1,741	-1.47%	-0.15%	39,116	33.54%	0.97%
Sullivan County	29,302	29,592	30,994	37,073	44,680	52,330	290	0.99%	0.10%	22,739	76.84%	1.92%
Ulster County	74,611	70,755	73,195	74,885	77,491	80,347	-3,856	-5.17%	-0.53%	9,591	13.56%	0.42%
Westchester County	462,833	445,188	488,751	501,944	517,434	533,878	-17,645	-3.81%	-0.39%	88,690	19.92%	0.61%
Mid-Hudson Total	976,397	962,986	1,045,449	1,091,902	1,144,663	1,201,123	-13,411	-1.37%	-0.14%	238,136	24.73%	0.74%
Bergen County	507,100	455,492	508,320	527,598	548,538	566,297	-51,608	-10.18%	-1.07%	110,805	24.33%	0.73%
Essex County	430,175	402,495	420,649	429,609	452,602	476,343	-27,680	-6.43%	-0.66%	73,848	18.35%	0.56%
Hudson County	303,701	289,912	335,410	351,143	371,447	390,123	-13,789	-4.54%	-0.46%	100,211	34.57%	0.99%
Hunterdon County	59,534	60,652	63,802	64,361	67,563	70,904	1,118	1.88%	0.19%	10,252	16.90%	0.52%
Mercer County	245,428	248,058	274,913	288,456	307,005	324,450	2,630	1.07%	0.11%	76,392	30.80%	0.90%
Middlesex County	417,715	400,069	439,985	453,005	476,961	495,024	-17,647	-4.22%	-0.43%	94,956	23.73%	0.71%
Monmouth County	273,171	288,407	302,227	304,399	318,260	334,246	15,236	5.58%	0.54%	45,839	15.89%	0.49%
Morris County	320,180	307,283	341,665	346,764	354,940	360,712	-12,897	-4.03%	-0.41%	53,430	17.39%	0.54%
Ocean County	162,818	181,413	201,457	212,336	227,087	242,401	18,595	11.42%	1.09%	60,989	33.62%	0.97%
Passaic County	209,638	191,749	213,869	222,102	231,939	241,692	-17,889	-8.53%	-0.89%	49,943	26.05%	0.77%
Somerset County	192,237	188,892	216,287	223,258	233,601	240,415	-3,345	-1.74%	-0.18%	51,522	27.28%	0.81%
Sussex County	43,330	48,291	51,578	52,628	54,105	55,778	4,961	11.45%	1.09%	7,488	15.51%	0.48%
Union County	263,920	250,670	276,376	282,636	296,035	308,835	-13,250	-5.02%	-0.51%	58,165	23.20%	0.70%
Warren County	38,724	39,432	41,080	42,182	43,386	44,202	708	1.83%	0.18%	4,770	12.10%	0.38%
New Jersey Total	3,467,669	3,352,815	3,687,618	3,800,475	3,983,470	4,151,423	-114,854	-3.31%	-0.34%	798,608	23.82%	0.71%
Fairfield County	519,961	480,866	531,540	553,151	581,351	613,250	-39,095	-7.52%	-0.78%	132,384	27.53%	0.81%
Litchfield County	81,154	68,435	73,954	75,605	78,206	80,889	-12,719	-15.67%	-1.69%	12,454	18.20%	0.56%
New Haven County	421,349	403,380	426,235	441,057	461,816	484,672	-17,969	-4.26%	-0.43%	81,291	20.15%	0.61%
Connecticut Total	1,022,464	952,682	1,031,729	1,069,812	1,121,373	1,178,811	-69,782	-6.82%	-0.70%	226,129	23.74%	0.71%

4.2 Payroll Employment

At the industry level, payroll employment growth is driven by a combination of national and regional trends. Nationally, employment growth is projected to be strongest in industries with stable or growing national demand and low to moderate labor productivity growth. In other words, payroll employment is likely to be most robust in sectors driven by stable consumer demand and where it is also difficult to outsource or automate work. Regionally, employment growth will be strongest in sectors with strong national growth and where New York City can maintain or increase its competitive advantage relative to the rest of the country. Table 5 shows that five industries are expected to account for the vast majority of payroll employment growth between 2010 and 2050.

Professional, Scientific, & Technical Services (NAICS 54). Demand for these services (e.g., legal, accounting, engineering, computer, consulting, research) has been strong for several decades and is expected to increase nationally. Although jobs in these fields are not typically performed “in-person”, they require a high degree of expertise and training, and the New York region has maintained a stable competitive advantage, serving regional, national, and international demand.

TABLE 5: PROJECTED PAYROLL EMPLOYMENT GROWTH BY INDUSTRY, 31-COUNTY TOTALS

NAICS Industry	Levels		Avg. Annual Change, 2010-2050		Industry % of Total Growth
	2010	2050	Levels	%	
11-Agriculture	16,532	19,362	71	0.4%	0.1%
21-Mining	2,572	6,171	90	3.5%	0.2%
22-Utilities	42,624	31,631	-275	-0.6%	-0.5%
23-Construction	356,694	509,200	3,813	1.1%	7.0%
31-33-Manufacturing	529,452	367,816	-4,041	-0.8%	-7.4%
42-Wholesale Trade	445,006	434,701	-258	-0.1%	-0.5%
44-45-Retail Trade	1,011,207	941,335	-1,747	-0.2%	-3.2%
48-49-Transportation & Warehousing	311,343	275,401	-899	-0.3%	-1.7%
51-Information	291,747	405,524	2,844	1.0%	5.2%
52-Finance & Insurance	609,591	663,316	1,343	0.2%	2.5%
53-Real Estate, Rental & Leasing	204,272	189,054	-380	-0.2%	-0.7%
54-Professional, Scientific & Technical	733,323	1,004,427	6,778	0.9%	12.5%
55-Management Of Companies & Enterprises	176,241	239,735	1,587	0.9%	2.9%
56-Administrative, Support, Waste Management	549,371	927,823	9,461	1.7%	17.4%
61-Educational Services	386,079	630,223	6,104	1.6%	11.2%
62-Health Care & Social Assistance	1,425,346	2,139,567	17,856	1.3%	32.8%
71-Arts, Entertainment & Recreation	158,073	189,099	776	0.5%	1.4%
72-Accommodation & Food Services	647,526	909,652	6,553	1.0%	12.0%
81-Other Services	507,692	540,511	820	0.2%	1.5%
92-Government	1,585,261	1,741,445	3,905	0.2%	7.2%
Total-All Industries	9,989,951	12,165,992	54,401	0.5%	100.0%

Administrative, Support, & Waste Management Services (NAICS 56). This sector is comprised of establishments performing routine support activities for the day-to-day operations of other organizations. Jobs in these fields are difficult to outsource or automate, and are supportive of many industries that have fared well in the current rebound – and that are expected to continue growing in the future.

Educational Services (NAICS 61). This sector includes private and nonprofit schools, colleges, and training centers (public schools and universities are included in 92-Government). Nationally, education services have seen rapid growth in the past 15 years – more than three percent per year. This reflects not only demand for private colleges, but also for workforce training centers. New York City maintains a very high competitive advantage in this sector relative to the rest of the country.

Health Care & Social Services (NAICS 62). In recent history, this sector has provided the best combination of strong national growth and stable labor productivity, generating the largest single-sector gain in payroll employment. These national trends – driven largely by demographic forces – are expected to continue through the end of the forecast period. Although many of the fields within this

sector are locally-serving (such as dentists), elements of New York's health care "cluster" serve both national and international demand.

Accommodation & Food Services (NAICS 72). Finally, growth in this sector reflects a recent increase in New York's share of national demand, driven by national and international tourism. These trends are expected to continue past the current cyclical rebound, albeit with a more moderate growth trend.

4.3 Self-Employment

Historically, self-employment has comprised just over 9 percent of total employment in the 31-County Region. Although self-employment rates, that is, the share of self-employment to total employment, vary across industries and counties, according to the U.S. Census Bureau's American Community Survey (ACS), overall rates have remained relatively stable since 2005 (as a percent of total employment). Table 6 shows projected self-employment levels and rates through the end of the forecast period.

TABLE 6: PROJECTED SELF-EMPLOYMENT, 2010–2050

Self-Employment	2010	2015	2020	2025	2030	2035	2040	2045	2050
New York City	419,128	439,192	448,559	453,446	455,551	458,973	461,852	465,064	467,922
Long Island	131,124	141,448	145,882	148,132	150,486	153,306	156,097	158,935	161,828
Mid-Hudson	112,644	112,501	116,251	118,773	121,251	123,903	126,560	129,239	131,990
New Jersey	272,952	284,039	299,311	304,911	308,454	314,525	321,106	325,715	330,287
Connecticut	100,208	102,580	108,135	111,598	116,119	120,451	125,360	130,203	135,282
31-County Totals	1,036,056	1,079,759	1,118,138	1,136,860	1,151,862	1,171,158	1,190,975	1,209,155	1,227,309
Self-Employment Rates	2010	2015	2020	2025	2030	2035	2040	2045	2050
New York City	9.3%	9.0%	8.9%	8.9%	8.9%	8.9%	8.8%	8.8%	8.7%
Long Island	10.7%	10.8%	10.9%	10.8%	10.9%	10.8%	10.8%	10.8%	10.8%
Mid-Hudson	11.7%	11.1%	11.1%	11.1%	11.1%	11.1%	11.1%	11.0%	11.0%
New Jersey	8.1%	8.0%	8.1%	8.1%	8.1%	8.1%	8.1%	8.0%	8.0%
Connecticut	10.5%	10.3%	10.5%	10.6%	10.9%	11.0%	11.2%	11.3%	11.5%
31-County Totals	9.4%	9.2%	9.2%	9.2%	9.2%	9.2%	9.2%	9.2%	9.2%

4.4 Overview of Employment Methodology

The NYMTC employment projections discussed above were developed in four broad steps, distinguished by the four colors shown in Figure 21. The steps are (1) benchmarking; (2) using the third-party forecasts to develop national employment forecasts and region/county employment shares; (3) forecasting payroll and self-employment; and (4) calibrating place-of-work employment forecasts against place-of-residence labor force forecasts (derived from population forecasts).

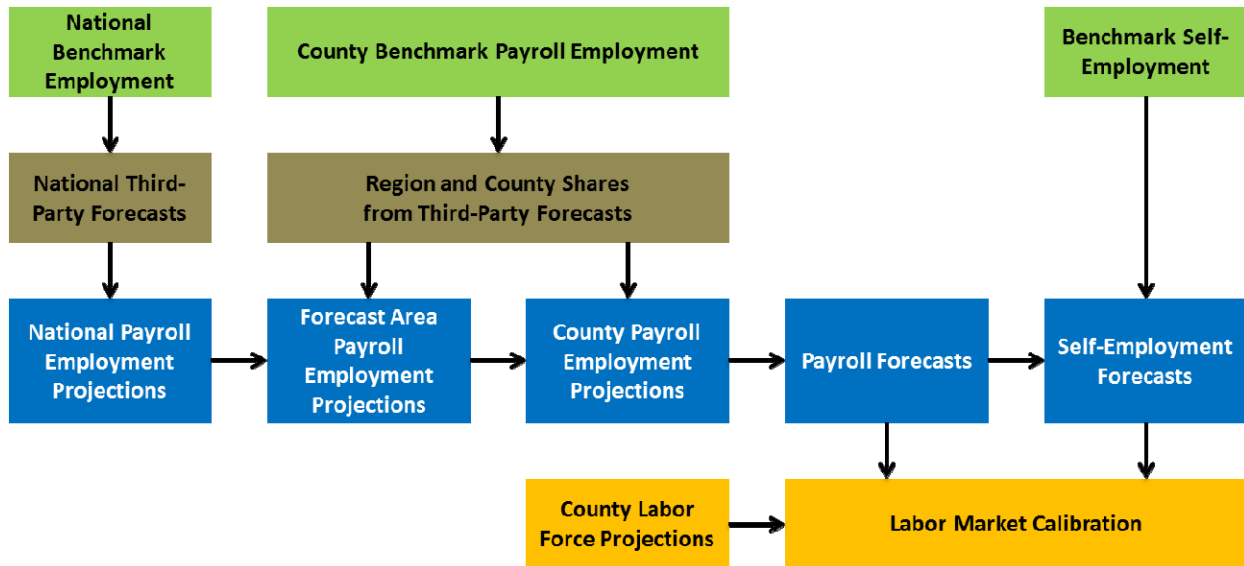
4.4.1 Benchmarking

The purpose of benchmarking was to estimate the most likely values of historical place-of-work employment by industry at the national and county level. At the national level, benchmark wage and salary employment was estimated using Current Employer Statistics (CES) data, supplemented with Current Population Survey (CPS) data for non-agricultural and private household employment.

The county-level benchmarking process was motivated by the need for place-of-work employment estimates broadly consistent with Journey to Work (JTW) patterns. A comparison of sources revealed that county estimates from the Quarterly Census of Employment and Wages (QCEW) program systematically differed from American Community Survey (ACS) estimates. It was determined that the primary source of these differences was "headquartering bias," a situation in which QCEW reported

employment at the location where the payroll was processed, and not necessarily where the employee worked. In contrast, the ACS is survey-based, therefore reporting the physical location of the job. To address this, a county-level wage and salary benchmark was developed using data from Bureau of Labor Statistics (BLS) State and Area Employment (SAE) and QCEW series, as well as the U.S. Census Bureau's ACS. County benchmark self-employment was also estimated from the ACS.

FIGURE 21: STEPS IN DEVELOPING EMPLOYMENT FORECASTS



4.4.2 Developing Third-Party Forecast Scenarios

The second step in the forecasting process was to leverage third-party forecasts to develop national employment forecasts as well as forecasts of region and county shares by industry. Three third-party forecasts were used:

- Bureau of Labor Statistics
- IHS-Global Insight
- Moody's

First, all three sources were used to establish distinct national payroll employment scenarios. These forecasts were indexed to the national benchmark employment series to avoid any discontinuity with the last historical year (2013). Second, regional third-party shares were developed by dividing the 31-County totals for Moody's and Global Insight by the corresponding national forecast. In both cases, the national forecasts used are those indexed to the benchmark series, and the regional forecasts used are those indexed to the benchmark series. This establishes a *Moody's Region Share* and *Global Insight Region Share* specification for each industry. Finally, county shares were developed in a similar manner as the regional shares. That is, for each industry, county shares are estimated by dividing benchmarked county employment by the benchmarked regional total. This established a *Moody's County Share* and *Global Insight County Share* specification for each industry.

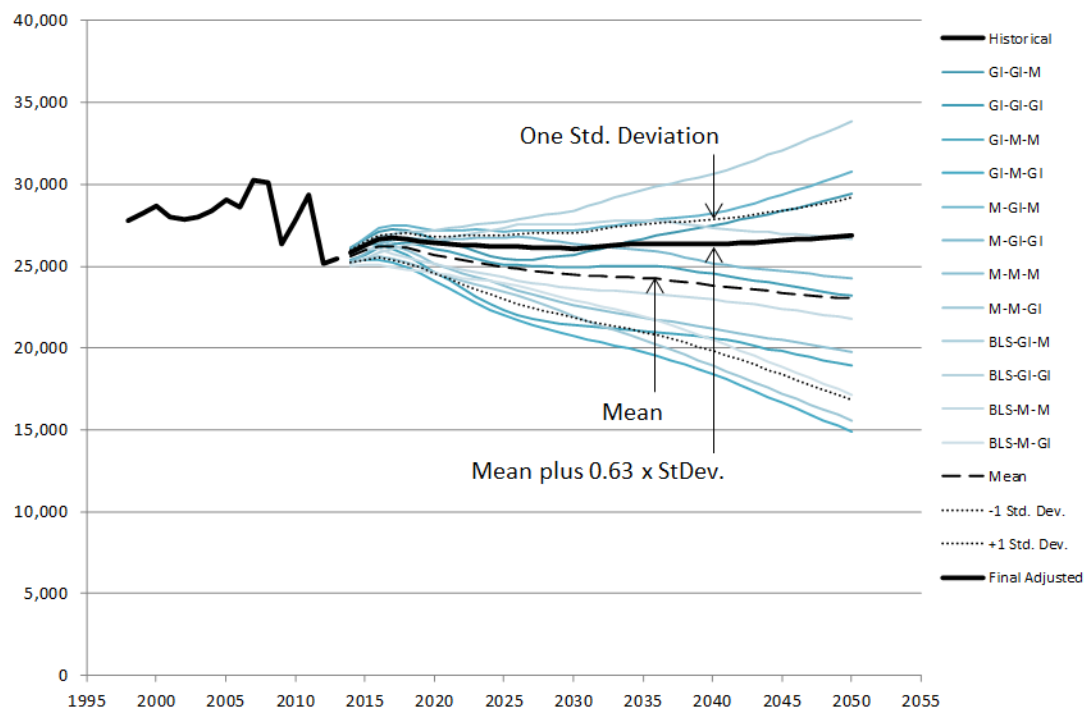
4.4.3 Forecasting Employment

The third step in the forecast methodology was to estimate baseline county employment using a forecast averaging process. This was accomplished by combining each national forecast with all possible region and county share specifications. Iterating over all possible combinations yielded a

range of 12 possible forecasts for each industry (3 national forecasts x 2 region shares x 2 county shares). Baseline payroll employment was selected as the average over all these combinations, subject to minor adjustments made based on feedback from local agencies.

This process is demonstrated in Figure 22 for retail employment in Essex County, New Jersey. In this figure, each blue line reflects one combination of a national forecast, a regional share method, and a county share method. For example, the lightest blue line shows the BLS national forecast shared to the 31-county region using *Moody's Region Share*, and then shared to counties using *Global Insight County Share* (BLS-M-GI in the legend). The average across all of these combinations is shown as the dashed black line.

FIGURE 22: EXAMPLE OF PAYROLL EMPLOYMENT FORECAST SELECTION PROCESS: RETAIL EMPLOYMENT IN ESSEX COUNTY, NJ



The final employment forecast was selected relative to the average. In the case of Essex County, an upward adjustment was applied based on feedback from local agencies. This adjustment was applied to all industries in the county based on the distribution's mean (the dashed line) and the standard deviation (the dotted lines). For Essex County, an upward adjustment of 0.63 was applied, such that the final benchmark forecast value for each industry was selected as the mean plus 0.63 times one standard deviation. The resulting forecast is shown as the thick black line in Figure 22.

It is important to note that the adjustment is made relative to the *variation* observed across all forecast combinations. As a result, when there is substantial agreement among third-party forecasts, adjustments are correspondingly small. Adjustments are larger when there is greater disagreement among the third-party forecasts as to national, regional and county trends. In practice, the process shown in Figure 22 was repeated 620 times – once for every county-industry combination (there are 31 counties and 20 industries). An overview summary of the adjustments made is as follows:

New York City: Based on feedback from local agencies, it was determined that Moody's and Global Insight forecasts were too aggressive in NYC, having been estimated in a strong growth period. Thus, a downward adjustment was made to bring growth trends past 2030 into closer alignment with long-run historical averages.

Long Island and Mid-Hudson: Based on feedback from local agencies, a modest upward adjustment was made to Mid-Hudson and Long Island Counties to partially offset the downward adjustment made to New York City.

New Jersey: Based on feedback from local agencies, it was determined that Moody's and Global Insight forecasts for several New Jersey counties (Bergen, Essex, Hudson, Passaic, and Sussex) were too pessimistic, having been calibrated in a period of slow or negative growth. Thus, an upward adjustment was applied to these counties to bring them more in line with long-run historical averages. Off-setting adjustments were made to other New Jersey counties so that NJ region totals remained roughly the same as before the adjustment. Additional county-level adjustments were made within the subregion control totals based on certain environmental and land use constraints. These included consideration of Pinelands regulations and land use controls as well as the Highlands regulations.

Once payroll employment was finalized, the last step in the employment forecasting process was to estimate self-employment by applying projected self-employment rates (as a percentage of wage and salary employment) to the wage and salary forecast levels.

4.4.4 Labor Market Calibration

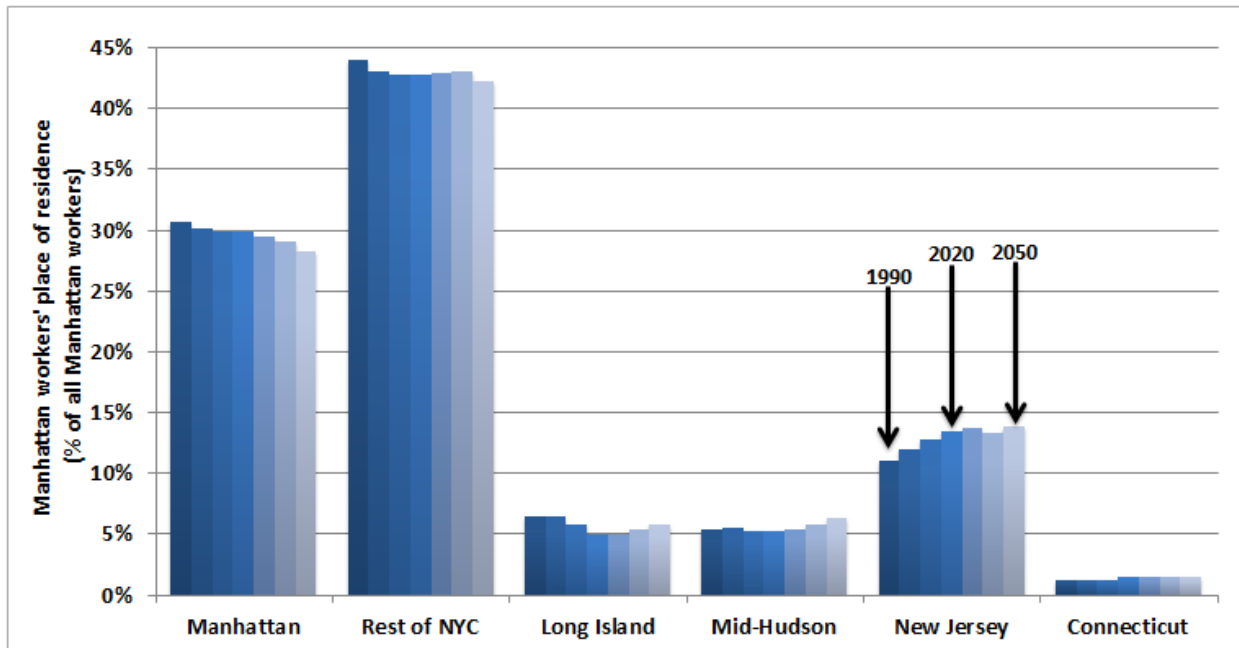
The final step shown in Figure 21 was to ensure that place-of-work employment forecasts could fully (and reasonably) reconcile with place-of-residence population and labor force projections (see Sections 5 and 6 below). There were three facets to this calibration: (1) unemployment rate; (2) multiple job-holding rate; and (3) Journey to Work (JTW).

First, county unemployment rates were forecasted based on trends from the ACS. These forecasts preserved historical variation among counties, yet assumed that the regional unemployment rate would continue to decline until about 2025, where it would stabilize at about 5.9 percent. This forecasted unemployment rate was applied to labor force projections to determine employed labor force.

Next, regional multiple-job-holding was estimated by comparing employment (a count of jobs held) with regional employed labor force (a count of individuals holding at least one job). This comparison revealed an implied multiple-job-holding rate of about seven percent in 2020, declining to about 5 percent by the end of the forecast period. These values were well within the historical range of 3 to 8 percent.

Finally, the last step in reconciliation was to balance forecasted employed labor force against forecasted employment. This was done by converting total employment by place-of-work into primary jobs (i.e., subtracting multiple-job-holders), and then balancing JTW trends. Figure 23 shows the results of this process in terms of distribution of Manhattan workers by place of residence. In this figure, the first three bars reflect historical years 1990, 2000, and 2010, with the rest resulting from the forecast calibration process.

FIGURE 23: SUMMARY OF JOURNEY TO WORK TRENDS, 1990–2050



5.0 POPULATION FORECASTS

The population levels in the entire 31-County Forecast Region are expected to increase by approximately 3.9 million between 2010 and 2050 as shown in Table 7, with New Jersey projected to grow by approximately 1.5 million residents in that 40-year forecast horizon, while New York City grows by approximately 900,000. The projected compounded annual growth rates (CAGRs) are generally lower than those observed for the same set of subregions in the 1990-2010 history.

TABLE 7: TOTAL POPULATION FORECAST SUMMARY, 2010–2050

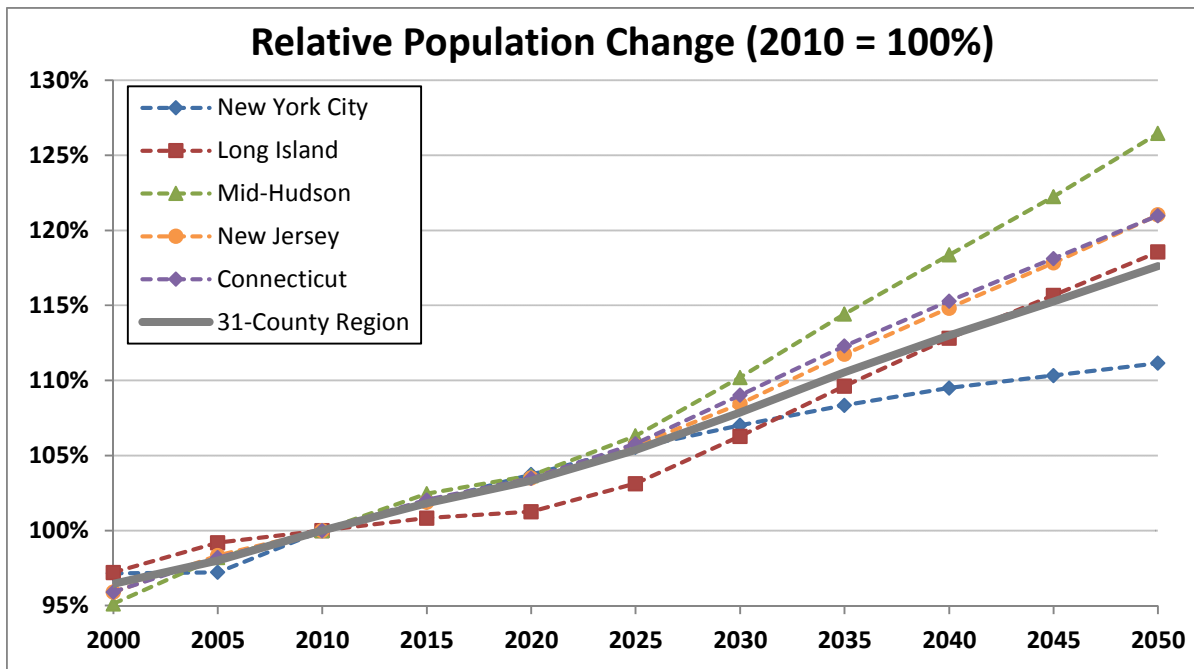
Region	1990	2010	2050	1990-2010		2010-2050	
				Difference	CAGR	Difference	CAGR
New York City	7,567,347	8,242,624	9,161,020	675,277	8.9%	918,396	11.1%
Long Island	2,609,212	2,832,882	3,358,559	223,670	8.6%	525,677	18.6%
Mid-Hudson	2,025,972	2,290,851	2,896,974	264,879	13.1%	606,123	26.5%
New Jersey	6,079,453	6,946,420	8,406,830	866,967	14.3%	1,460,410	21.0%
Connecticut	1,805,956	1,969,233	2,382,367	163,277	9.0%	413,134	21.0%
31 County Region	20,087,940	22,282,010	26,205,750	2,194,070	10.9%	3,923,740	17.6%

Figure 24 shows the Mid-Hudson subregion to be the fastest growing subregion in comparison to the other four. Mid-Hudson is predicted to grow by more than 26 percent over the 40-year time frame. Conversely, New York City is initially projected to grow at a rate similar to the regional average before tailing off to 11 percent total growth over the forecast horizon.

Both the New Jersey and Connecticut subregions trace a similar growth trajectory that results in a 2010-2050 population increase of approximately 20 percent each. The projected pace of growth in Long Island subregion initially lags behind the four other subregions, but eventually picks up in the latter half of the forecast horizon. This shift is due to increased population settlement resulting from land use and

housing constraints in NYC pushing labor induced migrants into the suburban commuting sheds of the Forecast Region.

FIGURE 24: SUMMARY OF RELATIVE SUBREGIONAL GROWTH RATES, 2010–2050



It should be noted that in order to maximize resources in terms of available data and on-the ground intelligence related to the critical land use and capacity issues facing the New York City, the New York City Department of City Planning (DCP) developed population forecasts for the five NYC boroughs, while Louis Berger developed forecasts for the remaining 26 counties. As such, this geographic distinction will be recognized in the subsequent discussion within this document so as to highlight any material differences in methodological approach and results. Table 8 provides a detailed breakdown of population projections at the individual county level.

TABLE 8: TOTAL POPULATION FORECAST, 2010–2050

	1990	2010	2020	2030	2040	2050	1990-2010			2010-2050		
							Difference		CAGR	Difference		CAGR
FORECAST REGION	20,087,940	22,282,010	23,021,904	24,035,904	25,179,090	26,205,750	2,194,070	10.92%	0.52%	3,923,740	17.61%	0.41%
Bronx County	1,265,771	1,385,108	1,446,788	1,518,998	1,579,245	1,619,344	119,337	9.43%	0.45%	234,236	16.91%	0.39%
Kings County	2,389,150	2,552,911	2,648,452	2,754,009	2,840,525	2,898,080	163,761	6.85%	0.33%	345,169	13.52%	0.32%
New York County	1,541,446	1,585,873	1,638,282	1,676,720	1,691,617	1,701,598	44,427	2.88%	0.14%	115,725	7.30%	0.18%
Queens County	1,992,003	2,250,002	2,330,295	2,373,551	2,412,649	2,438,647	257,999	12.95%	0.61%	188,645	8.38%	0.20%
Richmond County	378,977	468,730	487,155	497,749	501,109	503,351	89,753	23.68%	1.07%	34,621	7.39%	0.18%
New York City Total	7,567,347	8,242,624	8,550,972	8,821,027	9,025,145	9,161,020	675,277	8.92%	0.43%	918,396	11.14%	0.26%
Nassau County	1,287,348	1,339,532	1,355,496	1,423,052	1,530,074	1,627,374	52,184	4.05%	0.20%	287,842	21.49%	0.49%
Suffolk County	1,321,864	1,493,350	1,513,038	1,587,892	1,665,742	1,731,185	171,486	12.97%	0.61%	237,835	15.93%	0.37%
Long Island Total	2,609,212	2,832,882	2,868,534	3,010,943	3,195,816	3,358,559	223,670	8.57%	0.41%	525,677	18.56%	0.43%
Dutchess County	259,462	297,488	304,729	320,840	337,270	351,790	38,026	14.66%	0.69%	54,302	18.25%	0.42%
Orange County	307,647	372,813	398,517	442,618	493,501	545,140	65,166	21.18%	0.97%	172,327	46.22%	0.95%
Putnam County	83,941	99,710	100,499	103,703	108,281	111,425	15,769	18.79%	0.86%	11,715	11.75%	0.28%
Rockland County	265,475	311,687	327,825	351,090	380,097	409,244	46,212	17.41%	0.81%	97,557	31.30%	0.68%
Sullivan County	69,277	77,547	78,031	81,811	86,639	91,596	8,270	11.94%	0.57%	14,049	18.12%	0.42%
Ulster County	165,304	182,493	187,082	192,973	196,231	197,651	17,189	10.40%	0.50%	15,158	8.31%	0.20%
Westchester County	874,866	949,113	978,138	1,031,391	1,109,678	1,190,128	74,247	8.49%	0.41%	241,015	25.39%	0.57%
Mid-Hudson Total	2,025,972	2,290,851	2,374,821	2,524,425	2,711,696	2,896,974	264,879	13.07%	0.62%	606,123	26.46%	0.59%
Bergen County	825,380	905,116	936,513	970,411	1,011,159	1,053,154	79,736	9.66%	0.46%	148,038	16.36%	0.38%
Essex County	778,206	783,969	801,211	838,992	885,615	938,104	5,763	0.74%	0.04%	154,135	19.66%	0.45%
Hudson County	553,099	634,266	678,229	725,532	784,871	845,787	81,167	14.67%	0.69%	211,521	33.35%	0.72%
Hunterdon County	107,776	127,351	128,043	129,636	133,892	136,100	19,575	18.16%	0.84%	8,749	6.87%	0.17%
Mercer County	325,824	367,511	381,601	412,144	448,857	484,790	41,687	12.79%	0.60%	117,279	31.91%	0.69%
Middlesex County	671,780	809,858	845,251	886,904	942,881	993,675	138,078	20.55%	0.94%	183,817	22.70%	0.51%
Monmouth County	553,124	630,380	635,267	645,133	662,606	678,320	77,256	13.97%	0.66%	47,940	7.60%	0.18%
Morris County	421,353	492,276	510,334	520,708	527,355	531,824	70,923	16.83%	0.78%	39,548	8.03%	0.19%
Ocean County	433,203	576,567	603,675	656,592	727,411	785,549	143,364	33.09%	1.44%	208,982	36.25%	0.78%
Passaic County	453,060	501,226	515,359	545,994	584,980	630,541	48,166	10.63%	0.51%	129,315	25.80%	0.58%
Somerset County	240,279	323,444	334,507	344,461	359,896	376,033	83,165	34.61%	1.50%	52,589	16.26%	0.38%
Sussex County	130,943	149,265	151,005	152,028	156,225	158,637	18,322	13.99%	0.66%	9,372	6.28%	0.15%
Union County	493,819	536,499	557,963	590,331	633,168	675,650	42,680	8.64%	0.42%	139,151	25.94%	0.58%
Warren County	91,607	108,692	110,760	113,764	117,200	118,669	17,085	18.65%	0.86%	9,977	9.18%	0.22%
New Jersey Total	6,079,453	6,946,420	7,189,718	7,532,631	7,976,116	8,406,830	866,967	14.26%	0.67%	1,460,410	21.02%	0.48%
Fairfield County	827,645	916,829	948,901	995,809	1,060,727	1,123,422	89,184	10.78%	0.51%	206,593	22.53%	0.51%
Litchfield County	174,092	189,927	191,032	194,590	197,942	199,140	15,835	9.10%	0.44%	9,213	4.85%	0.12%
New Haven County	804,219	862,477	897,926	956,479	1,011,647	1,059,804	58,258	7.24%	0.35%	197,327	22.88%	0.52%
Connecticut Total	1,805,956	1,969,233	2,037,859	2,146,877	2,270,317	2,382,367	163,277	9.04%	0.43%	413,134	20.98%	0.48%

5.1 Forecast Results – New York City

New York City is projected to grow from 8.24 million persons in 2010 to 9.16 million in 2050, an increase of 918,000 or 11.1 percent. In 2010-2020, the first decade of the projection, New York City's population is projected to increase by 3.7 percent, but growth is expected to slow to 3.2 percent in the following decade, with the population reaching 8.82 million in 2030. Between 2030 and 2040, the City's population is projected to grow 2.3 percent, to 9.03 million, and 1.5 percent in the following decade, reaching 9.16 million in 2050 (Table 9).

TABLE 9: NEW YORK CITY POPULATION CHANGE, 2010–2050

	2010-2020		2020-2030		2030-2040		2040-2050		2010-2050	
	Number	Percent	Number	Percent	Number	Percent	Number	Percent	Number	Percent
New York City	308,347	3.7	270,056	3.2	204,118	2.3	135,875	1.5	918,396	11.1
Bronx	61,680	4.5	72,210	5.0	60,247	4.0	40,099	2.5	234,236	16.9
Brooklyn	95,541	3.7	105,557	4.0	86,516	3.1	57,555	2.0	345,169	13.5
Manhattan	52,408	3.3	38,439	2.3	14,897	0.9	9,981	0.6	115,725	7.3
Queens	80,293	3.6	43,256	1.9	39,098	1.6	25,998	1.1	188,645	8.4
Staten Island	18,425	3.9	10,594	2.2	3,360	0.7	2,242	0.4	34,621	7.4

The population forecasts of the five New York City boroughs rely on a cohort component model that is also informed by an independent land use evaluation process briefly described later in this document. While the results show an overall increase in the city's population of 11.1 percent between 2010 and 2050, growth will be highest in the Bronx (16.9 percent) and Brooklyn (13.5 percent). The other boroughs are projected to grow 8.4 percent in Queens and about seven percent each in Manhattan and Staten Island. In general, the city's population grows over time, though at a decreasing rate. The higher growth rates in the Bronx and Brooklyn are sustained through 2030, after which they begin to decrease. For Queens, Manhattan and Staten Island, growth is less rapid after 2020.

5.2 Forecast Results – 26-County Region

Table 8 generally shows that the projected population growth rates between 2010-2050 will be slightly lower than those observed between the 1990-2010 time period for a number of reasons that vary on an individual county basis (aging populations, land use constraints, etc). Due to limitations on data availability, land use and development capacity constraints were primarily addressed through qualitative feedback and input obtained from members of the FWG during the forecast development process. Possible transportation capacity constraints were not considered in the development of the forecasts, for if such constraints were an input to the process, they forecasts would then mask any further transportation capacity needs by lowering the forecast values. This effect would “blind” the planning process and render it unresponsive to potential future regional needs.

Several counties such as Nassau, Westchester and Hudson that contribute almost 50 percent of outside commuters into NYC are projected to maintain or exceed the 1990-2010 CAGR over the forecast horizon, due to the same NYC land use issues and resulting commuter led growth previously described. As will be described in the subsequent detailed methodology section (5.3.3), the labor induced migration adjustment allocates economic migrants that would otherwise settle in New York City to the surrounding counties.

The Mid-Hudson subregion as a whole is projected to grow at a rate very similar to that observed over the 1990-2010 time frame; however this trend is driven largely by the increase in the rate of growth in Westchester County that is the largest in the subregion. Excluding Westchester County, the remaining Mid-Hudson subregion counties are projected to experience noticeable reductions in annual average growth rates over the forecast horizon with the exception of Orange and Rockland, which have noticeably higher fertility rates.

New Jersey is forecast to have similar general reductions in population growth rates over time with the notable exception of Essex County. Although Essex County has previously shown declines in population dating back to 1970, recent trends observed in U.S. Census population estimates show a remarkable

turnaround within the last eight years that is projected to continue into the future. The very high growth rates recently experienced by Ocean County in New Jersey – due to high fertility rates, and migration particularly of seniors and retirees – are expected to slow down significantly due to land use restrictions (described later in Section 5.3.3); the lower 0.78 percent annual rate growth is still projected to hold as the highest within the subregion.

The Connecticut subregion is projected to grow at a slightly higher rate than the 1990-2010 time period, largely due to increases in the New Haven that were informed by the commutation outlook, as well as input from relevant FWG members and stakeholders.

5.3 Overview of Population Methodology

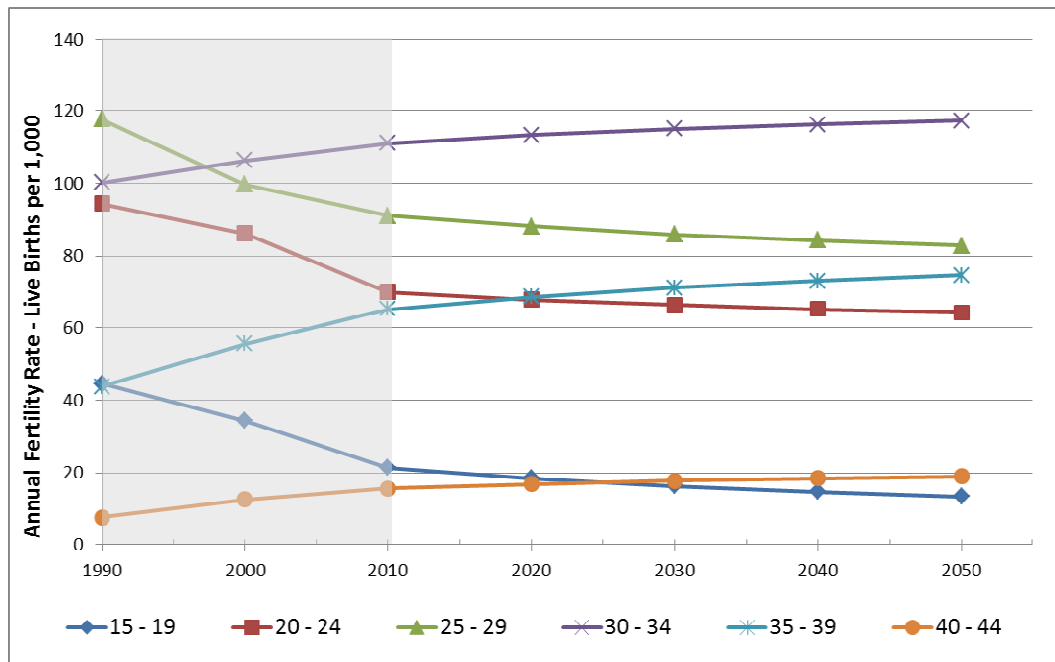
As indicated in Section 2.0, the population forecasts were primarily generated using a disaggregate cohort component (CC) approach. The CC model is based on the premise that the population can be broken down into two main components; natural increase comprising births and deaths added and subtracted respectively from a base population reference, and migration that is either added or subtracted depending on whether there is net positive or negative in- and out- migration. The CC approach can be simply represented as follows:

$$\text{Projected Population (P}_1\text{)} = \text{Base Population (P}_0\text{)} + \text{Births} - \text{Deaths} + \text{Net Migration}$$

Age-specific fertility rates (ASFR) are applied to the female population in the child bearing age cohorts to generate an estimate of births during each five year interval of the 2050 projection horizon. Similarly, age-specific survival rates are also applied to each age cohort to generate estimates of the survived population in each successive five year time increment. The estimated volume of net migration (the balance of in and out migration) is added to the survived population based on historically observed age specific patterns of migration.

5.3.1 Fertility Rates

The ASFRs used to estimate the number of births in each time interval are calculated by taking the historical ratio of live births reported by females within a given age cohort, divided by the corresponding total population of females in households within that age cohort. Figure 25 presents the estimated ASFRs for the 31-County Region between 1990 and 2010 (shaded region).

FIGURE 25: 31-COUNTY REGION HISTORICAL AGE-SPECIFIC FERTILITY RATES (1990–2010)

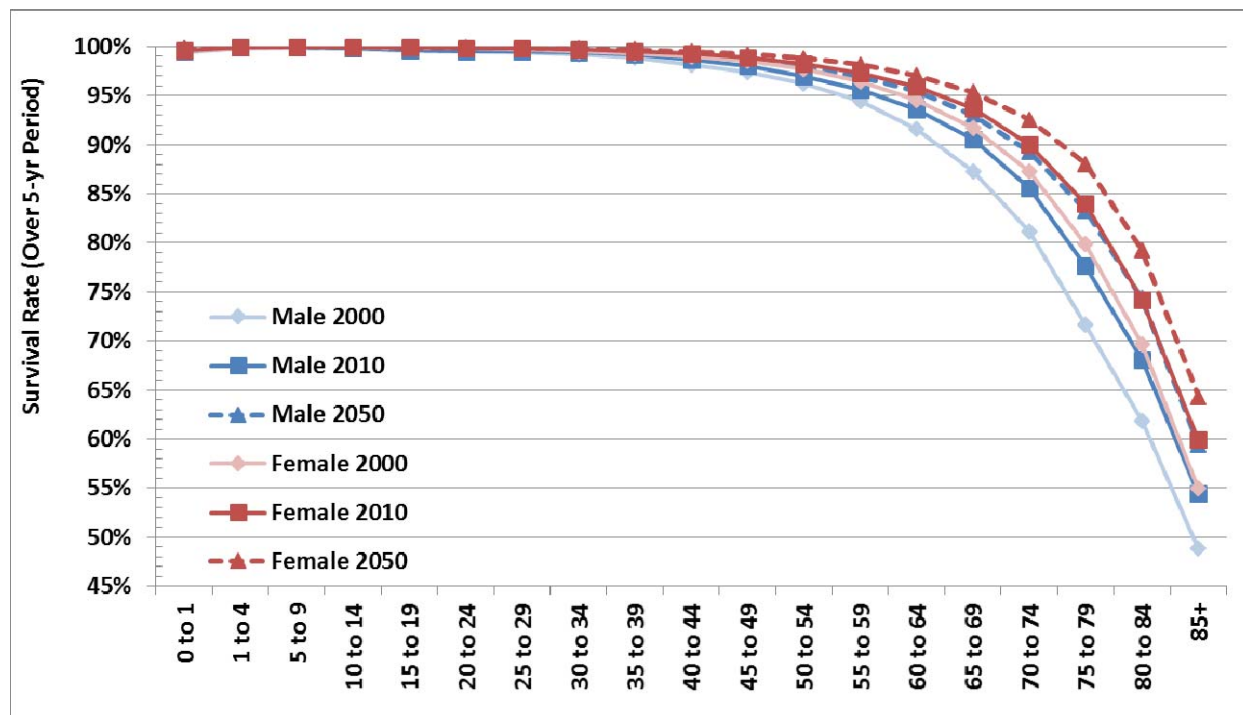
Although there is substantial variance across the individual counties within the region, there is a clear pattern of declining fertility rates for women below the age of 30, and increasing rates for women 30 and above, as discussed earlier in Section 3, Key Trends. Despite the relative clarity of the recent 1990-2010 trends, there is a great deal of uncertainty regarding the long term trend of ASFRs, especially when viewed through the lens of a longer history of fertility rates at the national level. Future ASFRs were estimated using logarithmic trend projections that maintained some of the general drift of the recent trends as shown in Figure 25.

Tests were conducted using both the logarithmically-projected ASFRs as well as holding rates constant at the 2010 levels. Due to the offsetting directionality of the ASFRs above and below the 30 year threshold, these sensitivity tests resulted in minimal changes to overall forecasts of less than 0.5 percent in the 2050 projections. Average constant rates centered on 2008-2010 ASFRs were ultimately applied to the NYC region, while logarithmically projected rates were applied to the rest of the 26 counties with the exception of Rockland (NY), Orange (NY) and Ocean (NJ) where constant 2010 rates were held in recognition of already high total fertility rates recorded in those counties.

5.3.2 Survival Rates

Figure 26 presents the survival rates calculated for the 31-County Region. The age-specific survival rates (probability of surviving) from one age cohort to the next are calculated using age-specific death rates (ASDR).

FIGURE 26: 31-COUNTY REGION SURVIVAL RATES



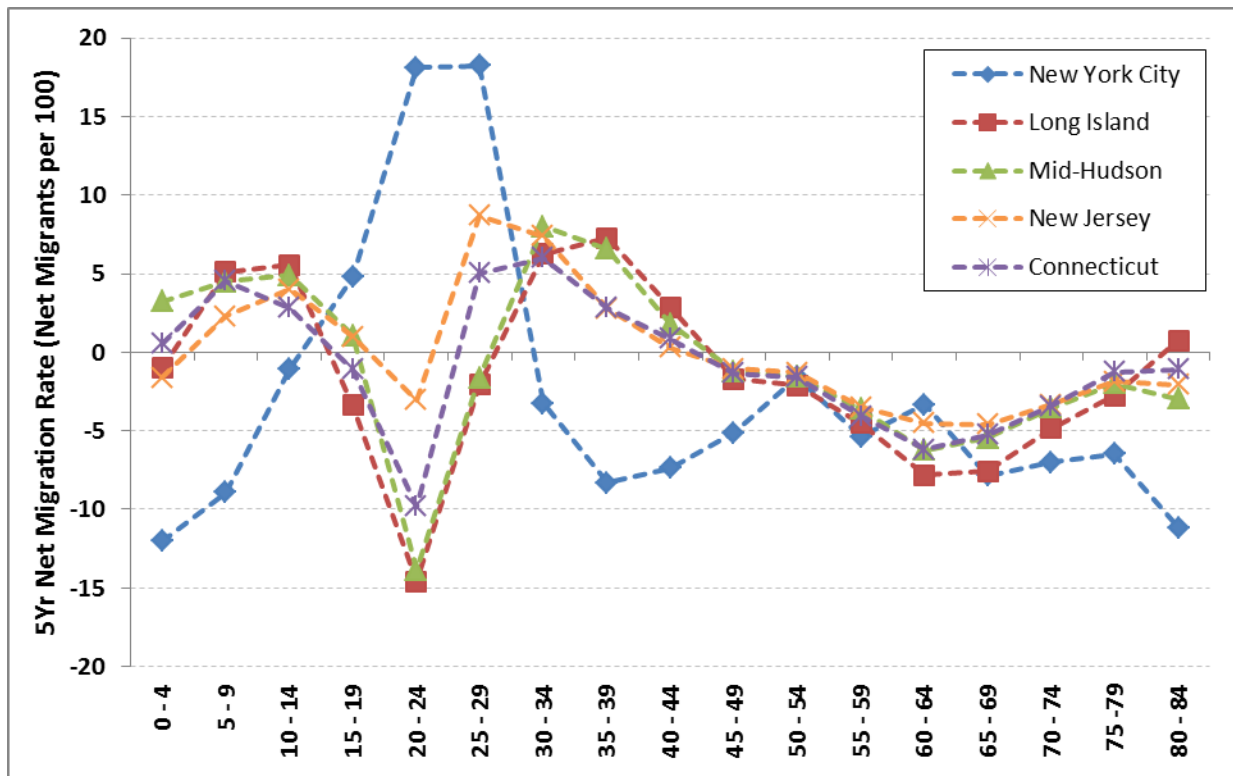
ASDRs represent the proportion of a particular age group that experiences death in a particular period, and are simply the ratio of the number of deaths observed in an age cohort divided by the total corresponding population. ASDRs were used to generate life tables that calculated survival rates by age. These rates represent the percentage of persons who are likely to survive to the next five-year time point. Survival rates applied in the future were developed based on projected changes implied by the Social Security Administration life tables.

5.3.3 Migration Rates

The age-specific rates of net migration were estimated from historical data with the “known” population from at least two time periods. The natural increase from an initial known population was calculated by accounting for the number of births and deaths during the specified time interval to the second known population. For example, some number of 45-49 year olds in 2000 will survive to ages 55-59 in 2010. This expected population of 55-59 year olds was then compared to the observed or actual population of 55-59 year olds in the 2010 census; the difference or residual is considered net migration. Age-specific rates of were calculated by dividing the net migration residual by the corresponding population in households at the beginning of the evaluation period.

County-specific fertility and survival rates from the 1990-2010 history were used to derive five-year net migration rate profiles for all 31 counties. Figure 27 provides a comparison of the average migration rate profiles developed for the five subregions over the 1990-2010 time period. Further adjustments to the migration rates were made for both the NYC and 26-county region in response to various factors.

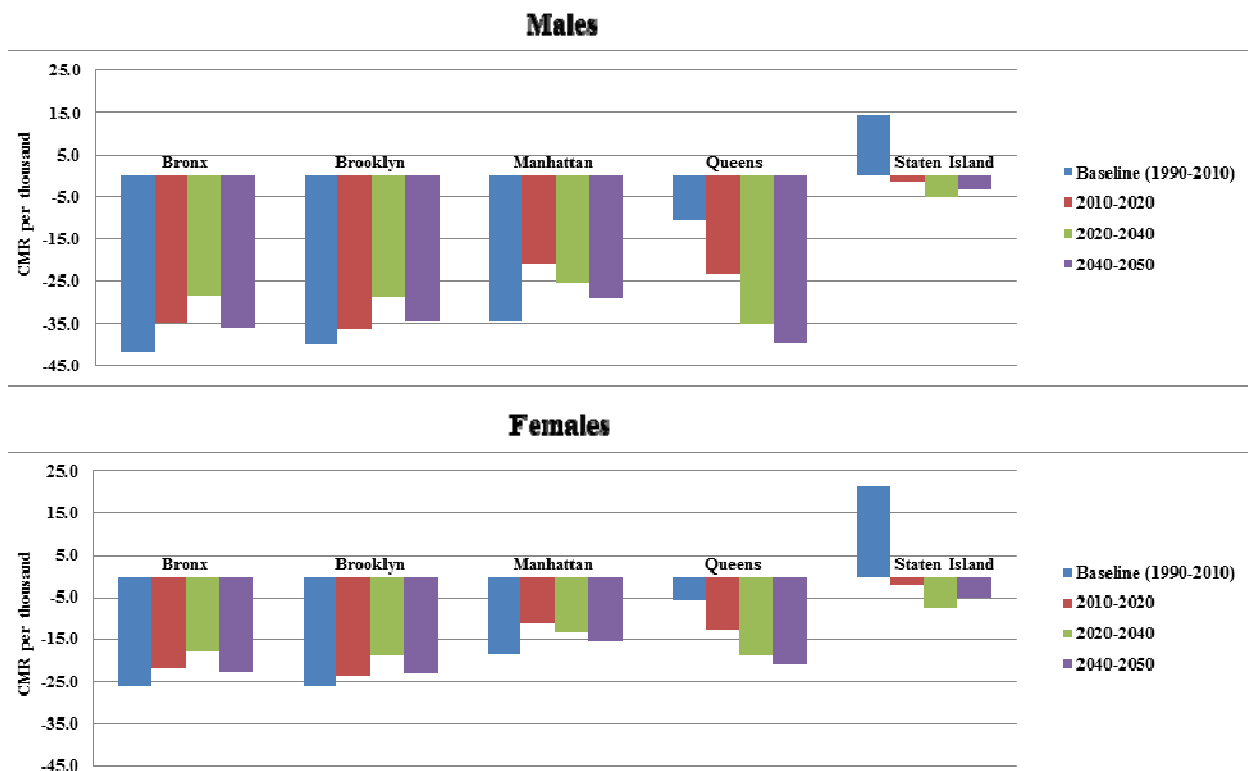
FIGURE 27: SUBREGIONAL NET MIGRATION RATES (1990–2010)



New York City: After evaluating the projects in the land use analysis and the number of housing units expected, baseline crude migration rates (CMRs) estimated from an evaluation of regional population change between 1990-2010 were adjusted for three periods (2010-2020, 2020-2040, and 2040-2050) to ensure that the projected population could be accommodated given the prospective housing potential in each borough.

In the Bronx and Brooklyn, given their greater capacity to accommodate growth, CMRs were adjusted to reduce outmigration losses for 2010-2020 and 2020-2040, after which net outflows were increased, as increased population growth could no longer be accommodated. In Manhattan, losses through migration were attenuated between 2010 and 2020, and increased thereafter to 2050. Due to reduced capacity of Queens to accommodate growth given existing land uses, its CMRs reflect greater migration losses, compared to its baseline rate. Staten Island actually reverses course, from a positive baseline CMR, to a slightly negative rate for 2010-2020, which stays negative to 2050 (Figure 28).

FIGURE 28: NEW YORK CITY CRUDE MIGRATION RATES (CMR)



26-County Region: As indicated in Section 2.0 of this document, labor induced migration adjustments were made to account for the imbalances between labor supply and labor demand. Labor demand implied by the employment model forecasts was reconciled with labor supply estimates generated from the conversion of preliminary population forecasts (initially accounting only for residual migration rates) into labor force estimates.

The assessment of labor imbalances and resulting flows into and out of the region was limited to those industries likely to affect migration patterns – that is to say that the local serving industries (e.g. restaurants, food and accommodation, other personal services) were held out from the calculation of labor induced migration. Given that the entire forecasting process viewed the 31-County Region as a functional labor market, the reconciliation and balancing process was conducted at the 31-County level and the resulting labor induced migrants allocated down to the individual counties according to each county’s proportional contribution towards total labor demand, with considerations made to account for existing commuting patterns across the region.

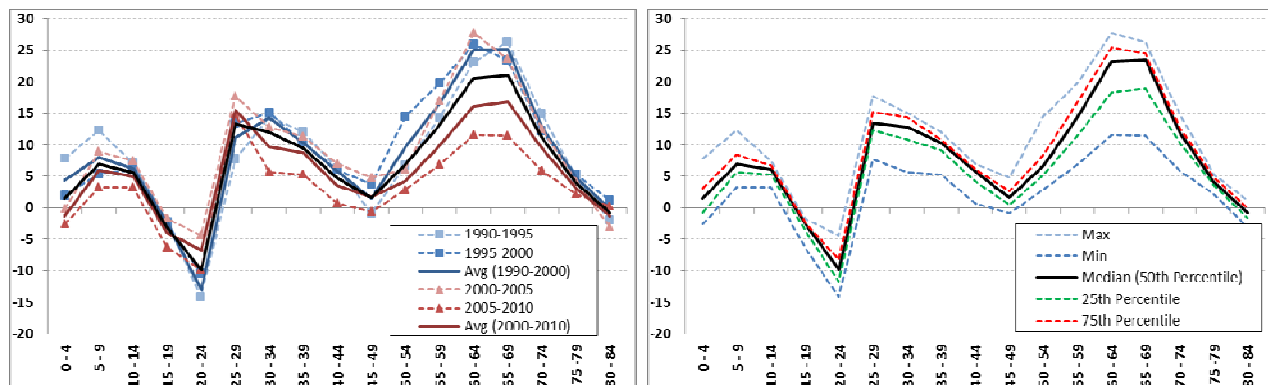
The labor balancing calculation was limited to those workers in the age cohorts spanning ages 20-64. The resulting migration of the young dependent population was made on based on dependency ratios observed within the existing resident population.

The final part of the labor induced migration calculation was an explicit accounting of land use constraints – particularly in New York City, where a rigorous evaluation of housing capacity has been conducted. Economic migrants that could not be accommodated within New York City were allocated to the surrounding commuting shed in proportion to commuting patterns currently observed.

Based on the resulting population projections implied by the sum of natural increase, the historical rates of migration and labor induced migration adjustments, a final alteration was made to the applied historical rate of migration. The adjustment was made to account for future conditions highlighted by members of the FWG that may not be addressed by projecting historical averages into the future. Additional adjustments included county-level adjustments in New Jersey that were made within the subregion control totals based on certain environmental and land use constraints. These include consideration of Pinelands regulations and land use controls as well as the Highlands regulations.

By using a historical period of analysis of 1990-2010 to derive patterns of net migration, an envelope of seven potential outcomes was developed as demonstrated by the Ocean County example in Figure 29. The median (50th percentile) that was set as the initial default residual rate of migration for all counties was therefore subsequently adjusted as required to address the various concerns and local planner knowledge communicated by the FWG members. The residual rates together with the labor induced migration adjustments combined to define a total level of migration. It should be noted that Ocean County's high migration rate for older cohorts, and in particular seniors, is slightly atypical of other counties in the region which more closely follow the earlier pattern (see Figure 17).

FIGURE 29: AGE-SPECIFIC MIGRATION RATE PROFILE ENVELOPE EXAMPLE IN OCEAN COUNTY, NJ



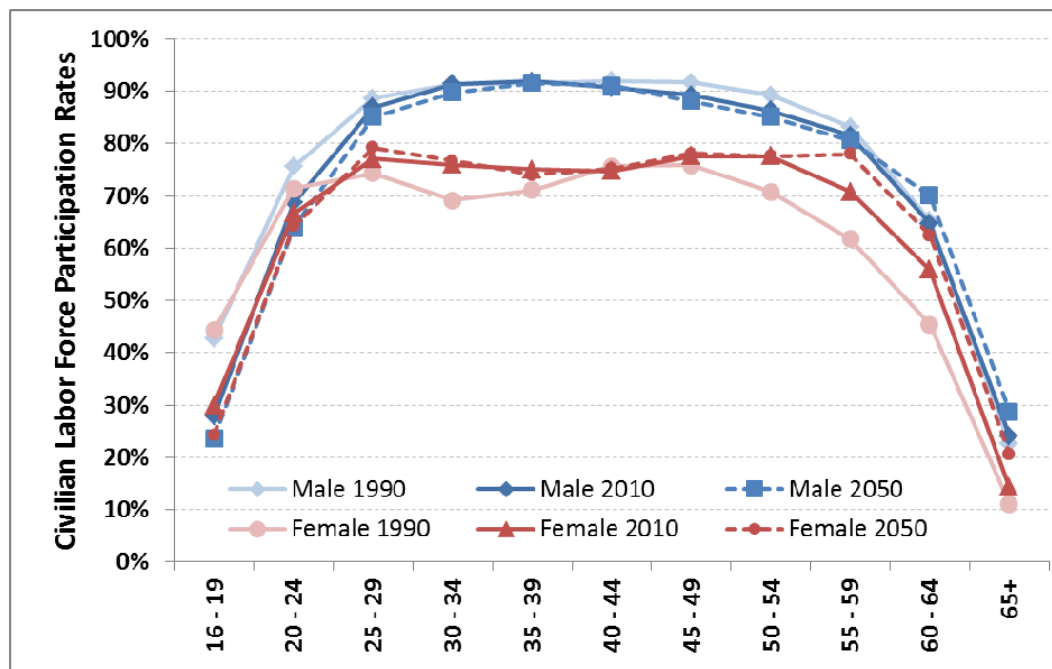
6.0 LABOR FORCE FORECASTS

Although the labor force model is an input to the population forecast, the final labor force projections are ultimately defined by the population forecasts. The Population Model generates county-level forecasts of population distinguished by age and gender. These population volumes are converted into labor force estimates by applying age/sex-specific civilian labor force participation rates derived from historical Public Use Microdata Sample (PUMS) data and forecasted into the future based on BLS as projections of national changes in age specific labor force participation rates. Figure 30 provides a depiction of the age-specific rates calculated for the 31-County Region. Table 10 presents the resulting forecast of labor force for all 31 counties based on the application of county-specific labor force participation rates. Growth is forecasted to be particularly strong in the Mid-Hudson region, driven by Orange, Rockland and Westchester counties.

TABLE 10: LABOR FORCE FORECASTS (2010–2050)

	2010	2020	2030	2040	2050	2010-2050		
						Difference		CAGR
FORECAST REGION	11,568,295	11,758,530	12,202,507	12,780,802	13,413,002	1,844,707	15.95%	0.37%
Bronx County	617,531	639,568	675,426	703,985	724,966	107,435	17.40%	0.40%
Kings County	1,236,176	1,268,601	1,331,047	1,383,097	1,399,489	163,313	13.21%	0.31%
New York County	921,966	939,387	968,735	985,267	991,260	69,294	7.52%	0.18%
Queens County	1,185,673	1,192,232	1,223,477	1,243,348	1,255,855	70,181	5.92%	0.14%
Richmond County	217,944	223,729	227,229	229,374	232,854	14,910	6.84%	0.17%
New York City Total	4,179,290	4,263,518	4,425,914	4,545,072	4,604,423	425,133	10.17%	0.24%
Nassau County	688,439	695,232	718,706	778,805	845,318	156,879	22.79%	0.51%
Suffolk County	784,674	777,227	792,891	830,276	877,474	92,800	11.83%	0.28%
Long Island Total	1,473,113	1,472,459	1,511,596	1,609,080	1,722,792	249,679	16.95%	0.39%
Dutchess County	155,789	162,101	163,052	171,058	182,767	26,977	17.32%	0.40%
Orange County	182,275	191,630	209,539	233,791	263,005	80,730	44.29%	0.92%
Putnam County	54,348	53,857	52,946	54,746	57,711	3,363	6.19%	0.15%
Rockland County	150,999	159,769	170,920	187,159	203,814	52,815	34.98%	0.75%
Sullivan County	39,099	38,618	40,268	42,892	45,530	6,431	16.45%	0.38%
Ulster County	94,826	94,852	94,418	96,177	98,608	3,782	3.99%	0.10%
Westchester County	497,887	501,871	528,333	567,671	618,046	120,159	24.13%	0.54%
Mid-Hudson Total	1,175,224	1,202,698	1,259,477	1,353,492	1,469,481	294,257	25.04%	0.56%
Bergen County	480,575	487,509	505,381	522,213	551,797	71,222	14.82%	0.35%
Essex County	400,430	410,232	430,353	452,600	481,733	81,303	20.30%	0.46%
Hudson County	360,289	366,115	395,707	430,422	460,872	100,583	27.92%	0.62%
Hunterdon County	69,840	75,029	72,630	73,626	77,217	7,378	10.56%	0.25%
Mercer County	195,951	194,390	209,043	227,716	248,754	52,802	26.95%	0.60%
Middlesex County	433,695	430,921	449,317	475,571	505,619	71,924	16.58%	0.38%
Monmouth County	333,624	337,687	330,274	337,918	351,740	18,116	5.43%	0.13%
Morris County	268,515	276,782	280,503	279,715	286,628	18,112	6.75%	0.16%
Ocean County	271,103	268,668	289,713	322,590	352,621	81,518	30.07%	0.66%
Passaic County	250,474	255,961	270,304	289,759	316,292	65,818	26.28%	0.58%
Somerset County	180,098	182,114	184,249	189,650	202,386	22,288	12.38%	0.29%
Sussex County	82,916	84,600	78,616	80,099	83,213	296	0.36%	0.01%
Union County	290,559	297,556	315,242	337,510	363,239	72,680	25.01%	0.56%
Warren County	58,848	59,523	59,422	60,198	62,202	3,354	5.70%	0.14%
New Jersey Total	3,676,918	3,727,085	3,870,753	4,079,586	4,344,313	667,396	18.15%	0.42%
Fairfield County	485,934	509,824	531,583	563,152	605,329	119,395	24.57%	0.55%
Litchfield County	106,195	110,609	106,406	106,976	110,958	4,762	4.48%	0.11%
New Haven County	471,620	472,336	496,778	523,444	555,705	84,085	17.83%	0.41%
Connecticut Total	1,063,750	1,092,770	1,134,767	1,193,572	1,271,993	208,243	19.58%	0.45%

FIGURE 30: 31-COUNTY REGION LABOR FORCE PARTICIPATION RATES



7.0 HOUSEHOLD FORECASTS

Household forecasts are crucial to understanding demand for new housing units and how well the current stock can handle projected growth. The forecasts are also largely defined by the population forecast. The estimate of households was developed by applying age-specific headship rates observed historically to the corresponding projected population in households. Figure 31 shows a comparison of the headship rates by subregion. The resulting estimate of households derived by applying these rates to population projections is presented in Table 11.

Due to the land use/housing component population forecasting approach applied to NYC, the number of households in NYC was estimated by dividing the projected population in households by a set average household size. Based on a review of historical household size data within the 31-County Region (Figure 32), the observed shares of one, two, three, four, five, six and seven plus households in New York City has remained virtually unchanged since 1990. The New York City Population Model approach of setting the average household size at fixed rate and applying that rate to projected household population levels is therefore justified.

FIGURE 31: 31-COUNTY FORECAST REGION HEADSHIP RATES BY AGE AND SUBREGION

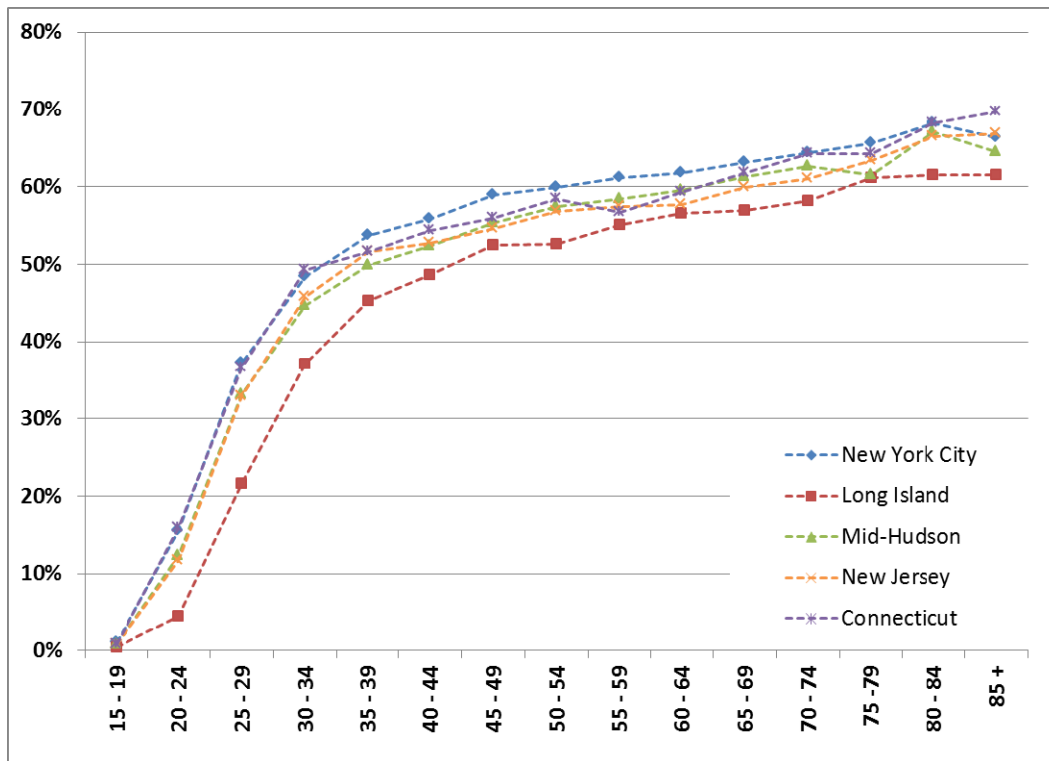


FIGURE 32: 31-COUNTY REGION HOUSEHOLD SIZE

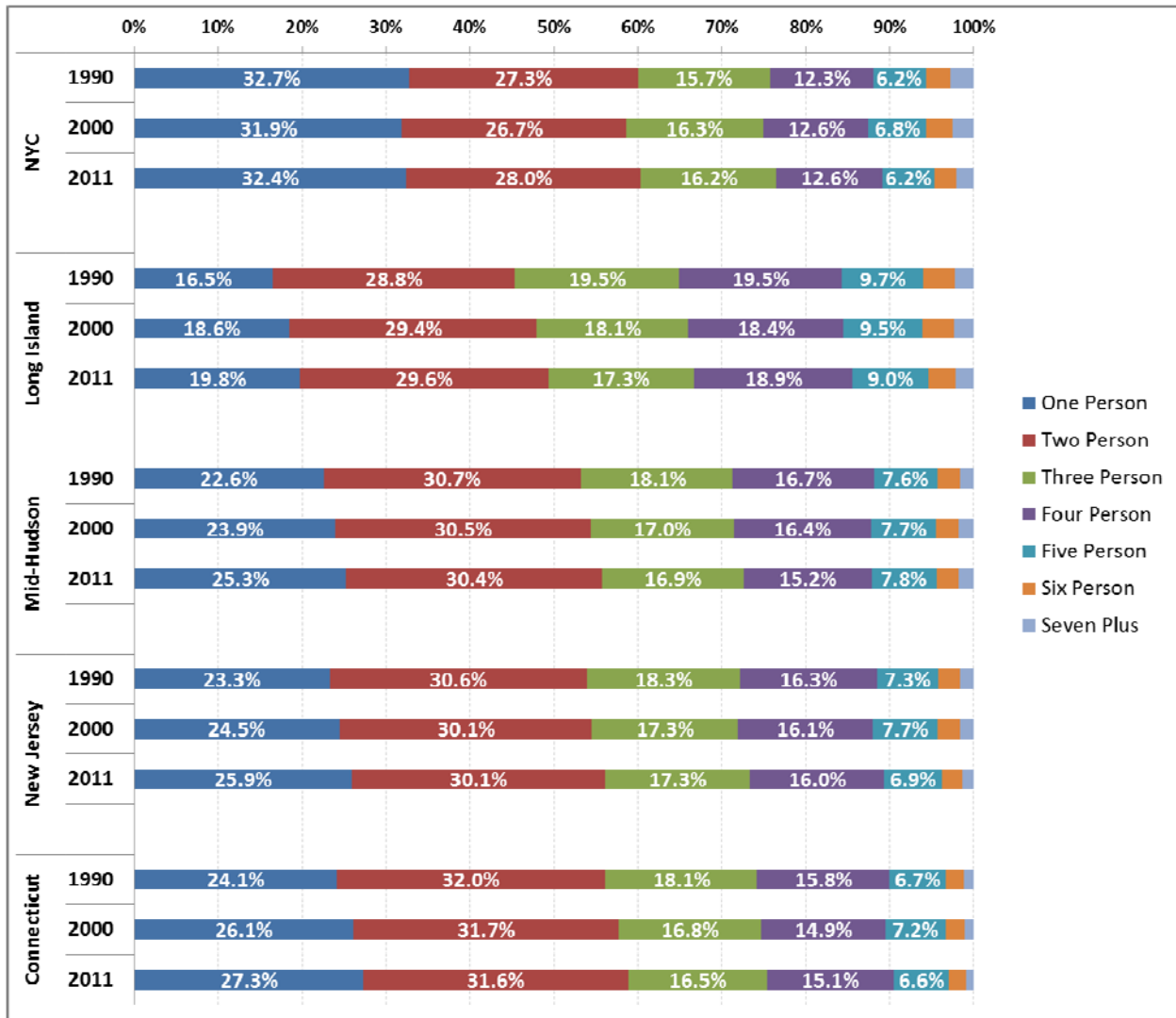


TABLE 11: HOUSEHOLD FORECASTS (2010–2050)

	2010	2020	2030	2040	2050	2010-2050		
						Difference		CAGR
FORECAST REGION	8,178,733	8,362,118	9,024,973	9,430,557	9,800,202	1,621,469	19.83%	0.45%
Bronx County	483,449	505,729	531,812	553,574	568,058	84,609	17.50%	0.40%
Kings County	934,946	953,492	1,009,636	1,041,768	1,063,145	128,199	13.71%	0.32%
New York County	763,846	776,333	809,544	817,038	822,059	58,213	7.62%	0.18%
Queens County	787,335	801,326	831,113	844,966	854,178	66,844	8.49%	0.20%
Richmond County	165,516	168,974	175,937	177,144	177,949	12,433	7.51%	0.18%
New York City Total	3,135,092	3,194,634	3,358,042	3,434,491	3,485,390	350,298	11.17%	0.27%
Nassau County	448,528	450,931	482,441	511,886	541,829	93,301	20.80%	0.47%
Suffolk County	499,922	508,487	560,510	588,168	612,077	112,155	22.43%	0.51%
Long Island Total	948,450	959,418	1,042,951	1,100,054	1,153,906	205,456	21.66%	0.49%
Dutchess County	107,965	112,123	124,013	129,717	134,452	26,487	24.53%	0.55%
Orange County	125,925	132,783	156,776	174,450	191,614	65,689	52.17%	1.06%
Putnam County	35,041	36,186	39,111	40,289	41,080	6,039	17.24%	0.40%
Rockland County	99,242	103,959	113,270	121,925	130,892	31,650	31.89%	0.69%
Sullivan County	30,139	31,069	34,045	36,231	38,313	8,174	27.12%	0.60%
Ulster County	71,049	74,098	81,184	83,096	83,804	12,755	17.95%	0.41%
Westchester County	347,232	356,766	386,163	411,423	438,277	91,045	26.22%	0.58%
Mid-Hudson Total	816,593	846,984	934,562	997,131	1,058,434	241,841	29.62%	0.65%
Bergen County	335,730	339,860	364,940	375,917	389,078	53,348	15.89%	0.37%
Essex County	283,712	289,757	317,134	335,761	355,508	71,796	25.31%	0.57%
Hudson County	246,437	259,460	289,731	317,032	344,953	98,516	39.98%	0.84%
Hunterdon County	47,169	48,489	51,821	52,722	53,142	5,973	12.66%	0.30%
Mercer County	133,155	133,401	150,619	163,141	176,177	43,022	32.31%	0.70%
Middlesex County	281,186	284,658	312,684	333,200	350,407	69,221	24.62%	0.55%
Monmouth County	233,983	238,584	256,009	262,238	267,928	33,945	14.51%	0.34%
Morris County	180,534	186,604	201,578	203,040	205,043	24,509	13.58%	0.32%
Ocean County	221,111	225,056	254,431	282,784	303,300	82,189	37.17%	0.79%
Passaic County	166,785	170,877	187,674	201,022	218,186	51,401	30.82%	0.67%
Somerset County	117,759	118,200	129,499	134,632	140,474	22,715	19.29%	0.44%
Sussex County	54,752	56,688	59,830	61,624	62,648	7,896	14.42%	0.34%
Union County	188,118	189,424	206,126	220,062	233,939	45,821	24.36%	0.55%
Warren County	41,480	42,989	46,875	48,541	49,300	7,820	18.85%	0.43%
New Jersey Total	2,531,911	2,584,045	2,828,953	2,991,717	3,150,082	618,171	24.42%	0.55%
Fairfield County	335,545	348,204	378,542	400,214	423,423	87,878	26.19%	0.58%
Litchfield County	76,640	80,885	87,181	88,741	89,367	12,727	16.61%	0.38%
New Haven County	334,502	347,947	394,742	418,210	439,601	105,099	31.42%	0.69%
Connecticut Total	746,687	777,037	860,465	907,165	952,391	205,704	27.55%	0.61%

8.0 APPENDIX

8.1 North American Industry Classification System (NAICS) Listing

- **Agriculture (NAICS Code 11):** establishments primarily engaged in growing crops, raising animals, harvesting timber, and harvesting fish and other animals from a farm, ranch, or their natural habitats.
- **Mining (NAICS Code 21):** establishments that extract naturally occurring mineral materials such as coal and ores, crude petroleum, and natural gas.
- **Utilities (NAICS Code 22):** public or private establishments engaged in the provision of electric power, natural gas, steam supply, water supply, and sewage removal.
- **Construction (NAICS Code 23):** establishments primarily engaged in the construction of buildings or engineering projects (e.g., highways and utility systems)
- **Manufacturing (NAICS Code 31-33):** establishments engaged in the mechanical, physical, or chemical transformation of materials, substances, or components into new products or components.
- **Wholesale Trade (NAICS Code 42):** establishments engaged in the intermediate distribution of merchandise, typically being organized to sell to other businesses, operating from a warehouse, and having little or no display of merchandise.
- **Retail Trade (NAICS Code 44-45):** establishments engaged in retailing – the final step in the distribution of merchandise; retailers are typically organized to sell merchandise in small quantities to the general public.
- **Transportation & Warehousing (NAICS Code 48-49):** private establishments providing air, rail, water, road, or pipeline transportation services of passengers and cargo; warehousing and storage of goods (not engaged in wholesale or retail activity)
- **Information (NAICS Code 51):** establishments engaged in publishing (including software publishing), motion picture and sound recording, broadcasting (including internet broadcasting), telecommunications, and web hosting.
- **Finance & Insurance (NAICS Code 52):** establishments engaged in transactions involving the creation, liquidation, or change in ownership of financial assets, or in facilitating of such transactions.
- **Real Estate, Rental & Leasing (NAICS Code 53):** establishments primarily engaged in the renting or leasing of tangible or intangible assets, including real estate.
- **Professional, Scientific & Technical (NAICS Code 54):** establishments engaged in legal, advice, accounting, bookkeeping, and payroll services; architectural, engineering, and specialized design services; computer services; consulting services; research services; advertising services; photographic services; translation and interpretation services; and veterinary services.
- **Management of Companies & Enterprises (NAICS Code 55):** establishments owning a controlling interest or influencing management decisions, or that administer, oversee, and manage other establishments.

- ***Administrative, Support, Waste Management (NAICS Code 56)***: establishments performing office administration, hiring and placing of personnel, document preparation and similar clerical services, solicitation, collection, security and surveillance services, cleaning, and waste disposal.
- ***Educational Services (NAICS Code 61)***: private or nonprofit establishments that provide instruction and training in a wide variety of subjects in facilities such as schools, colleges, universities, and training centers.
- ***Health Care & Social Assistance (NAICS Code 62)***: private or nonprofit establishments providing health care and/or social assistance for individuals.
- ***Arts, Entertainment & Recreation (NAICS Code 71)***: establishments that operate facilities or provide services to meet varied cultural, entertainment, and recreational interests of their patrons.
- ***Accommodation & Food Services (NAICS Code 72)***: establishments providing customers with lodging and/or preparing meals, snacks, and beverages for immediate consumption.
- ***Other Services (NAICS Code 81)***: establishments engaged in equipment and machinery repairing, promoting or administering religious activities, grant-making, advocacy, and providing dry-cleaning and laundry services, personal care services, death care services, pet care services, photofinishing services, temporary parking services, and dating services.
- ***Government (NAICS Code 92)***: establishments of federal, state, and local government agencies that administer, oversee, and manage public programs. This sector includes government-operated establishments in other sectors such as schools and universities (61), hospitals (62) postal services (48-49), and utilities (22).

8.2 Public Comments and Responses

		Commenter			
No.	Topic Area	Name	Organization	Comment	Response
1	Raw Data		RPA	We ask that the following be made available. Data underlying the charts and tables in both the white paper and webinar presentation that will allow us to understand the difference between industry employment and population fertility, mortality and migration under different assumptions. These include the national forecasts that drove the employment model, the county level industry projections by Global Insight and Moody's, other shift share analyses performed by the consultant team, and the adjustments made following input from the forecast working group. 1990-2010 growth rates and migration trends (the period that has been reviewed for historical trends)	Our license agreements with Moodys and Global Insight prevent us from publishing their raw forecasts in full detail without modification. However, each third-party forecast went through a process of benchmarking, where they were indexed to a historical benchmark series (which uses ACS in addition to QCEW). This process will be described in full detail in the forthcoming technical document (Modeling Methodology, T.M 3.1 and Forecast Results T.M 4.1), and the resulting indexed series can be included in an appendix there. These indexed series form the raw inputs of the forecast averaging process used to derive the final forecast for each county/industry
2	Raw Data		RPA	We request the initial national and county level industry employment projection levels, shift share analysis inputs and outputs, and adjustments made by the Forecasting Working Group (FWG) as described in sections 4.4.2 and 4.4.3 of the December 17, 2014 Draft Socioeconomic & Demographic Forecasts Report.	
3	Raw Data		RPA	The unconstrained migration rates, resulting population changes from the cohort-component model after adjustments for land use and housing constraints and other considerations made by the FWG, and more detailed information on the constraints described in section 5.3.3.	Changes in baseline migration rates resulting from land use considerations is part of Task 4 of the NYTMC SED Report and is currently being reviewed. The description of output at each step of the population projections process is essential to understanding changes in the migration rates; so, we do not want to provide any rates without the context provided by the Task 4 discussion.
4	Raw Data		RPA	Data sources for fertility and mortality rates, and whether rates are held constant or projected to change in the future. If projected, more detailed information about the calculations and other data sources used to project these future survival and fertility rates would be helpful.	Fertility and mortality rate assumptions will be provided in upcoming technical memoranda on methodology and forecast results. These memoranda will describe details regarding the methodology used to project both rates into the future
5	Raw Data		RPA	Where available, information on land use capacity constraints that reduced the potential growth (we understand that this information will be quantitative for New York City but more qualitative in nature for the remainder of the region).	Qualitative assessments of the land use constraints from the counties outside NYC will be included in the documentation. NYC will not provide details on specific constraints due to the sensitive nature of the information, but rather provide a detailed description of their methodology.
6	Results		RPA	What factors are driving growth in employment and population? Does growth follow past trends, and if not, what changes are expected in the future? How do the projections compare with projections developed by others, and what accounts for any differences?	On the population side, trends in fertility, survival rates and migration are significant drivers of the projections, supplemented with local knowledge of potential land use constraints and opportunities that push the forecasts in either a more aggressive or more moderate direction. A cap on NYC, due to land use constraints, adds additional labor induced migrants to the counties surrounding NYC in proportion to the current commuting trends. Employment growth is driven by a combination of national and regional trends. These factors are explained in detail in the technical memorandum.
7	Methodology		RPA	What accounts for the differences between these projections and NYMTC's prior adopted county forecasts for 2040?	Differences in the projected economic conditions now and when the 2040 projections were developed are probably the largest driver of differences between the two forecasts

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		Commenter			
No.	Topic Area	Name	Organization	Comment	Response
8	Results		RPA	In what areas of each geography is growth expected to occur? We are aware that the TAZ-level projections will not be available for several months, but would like to be understand the areas or types of locations that the forecast team judged to have the best combination of capacity and assets that will drive demand. For example, how much growth is anticipated for city, town, and village centers versus suburban locations in each sub-region or county? What assumptions are being made about growth in the region's larger cities, such as Newark or Bridgeport? Please indicate whether zoning would have to change in order to accommodate the projected growth, and if redevelopment of existing uses is anticipated.	This will be detailed in the TAZ methodology and results and information cannot be disseminated at this time.
9	Assumptions		RPA	Overall level of growth: While the projected growth of 2.4 million jobs and 3.9 million people is substantial and consistent with historic growth rates, both recent trends, current housing prices and the third party forecasts indicate that the demand for stronger growth exists. Have we fully explored how both market forces and governments might respond to this demand?	The Project Team worked to develop a forecast that reflects both the impacts of the model inputs (e.g. third party employment forecasts, and rates of fertility, survival and migration), as well as the feedback of the Forecast Working Group regarding the plausibility of resulting outputs with respect to land use constraints and zoning considerations affecting the forecast. Increases in people who telecommute, more intensive use of existing office space, and the possible conversion of underutilized industrial space to office space specifically in New York City, are all factors that could potentially affect employment levels in a substantial way; however, discussions within the Project team and with the Forecasting Working Group failed to provide a good basis for estimating these impacts. To address potential uncertainty regarding either these inputs, the Project Team is developing a set of high and low forecast scenarios to test alternative input assumptions. The forecasting methodology, however, does not explicitly take technological change into account except to the degree that these considerations are reflected in the third party employment forecasts. Demographic/cultural considerations are also not explicitly accounted for except to the degree that these effects are embedded in recent trends (e.g. fertility and survival rates) used to define future assumptions. It is true that, with some exceptions, New York City has been much more growth-oriented in its policies relative to other parts of the region. However, it may be premature to conclude that the inner ring suburbs will be able to maintain their "resistance to growth," given the demographic imbalances that are projected to see the continued outmigration of young persons, as those aged 65 and over swell. Therefore, while the obstacles to change in policies in the inner ring counties are substantial, over the course of the coming decades it is reasonable to assume that the demographic realities will be brought to bear on attitudes toward immigration, housing development, and other forces that effect change.
10	Results		RPA	Future game changers: How might technological, demographic and cultural trends change demand and locational preferences? Many of these appear to be pushing toward more growth in urban areas that does not appear to be fully reflected in the forecast.	
11	Results		RPA	We also have strong reservations about the relative rates of population and employment growth in New York City and the inner ring counties. We believe that these underestimate both the ability of New York City to respond to increased demand and the challenges of accommodating increased growth in smaller cities and inner ring suburbs. It is certainly true that development will become increasingly difficult to accommodate within the five boroughs as population grows and more land is redeveloped. It is also true the projects like East Side Access and planned development in places such as Jersey City or White Plains are likely to expand population in close-in cities and suburbs. However, resistance to growth is more difficult to overcome in mature suburbs than in New York City, which has pursued more aggressive growth policies for decades. Smaller cities such as Newark and Yonkers often pursue more growth oriented policies, but often lack the capacity for overcoming the financial and regulatory hurdles. Thus, while the potential exists for inner ring cities and suburbs to absorb more demand generated by New York City, it is likely to require a greater change in local policies than it would to create new development capacity within the five boroughs.	
12	Results		RPA	Distribution that appears to deviate from historic or expected trends: Several of the county level forecasts seem to require further thought and/or explanation. Even with East Side Access, will Nassau County really grown faster than Suffolk that has more development opportunities and other transportation and TOD investments and plans? Will many inner suburban counties that are forecast for stronger growth be able to overcome local resistance to new development, and will the outer counties slow as much as predicted?	

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		Commenter			
No.	Topic Area	Name	Organization	Comment	Response
13	Assumptions		RPA	The forecasts do not appear to fully take into account recent and future demographic and technological changes, including the changing location preferences of younger generations and growing professional and technical service sectors that are making urban areas more attractive relative to suburban locations.	Changes in the balance of migrants to the cities and suburbs have been evident over the last 10 years, with increases in the number of young domestic in-migrants to New York City from the rest of the nation. One possible reason for this has to do with employment opportunities, which have been good in NYC relative to the rest of the nation. This increasing affinity for cities has been factored into our analysis because it affects net migration by age, which in-turn is used for the base migration rates. It is important to note that the age structure of migration or the relative rates by age are maintained in our model; that is we change the overall crude migration rates but keep the relative picture of rates by age the same. Be they native- or foreign-born, rates of migration are highest in the for persons in their late teens and twenties.
14	Assumptions		RPA	Are capacity constraints to the transportation system being considered in calculating how many jobs in NYC can be filled by non-NYC residents? Will information be available about commutes by non-NYC bound commuters, especially reverse commuters to suburban counties from New York City?	Capacity constraints to the transportation system are not an explicit input into the model. An output of the model is the implied journey to work shares for the forecast horizon. This output is not a forecast of commuting, but rather a simple estimate of the implied JTW flows resulting from the both projected population growth and forecasted employment initially based on the 2006-2010 ACS JTW shares.
15	Methodology		RPA	Why has New York City chosen to project households assuming a constant household size instead of estimating the number of households using headship rates, as is being done for the rest of the region?	Average household size will remain constant at 2010 Census levels because of the lack of stability that will be introduced when attempting to alter the average household size for future years. Increases in immigration may portend increases in household size, while an increase in the number of non-family households with heads under the age of 65 may portend a drop in household size going forward. It is a valid approach to use current person per household counts obtained from the most recent census, in light of the fact that data to update average household size on a regular basis does not have enough precision to be useful at the local level.
16	Results		RPA	Will additional information be available about the profile of households in all counties, including the age, gender, and ethnicity of the head of household?	The household calculation in the model is limited to only providing an estimate on the number of households based on the age profile of the population and corresponding age-specific household formation rates.
17	Raw Data		RPA	We request the unemployment, multiple job holding and journey-to-work data and assumptions used in the labor market calibrations described in section 4.4.4.	These will be included in Modeling Methodology (T.M 3.1) and Forecast Results (T.M 4.1)
18	Results		RPA	We request the population and household head projections by age and gender by county.	The population by age, gender and county will be made available in the technical documentation. Headship rates were calculated for male and female in aggregate, as the Project Team was tasked with projecting the total number of households.
19	Assumptions		RPA	We question the assumption that employment will grow at approximately the same rate in Manhattan as in the other New York City boroughs. For at least three decades, employment has grown much faster in the other boroughs than in Manhattan for a number of reasons that can be expected to continue, such as the growth of health, education and other population-related employment, the growth of employment centers such as downtown Brooklyn and the Queens airports, and the potential of other centers such as Long Island City, Jamaica and the Bronx hub.	Given the importance of commuting in this analysis, the Project Team and FWG thought it prudent to apply the same relative level of growth to Manhattan as for the other boroughs. We really don't know what the relative change will look like for the five boroughs going forward and the past is not necessarily a good indicator of the future. While it is true that there are areas of opportunity in the boroughs outside of Manhattan, quantitatively altering their relative shares going forward is quite another matter, given the complex interaction of factors that affect employment levels. For example, despite the increasing importance of health services outside Manhattan, the education associated with jobs and losses in other sectors can affect the supply and demand for labor and upend assumptions about the relative changes among the boroughs. Moreover, although there are factors that favor growth outside Manhattan, there are also factors that favor it within Manhattan, including increases in office-based employment, expansion of tourism, and the growth of major educational and medical institutions. On the whole, we are reluctant to pick "winners" from among the boroughs.

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		Commenter			
No.	Topic Area	Name	Organization	Comment	Response
20	Assumptions		LI Index	What fundamental changes are assumed on Long Island? Does the analysis assume that Long Island implements more progressive land use policies, becomes more accepting of multifamily housing, or implements unfunded transit infrastructure like the Third Track?	On Long Island, trends in fertility, mortality and migration are similar to those that drive population growth using the cohort component approach for the region as a whole. Land use constraints in New York City restricting more aggressive population growth resulted in the neighboring counties in the City's commuting shed absorbing much of labor induced migration to the 31-County Region; that is workers who move to the New York area for work, but cannot be accommodated by the constrained housing market in New York City, and are pushed to the neighboring counties. It is assumed that Nassau County, with anticipated TOD projects and East Side Access coming online, will absorb a significant proportion of this spillover. Input from Nassau representatives in the Forecast Working Group further indicated a slowing of population growth rate in later years, following the impacts of ESA. Forecasts for growth in Suffolk County were mildly moderated due to feedback from Suffolk representatives in the FWG, indicating land use constraints.
21	Results		LI Index	New York City and the 31-County NYMTC Region are anticipated to grow at similar rates over the next 15 years (2015 to 2030) as they did over the previous 15 years (5% for New York City, and 6% for the region from 2000 to 2015). However, Nassau County is projected to grow approximately five times faster in the next fifteen years than the previous fifteen years (1% compared to 5%). It would be helpful to have an understanding of the factors driving Nassau's increase, which is particularly large in the context of the other geographies.	Land use constraints in New York City restricting more aggressive population growth resulted in the neighboring counties in the City's commuting shed absorbing much of labor induced migration to the 31-County Region; that is workers who move to the New York area for work, but cannot be accommodated by the constrained housing market in New York City, and are pushed to the neighboring counties. It is assumed that Nassau County, with anticipated TOD projects and East Side Access coming online, will absorb a significant proportion of this spillover.
22	Methodology		LI Index	The new employment projections appear to use a substantially different methodology for defining workers compared to the previous NYMTC projections. The 2050 projections for Long Island are approximately 20-25% lower than the 2040 NYMTC projections in any given year. What changed in the definition of workers?	The main difference was that the consultant for the 2040 forecasts benchmarked 31-county employment to BEA REIS data, which has a substantial upward bias in the self-employment series. The current forecasting effort benchmarks self-employment to the American Community Survey.
23	Results		NJTPA	Morris has performed their own analysis of population and they believe the forecasts are too low in the interim years from 2020-3035. They have been seeing a lot of building permit activity which would indicate greater growth in these years. It is important to note that our numbers do not have to match their numbers exactly. For example, the Morris number for 2050 is about 530K while our forecasts are 528K. This is close enough (we can keep our 2050 number). They are just looking for our numbers to be a few thousand off from their numbers (the numbers should be in the same ballpark).	Necessary adjustments will be made to the final county forecast drafts
24	Methodology		NJTPA	The original census population data was incorrect for Hunterdon (West Amwell specifically). The census originally placed the Mercer County Correction center in Hunterdon but it should be in Mercer County (Hopewell). This impacts 998 of group quarters population (Hunterdon should be lower and Mercer should be higher). Households should not be impacted.	Necessary adjustments will be made to the final county forecast drafts
25	Results		NJTPA	The only other comment I have received so far from the counties is that Bergen thinks the growth in employment from 2015-2020 should be decreased from about 17k to about 13-15k. This is due to anticipated slower growth in the American Dream complex. The growth in employment would be delayed until the 2020-2025 time period.	Necessary adjustments will be made to the final county forecast drafts

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		Commenter			
No.	Topic Area	Name	Organization	Comment	Response
26	Methodology		MTA	One thing that would be useful (and I'm hoping is already part of what the Forecast consultants are doing as part of a more detailed methodology report) would be a precise description (possibly accompanied by relevant spreadsheets) of how each of the historic/benchmark numbers were arrived at. For some numbers, such as decennial Census population figures, this might just be a citation of the source. For others (such as Total Employment), that may be developed using calculations based on several sources, this should also include documentation of the calculations done. This would serve at least two purposes: 1) Establishing credibility of the numbers, by allowing any interested person to verify how the historic numbers were arrived at; and 2) allow for future assessment of whether future actual numbers, when they become available (say, for 2015) are at or above or below the forecast.	The methodology document (Modeling Methodology, T.M 3.1 and Forecast Results T.M 4.1) will contain an extensive discussion of the benchmarking process, including (1) a review of all available estimates of county payroll employment, precise definitions for each source, and their perceived accuracy (or biases, if applicable), (2) a technical discussion of how the benchmark series were arrived at, including step-by-step derivation and tables with intermediate results, and (3) a full reconciliation of the final results, showing that via the JTW estimates, the benchmark series properly balances place-of-residence estimates of labor force participation, unemployment, and multiple job-holding rates.
27	Other	Jack McGreevy		The five-town Peconic Bay region on Long Island has become a major tourist destination – “light-rail” is needed!	While the comment is outside of the framework of the development of the 2050 SED forecasts, it will be considered as an input in the transportation planning process.