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The Economic and Demographic Outlook for Michigan Through 2050

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Introduction

Since the early 1990s, the University of Michigan has produced seven sets of long-term economic and demographic forecasts (1994, 1998, 2003, 2008, 2012, 2017, and 2022) for the Michigan Department of Transportation (MDOT), the Metropolitan Planning Organizations (MPOs), and the State Regional Planning Organizations. In this report, we summarize the methods used and the broad results for the most recent outlook, produced in 2022.[1]

We developed a set of forecasts for the state as a whole and for each of Michigan's counties. The individual county-level results can be summed to form a forecast for any region. The last year of historical data in the model used to produce the forecasts is 2019, while the forecast period runs through 2050.[2] Forecasts are provided for each year through 2025 and in five-year intervals from 2025 through 2050; they include population, employment, the labor force participation rate, personal income, households, and Gross Domestic Product for each county and for the state. The forecasts were developed using a

[1] Portions of this report draw from previous versions.
[2] The historical data reflects the values that were initially released by the government agency and do not incorporate subsequent data revisions.

version of the REMI TranSight model (REMI, 2021), together with a methodology for developing household forecasts designed by the University of Michigan in cooperation with MDOT.

The forecasts are quite detailed. Some features of the forecasts are as follows:

- The population forecasts are subdivided into eleven age cohorts for both males and females.
- Population change is divided into its major components: natural change (difference between births and deaths), net domestic migration (differentiated between those aged 65 or more and those aged 64 or less), and net international migration.
- The employment forecasts are based on the Bureau of Economic Analysis (BEA) series and are broken out into seventy-one divisions, consistent with the North American Industrial Classification System (NAICS) for defining industry categories. The forecasts include a detailed breakout of manufacturing industries to accommodate MDOT's truck and commodity modeling activities.
- Personal income is partitioned into eight major subcategories plus total personal taxes and disposable income.
- Total output (sales) is categorized into seventy industries (state and local government activity is combined into one industry).
- Gross Domestic Product is distributed among four final demand categories.
- The labor force participation rate is calculated for thirteen age categories.
- The household forecasts cover the number of households as well as the population in households and group quarters. They included projections of the distribution of households by size of household, age of household head, category of income, number of vehicles, with/without children status, and with or without persons 65 or older status.

The statewide and individual county-level forecasts can be requested from the Bureau of Transportation Planning at MDOT. Because of the density of these forecasts, in number of regions, number of years, and number of indicators per region, it is not possible to present the detailed results in

this summary report. Instead, we summarize here the general process and trends that characterize these forecasts, with a primary focus on the state.

In the next section, we discuss our use of models to generate the forecasts for the counties. Following that, we look at the future path of the national economy and population. We then present our economic and demographic forecasts for Michigan, followed by a summary county breakout of these forecasts. We close with a brief concluding section.

Method

The Economic/Demographic Model

The forecasts, except for the household forecasts, were developed using an economic/demographic model constructed by Regional Economic Models, Inc. (REMI) of Amherst, Massachusetts (REMI, 2021), and adapted by the research team at the University of Michigan. The REMI model has been fully documented and peer-reviewed in the professional literature and is one of the most widely applied regional economic forecasting and policy analysis tools in the nation. We have been using evolving versions of the REMI model since 1983 to assess projects for several state government agencies in Michigan.

This study's near-term economic forecasts for the nation and state are guided by our own internally produced forecasts, which are also used by the Michigan Department of Treasury, House Fiscal Agency, and Senate Fiscal Agency (RSQE, 2022). Where possible, we updated economic and demographic information for 2020 and 2021 in the REMI model. We also made numerous adjustments to the model based on both our expertise and the comments and insights of several local MPOs and regional planning organizations. Specifically, because no model can incorporate all local knowledge about a regional economy, we generated a preliminary set of forecasts and solicited input from these local organizations. Their comments guided several of the adjustments that contributed to the final set of forecasts summarized in this report.

The REMI model used in this study is a multi-region model that includes all of Michigan's eighty-three counties. An economic model was chosen to produce the forecasts for a number of reasons:

- A model imposes a logical consistency and objectivity across counties.

- Its success patterns can be replicated and forecast errors can be systematically analyzed and corrections introduced.
- The forecasts can be comprehensive in coverage.
- The forecasts can be generated frequently.
- The model can capture the interactions between demographic and economic forces.
- Sophisticated models can capture trade flows among regions, and thus a county's responsiveness to activities outside of the county.
- A model does not assume that trends continue indefinitely; unlike extrapolation techniques, a model allows the economy to adjust over time.

Among economic models, the REMI model was selected because of several of its features and credentials:

- It is a state-of-the-art model that has been extensively peer-reviewed in the professional literature.
- It has been field-tested for over thirty-five years.
- The model is sufficiently comprehensive to incorporate both an economic and a demographic module that interact.
- The model accounts for trade flows among counties.
- It is a detailed model that captures the dynamic interactions among economic sectors.
- It is used by other government agencies in Michigan.

The Household Model

The REMI model does not generate household forecasts. Thus, our research team at the University of Michigan, in cooperation with MDOT, developed an interface model to produce such forecasts. The interface model uses data from the 2019 American Community Survey five-year PUMS and a program to apportion households by age category (i.e., the age of the household head) at the county level.

The changing age structure of the population is what drives all of the household forecasts. If, for example, we know from Census data that a particular county contained 4,000 people aged 45 to 54 in a particular year, with 1,500 households headed by someone in that age group, then the

household/population ratio for this age group is 0.375 (1,500/4,000). These 1,500 households are then allocated to the other household categories included in the forecast (income, household size, number of motor vehicles available, presence or absence of children) based on the distribution from the PUMS data. All of these ratios are held constant over the forecast period. The variable that moves the forecast forward is the population in each age category, which changes over time. The resulting apportionment contains seven categories for age, five for household size, three for income, four for vehicle availability, two for presence or absence of children, and two for the presence or absence of persons aged 65 or more, for a total of 1,680 potential cells for each county.[3]

U.S. Demographic and Economic Forecast

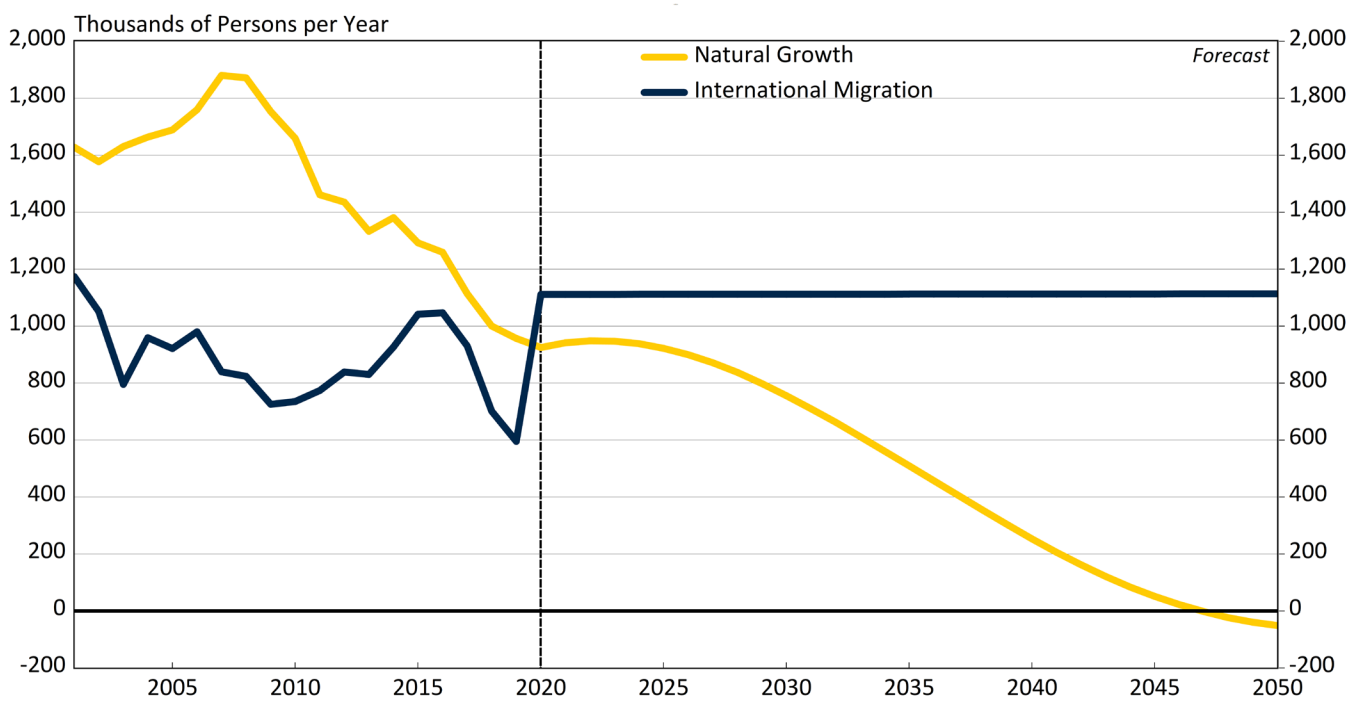
The structure of the models, with its embedded mapping of the dynamic movements of the economy and underlying response rates, is a key determinant of the forecast results presented in this study. The other key element influencing the local forecast is the series of assumptions that serve as inputs to the model. Even if we accurately capture the workings of the economy, it is also the case that all forecasts are conditional on the assumptions that guide the results. In the case of regional forecasts, many or most of the inputs take the form of assumptions involving the future path of the national economy and population. In the REMI model, some of the features of the U.S. forecast are fixed in the program; consequently, in some instances we have made direct adjustments to the local-area forecasts. In the remainder of this section, we review the national demographic and economic outlook.

U.S. Demographic Outlook

First, we consider the demographic profile of the United States, starting with the composition of the change in the country's population. The U.S. population tends to grow each year because of international migration and natural increase (the excess of births over deaths).

[3] The total of 1,680 cells is arrived at as follows: 7 (age) x 5 (household size) x 3 (income) x 4 (number of vehicles available) x 2 (presence or absence of children) x 2 (presence or absence of adults aged 65+) = 1,680.

Figure 1
Components of U.S. Population Change



In 2001, the U.S. population increased by about 2.8 million people, including 1.6 million from natural population growth (4.0 million births exceeding 2.4 million deaths) and about 1.2 million international migrants. Through 2007, the number of births steadily increased to about 4.3 million per year while the number of deaths remained steady at about 2.4 million, thus causing population gains from natural growth to rise to about 1.9 million. The number of international migrants declined to about 800,000 in 2007. After 2007, the number of births slowly declined to about 3.8 million in 2019, while the number of deaths grew to about 2.8 million that year. Consequently, natural population growth slowed to only about 1.0 million in 2019. International migration ranged between 700,000 and 1.0 million in each year between 2008 and 2018, before declining to 600,000 in 2019. The REMI model's forecast, which we adopted, assumed that international migration would rebound to about 1.1 million in 2020 and remain at about that level through 2050. We now know that international migration was much weaker than that forecast in 2020 and 2021, due primarily to the COVID-19 pandemic. The Census Bureau now estimates that there were only 245,000 net international migrants to the United States in 2021 (U.S. Census Bureau, 2022b). Over the longer-run, however, tight labor markets in the United States might encourage more international migration than anticipated. Thus, while our forecast assumption with respect to the number of

international migrants is too high in the short run, we do not expect it to introduce a substantial error into our long-run population forecast for the United States.

We forecast that the U.S. population would increase by about 900,000 people in both 2020 and 2021 due to natural population growth. We now know that the COVID-19 pandemic reduced the number of births and increased the number of deaths nationally in those years. We still do not have data for 2020, but the Census Bureau estimates that in 2021 the natural population increase was only 393,000. We suspect that the lingering effects of the pandemic will cause our forecast of natural population growth in 2022 (948,000) to be too high as well, but that in subsequent years the natural population growth will be consistent with our forecast, which shows a steady decline in natural population growth as the number of births stabilize at about at about 3.9 million per year, while the number of deaths each year steadily grows. By 2047, the number of deaths each year will exceed the number of births and by 2050, the natural change in the U.S. population will be approximately negative 50,000 per year.

Figure 2
U.S. Population by Age Category

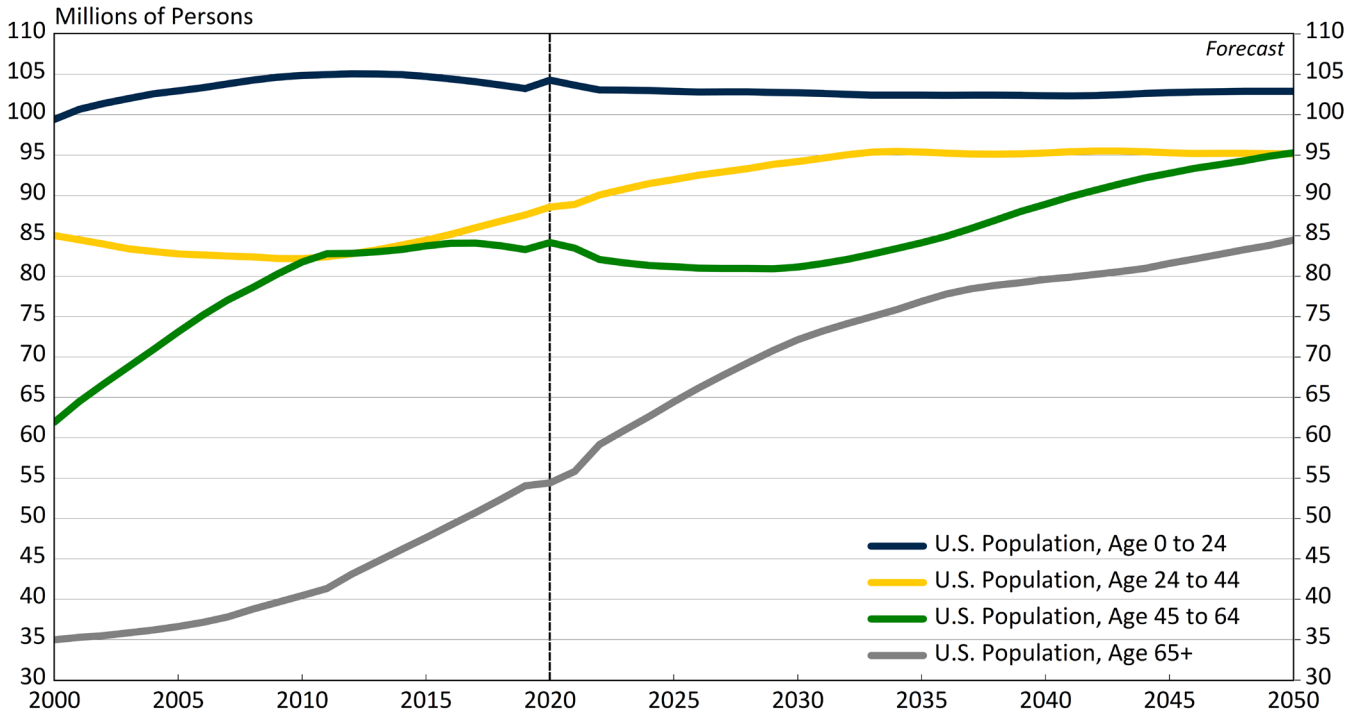


Figure 2 displays the age composition of the U.S. population. Between 2000 and 2010, the population aged 45 to 64 increased from 62 million to 82 million. This age group's share of the population

increased from 22.0 percent to 26.4 percent. Over this period, the population under age 25 increased from 99 million to 105 million, while the population aged 25 to 44 declined from 85 million to 82 million, and the population aged 65 and older grew from 35 million to 41 million. These changes correspond to a 1.4 percentage point decline in the under-25 age group's share of the total, and a 3.6 percentage point decline in the share of the 25- to 44-year-old group. The share of the population that was 65 years or older increased slightly, from 12.4 to 13.1 percent.

The first of the post-World War II babies reached the Social Security Administration's full retirement age in mid-2011. The share of the population aged 65 and older rose to 16.4 percent in 2020, and it is forecast to jump to 22.4 percent in 2050. To put this growth in perspective, in 2021 people aged 65 years and older accounted for 21.1 percent of the population in Florida, a state known for its concentration of retirees. The aging of the last of the baby boomers will reduce the share of those aged 45 to 64 from 25.4 percent in 2020 to 23.2 percent in 2030 before this group's share slowly recovers to 25.2 percent in 2050. The population aged 25 to 44 is expected to slowly increase between 2020 and 2034, at which point it will flatten out at about 95 million, or 25.2 percent of the total U.S. population. The U.S. population aged 24 years and younger is forecast to decline slowly over the next 30 years, so that this cohort's share of the population declines from 31.5 percent in 2020 to 27.2 percent in 2050.

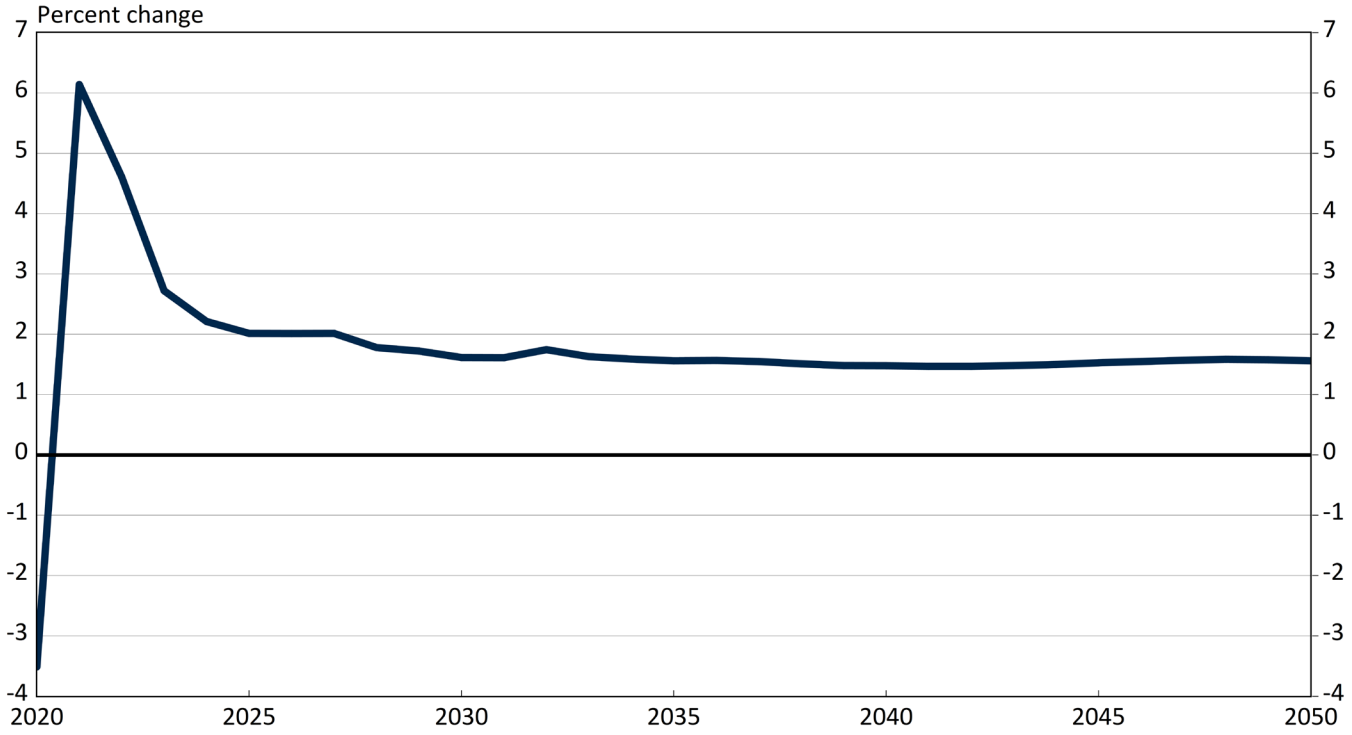
The slowing population growth in the United States, combined with the aging of the population, will cause a substantial slowdown in the growth in the nation's potential workforce over the next 30 years.

U.S. Economic Outlook

The most comprehensive measure of output for the U.S. economy is inflation-adjusted (real) Gross Domestic Product (GDP), that is, the value of all goods, services, and structures newly produced in the United States. Figure 3 displays our forecast of the year-to-year change in real GDP between 2020 and 2050. When we prepared this forecast last fall, we expected real GDP to grow by 6.1 percent in 2021 as the economy rebounded from the COVID-19 pandemic and recession; growth for the year is now reported at 5.7 percent. While we expected GDP growth to slow in 2022, our forecast from last fall for growth of 4.6 percent now looks too optimistic. In our most recent U.S. economic outlook from May 2022, we projected growth of 2.9 percent for 2022. We anticipate that real GDP growth will slow significantly after

2022. We are forecasting real GDP will grow by 1.7 percent per year on average from 2023 to 2050, with the fastest growth occurring in 2023.

Figure 3
Annual Growth of U.S. Real GDP



GDP growth can be expressed as the sum of growth in the number of jobs and growth in GDP per job. Because of the demographic trends described above, employment growth is forecast to slow from an average of 1.1 percent per year between 2007 and 2019 to only 0.5 percent per year between 2022 and 2050. Real GDP per job grew by 0.7 percent per year between 2007 and 2019. In our forecast, productivity growth picks up compared to recent history. Real GDP per job is forecast to grow by 1.2 percent per year between 2022 and 2050. If productivity growth does not pick up after 2022, real GDP growth will be even lower than we are forecasting.

Real GDP is the sum of consumer expenditures, private investment including residential construction, government spending excluding transfer payments, and net exports. Net exports are better known as a trade surplus (when positive) or a trade deficit (when negative). When net exports are negative, then the consumption, investment, and government components will sum to more than total GDP. The United States has run a trade deficit in every year since 1976. Furthermore, in general, the

trade deficit has been growing over time. Table 1 shows that in 2021, net exports were -6.0 percent of GDP, allowing the consumption, investment, and government components to sum to 106.0 percent of GDP. We expect that the trade deficit will grow over the next few years, so that net exports reach -6.9 percent of GDP in 2026. Over the longer run, the U.S. trade deficit will shrink as a share of GDP, so that net exports are -5.4 percent of GDP in 2050.

Table 1
Distribution of U.S. GDP

GDP Components	2021	2026	2050
Consumption	70.2%	70.6%	71.0%
Durable Goods	11.4%	11.3%	11.5%
Motor Vehicles & Parts	3.2%	2.8%	2.6%
Other Durable Goods	8.2%	8.6%	8.9%
Non-Durable Goods	17.3%	15.8%	15.9%
Services	42.5%	43.5%	43.6%
Residential Investment	3.6%	3.4%	3.0%
Business Investment	14.8%	16.1%	16.8%
Inventory Change	-0.2%	0.6%	0.6%
Government	17.4%	16.2%	14.0%
Net Exports	-6.6%	-6.9%	-5.4%

Private business investment and consumer spending increase their shares of GDP over the next 30 years, while the shares of GDP accounted for by residential investment spending and government spending shrink. Note that government spending in the GDP accounts does not include transfer payments like Social Security, Medicare, or Medicaid; it counts only direct government activity, such as government employees' wages and salaries, and direct purchases from private-sector business such as the purchase of military equipment. This type of government activity is forecast to shrink from 17.1 percent of GDP in 2021 to 16.2 percent in 2026 and to only 14.0 percent in 2050. Residential investment is forecast to shrink from 3.6 percent of GDP in 2021 to 3.4 percent in 2026 and 3.0 percent in 2050.

Private business investment is expected to grow from 15.0 percent of GDP in 2021 to 16.1 percent in 2026 and 16.8 percent in 2050. Much of this investment will be needed to support new capital spending on electric vehicles and growth in the electric power grid to sustain them. Other spending will go toward new factories as manufacturers re-shore some products that are currently made overseas. Finally,

additional capital spending will be needed to increase domestic worker productivity and to alleviate expected labor shortages.

Consumer expenditures have increased from 64.3 percent of GDP in 1976 to 70.2 percent in 2021. Unless the trade deficit continues to expand as a share of GDP, which we do not expect over the long term, the historical rise in consumer spending's share of GDP must be constrained. We expect that consumer spending will increase modestly going forward, from 70.2 percent of GDP in 2021 to 70.6 percent in 2026, and 71.0 percent in 2050.

Consumer spending on services is forecast to grow from 41.5 percent of GDP in 2021 (when COVID-19 restrained consumer spending on services) to 43.5 percent in 2026 and 43.6 percent in 2050. Given the aging of the population and the increase in spending on medical care services it will entail, we could easily imagine the services share of consumption expenditures increasing even farther. Even the 2.1 percentage point increase we have forecast, however, will entail a reduction in consumer spending on goods from 28.7 percent of GDP in 2021 to 27.4 percent in 2050. Much of this decline reflects a reduction in consumer spending on motor vehicles and parts, from 3.3 percent of GDP in 2021 to 2.6 percent of GDP in 2050. Although that decline may seem large, between 2012 and 2019, consumer spending on motor vehicles and parts averaged 2.7 percent of GDP.

Table 2 displays the historical and forecast distribution of personal income in the United States for select years. The second row shows the share of personal income generated by earnings, which are the sum of wages and salaries, employer-paid benefits, and self-employment/proprietors' income. (Earnings are thus the income received by workers and owners of un-incorporated businesses.) Earnings' share of personal income fell from 76.3 percent in 2000 to 70.8 percent in 2019. The COVID-19 recession sharply and temporarily reduced that share to 67.4 percent in 2020. We are projecting a strong recovery in employment and wages through 2026, causing earnings' share of personal income to increase to 71.1 percent, slightly exceeding the 2019 share. Earnings' share of personal income then declines to only 65.8 percent in 2050.

Table 2
Distribution of U.S. Personal Income

Percent of U.S. Personal Income	2000	2019	2020	2026	2050
Earnings	76.3%	70.8%	67.4%	71.1%	65.8%
Social Insurance taxes	-8.2%	-7.7%	-7.4%	-7.8%	-8.8%
Net Earnings	68.1%	63.1%	59.9%	63.3%	57.0%
Dividend Interest Rent Income	19.3%	19.9%	18.5%	19.2%	20.9%
Personal Current Transfers	12.6%	17.0%	21.6%	17.4%	22.1%
Personal Current Taxes	-14.3%	-12.0%	-11.2%	-12.7%	-15.1%
Disposable Personal Income	85.7%	88.0%	88.8%	87.3%	84.9%

Personal income includes transfer payment income such as Social Security, Medicare, and Medicaid. To avoid double counting, it excludes the social insurance taxes used to help pay for those benefits. Thus, social insurance taxes are shown with a negative value in Table 2. We project that there will be an increase in social insurance taxes sometime after 2030 to help pay for the growing cost of Social Security and Medicare, resulting in social insurance taxes increasing to -8.8 percent of personal income by 2050.

Dividend, interest, and rent income includes payments both directly to individuals and to their pension funds (both defined benefit funds and defined contribution funds). It also includes an imputed rental value of owner-occupied housing. It is important to note that these income statistics do not include any “capital gains” income either received directly by an individual or by a pension fund. It is also important to note that these income statistics count non-social security retirement income when that money is earned, not when an individual receives the money. Thus, employer contributions to retirement accounts are counted as part of employer-paid benefits when those payments are made to retirement funds, and the dividend and interest income earned by the pension funds are counted as that income is collected. Dividend, interest, and rent income has historically accounted for about 19 percent of personal income. We expect that it will gradually increase to 20.9 percent of personal income by 2050.

Transfer payments’ share of personal income grew from 12.6 percent in 2000 to 17.0 percent in 2019. Transfer payment income jumped to 21.6 percent of personal income in 2020 primarily because of

the stimulus checks and expanded unemployment benefits enacted in response to the COVID-19 pandemic and recession. The recession also reduced non-transfer payment income; because of the size of the temporary transfer payments, however, real personal income per capita jumped by 4.9 percent, the largest increase since 1984.

As the economy recovers and the temporary transfer payments end, we are forecasting that transfer payments share of personal income will fall back to 17.4 percent in 2026, before growing to 22.1 percent of personal income in 2050.

Despite the large decline in government's share of GDP shown in Table 1 and the increase in social insurance taxes shown in Table 2, we believe that personal income taxes will increase as a share of personal income. In 2000, personal taxes accounted for 14.3 percent of personal income. A series of tax cuts in the first two decades of this century reduced personal taxes share to 12.0 percent of personal income in 2019. The weak economy and the changing mix of personal income reduced the personal tax liability even further in 2020 to 11.2 percent of personal income. We are forecasting that personal taxes will grow to 12.7 percent of personal income by 2026 and to 15.1 percent of personal income in 2050.

Despite our forecast for slowing GDP growth and increased social insurance and personal taxes compared to the first two decades of this century, we expect that the average person will still enjoy a much higher real after-tax income in 2050 than they do today. We are forecasting that real disposable personal income per capita (measured in 2012 dollars) will grow to $69,582 in 2050, compared to $45,323 in 2019. Our real after-tax income per capita, however, will not grow as quickly during the forecast period as during the first two decades of this century. We forecast an average growth rate of 1.4 percent per year between 2019 and 2050, compared to an average of 1.6 percent per year from 2001 to 2019.

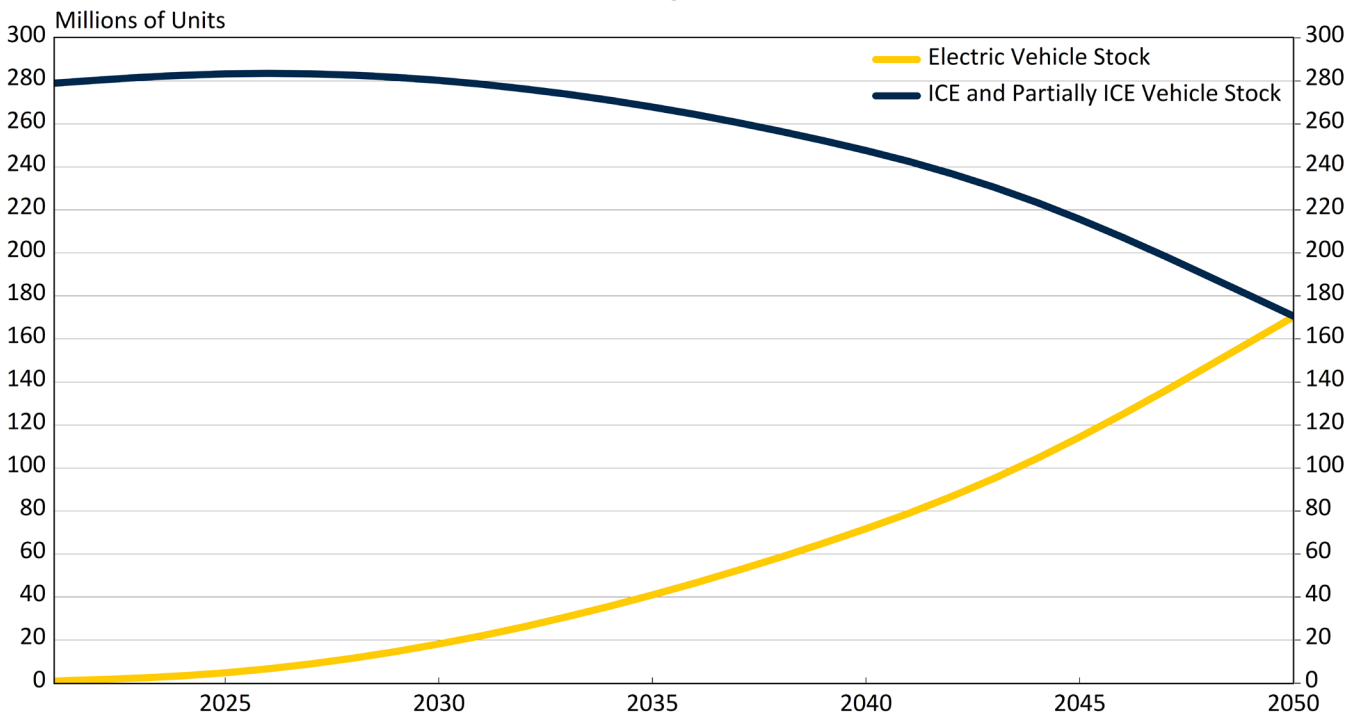
The Conversion to Electric Vehicles

The widespread adoption of electric vehicles (EVs) will have a dramatic effect on employment in motor vehicle manufacturing (and ancillary services that provide repair and maintenance services to motor vehicles) and to establishments that manufacture and sell diesel fuel and gasoline. Most of this transition will reduce the demand for workers because electric vehicles have many fewer parts than traditional internal combustion engine (ICE) vehicles. The introduction of EVs, however, will also require

a major increase in capital spending on manufacturing plants and charging infrastructure, which will increase employment in construction and capital equipment manufacturing industries. There will also be an associated increase in battery manufacturing, which is currently considered a part of the electrical equipment manufacturing industry.

We anticipate that there will be a relatively slow adoption of EVs in the United States. We project that about 9 percent of new light vehicle sales will be fully electric vehicles in 2025, increasing to 24 percent of new vehicles sales in 2030, and finally reaching 100 percent of new vehicle sales in 2050. Because of the long and increasing operational life of new motor vehicles, we expect that ICE or partially ICE vehicles will continue to account for the majority of the U.S. vehicle fleet through 2050, as shown in Figure 4.

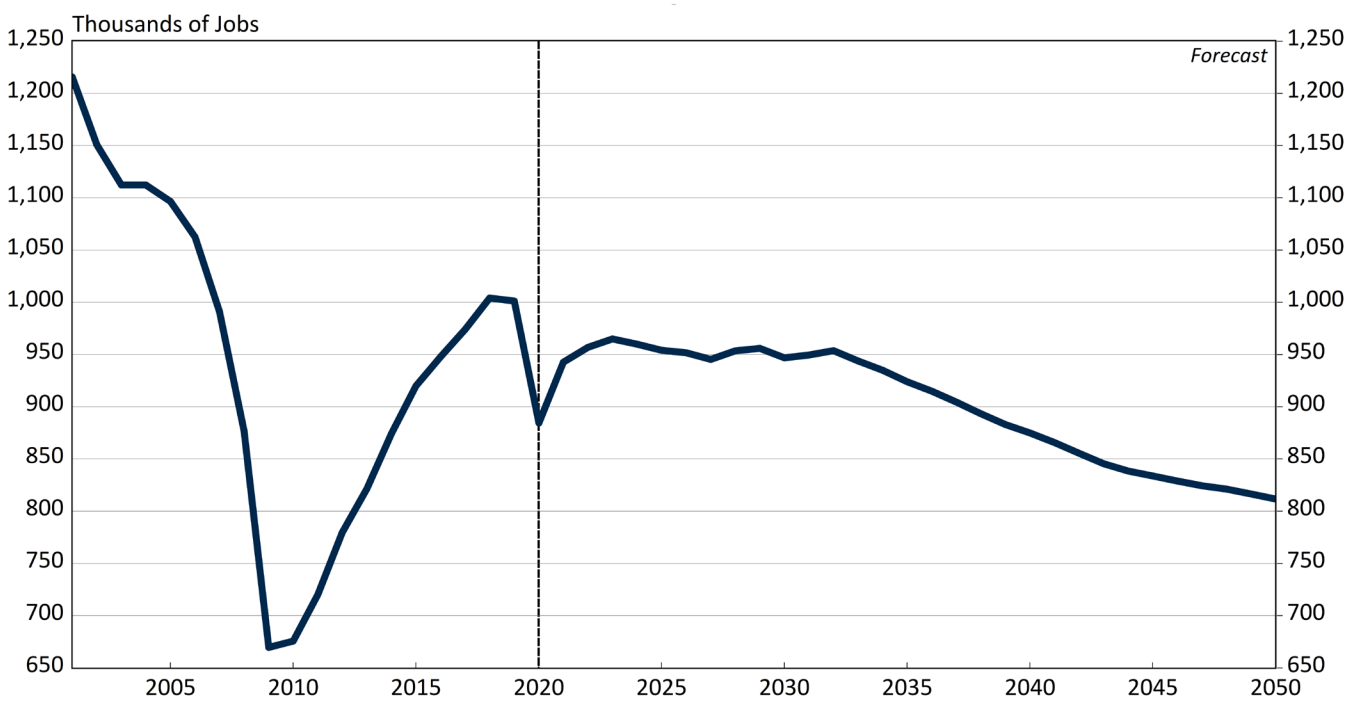
Figure 4
U.S. Light Vehicle Fleet by Power Type



The relatively slow adoption of EVs that we anticipate means that they will have a relatively minor impact on employment in retail trade and motor vehicle repair and maintenance services until the end of this decade. In fact, the introduction of EVs will initially help to sustain employment in motor vehicle manufacturing facilities, as companies continue to produce both types of vehicles in separate plants. We

expect that U.S. employment in motor vehicle and parts manufacturing will peak in 2023 at 964,978 and will decline slowly through 2032, when employment will register 953,776. The rate of decline will accelerate after 2032, but we expect employment will still stand at 811,665 by 2050.

Figure 5
U.S. Employment in Motor Vehicles, Bodies, and Parts Manufacturing

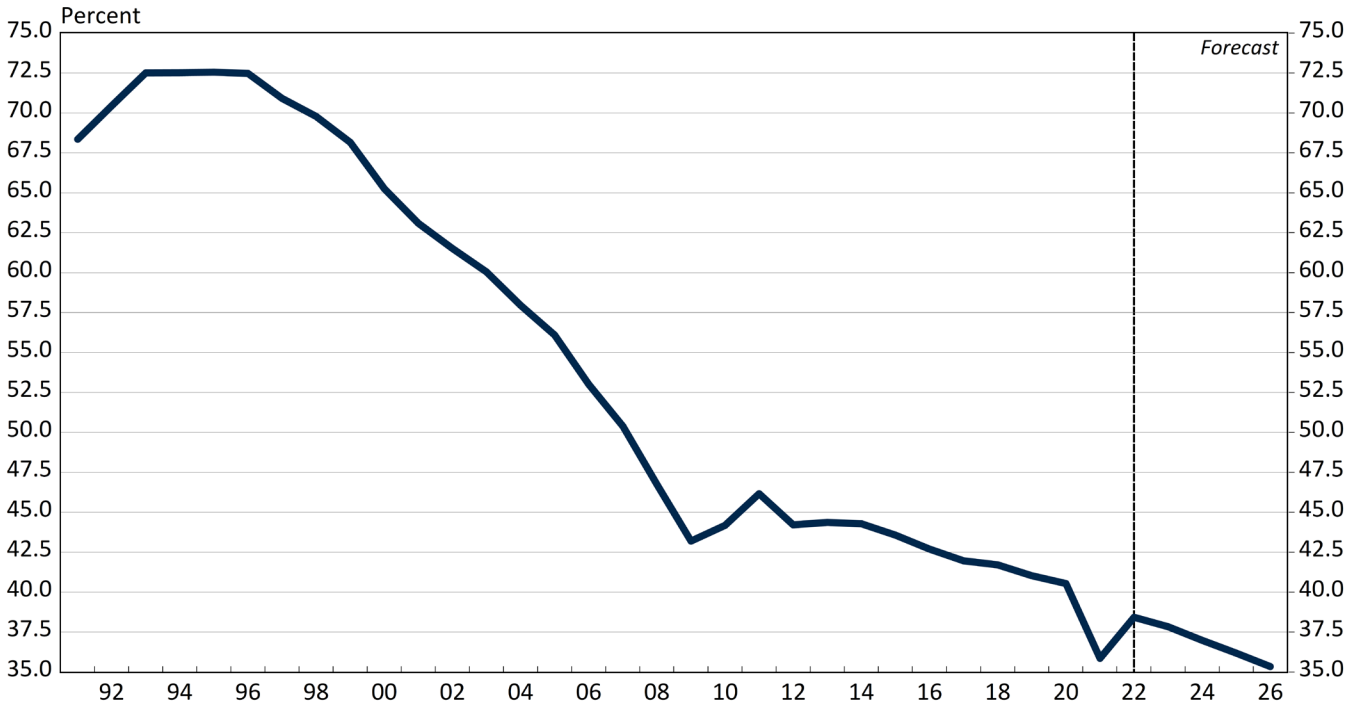


If the introduction of electric vehicles occurs more quickly than we anticipate, then the job loss in motor vehicle and parts manufacturing would occur sooner and be larger than we have forecast. For example, if electric vehicles were to account for 100 percent of new light vehicle sales by about 2040, we believe that this would reduce motor vehicle manufacturing employment by approximately 30 percent. That decline would bring motor vehicle manufacturing employment down to about 675,000 by 2050. Compared to our baseline forecast, there would also be larger job losses in motor vehicle repair and maintenance services and retail trade.

Perhaps even more important to the Michigan economy than the adoption of EVs is how successful the Detroit Three auto manufacturers are in selling EVs. Between 1996 and 2009, the market share of the Detroit Three fell sharply, from 72 percent to 43 percent. The Detroit Three's share of the market then

declined more gradually, to 41 percent in 2019 before dipping to 36 percent in 2021 amid the microchip shortage that has plagued the auto industry in the wake of the COVID-19 pandemic.

Figure 6
Detroit Three's Share of the Light Vehicle Market



We have assumed that the Detroit Three are successful in making the transition to electric vehicles. We project that their market share will rebound from the microchip shortage in the short run before declining to 35 percent by 2026. It then hovers around that level through the remainder of the forecast. If the Detroit Three's market share were to fall further, however, it would have an adverse impact on motor vehicle manufacturing employment in Michigan.

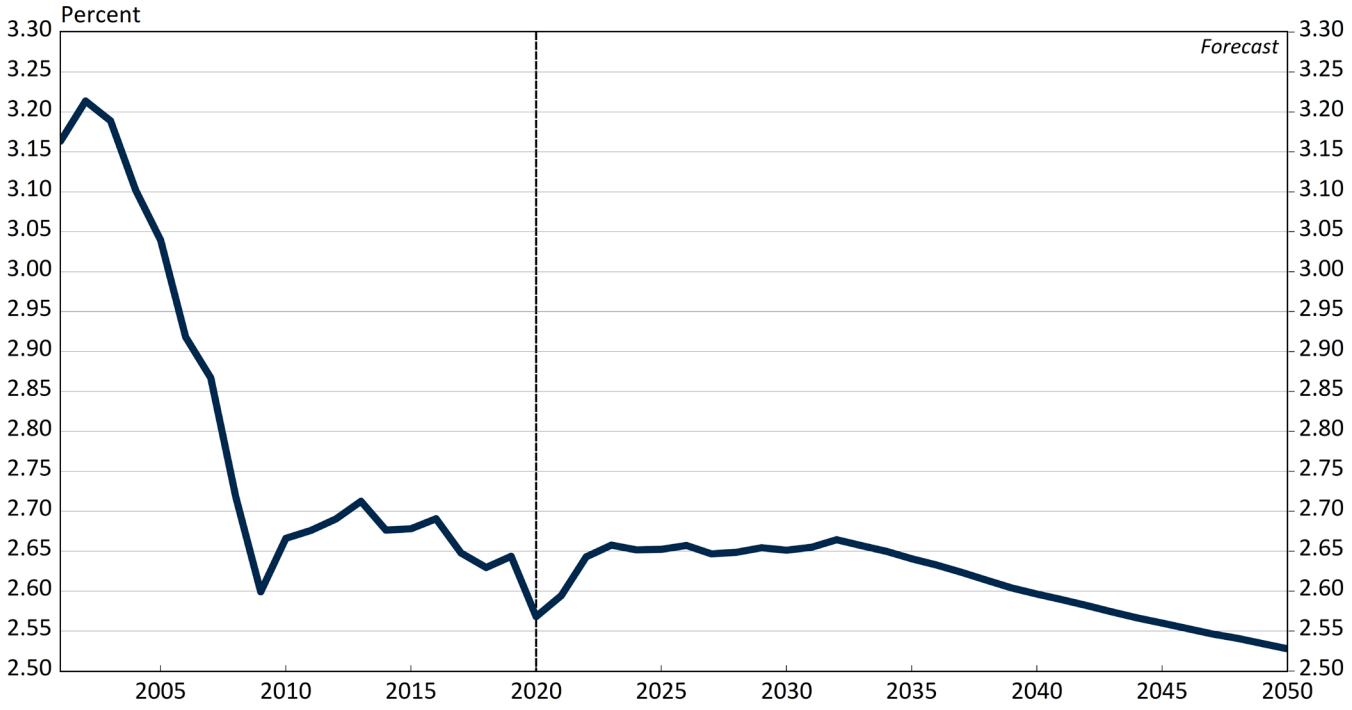
Forecast for Michigan through 2050

Current conditions locally as well as anticipated future trends nationally portend moderate growth for Michigan's population and labor market over the next thirty years. We should recognize from the outset that long-term forecasts are intended to identify economic trends, not to predict movements in the business cycle. These forecasts are also unable to capture major one-time events for which there is no prior knowledge, such as pandemics, wars, or terrorist attacks. With these caveats in mind, we now review the headline items for our Michigan forecast.

Michigan Real GDP

Average annual growth in U.S. real GDP is forecast to slow from 2.02 percent between 2001 and 2019 to 1.75 percent between 2019 and 2050. In contrast, Michigan's real GDP accelerates from 1.01 percent per year between 2001 and 2019 to 1.60 percent per year between 2019 and 2050. The acceleration in growth in Michigan reflects the bounce-back from the weak performance of the local manufacturing sector, and especially motor vehicle manufacturing, during the first decade of the 2000s. Although our projection of accelerating real GDP growth in Michigan alongside slowing growth nationally may seem like a reversal of fortune, Michigan's projected growth from 2019 to 2050 is still forecast to lag the national rate. Figure 7 shows that Michigan's share of U.S. real GDP begins to shrink in our forecast after 2032.

Figure 7
Michigan's Share of U.S. Real GDP



Michigan Population

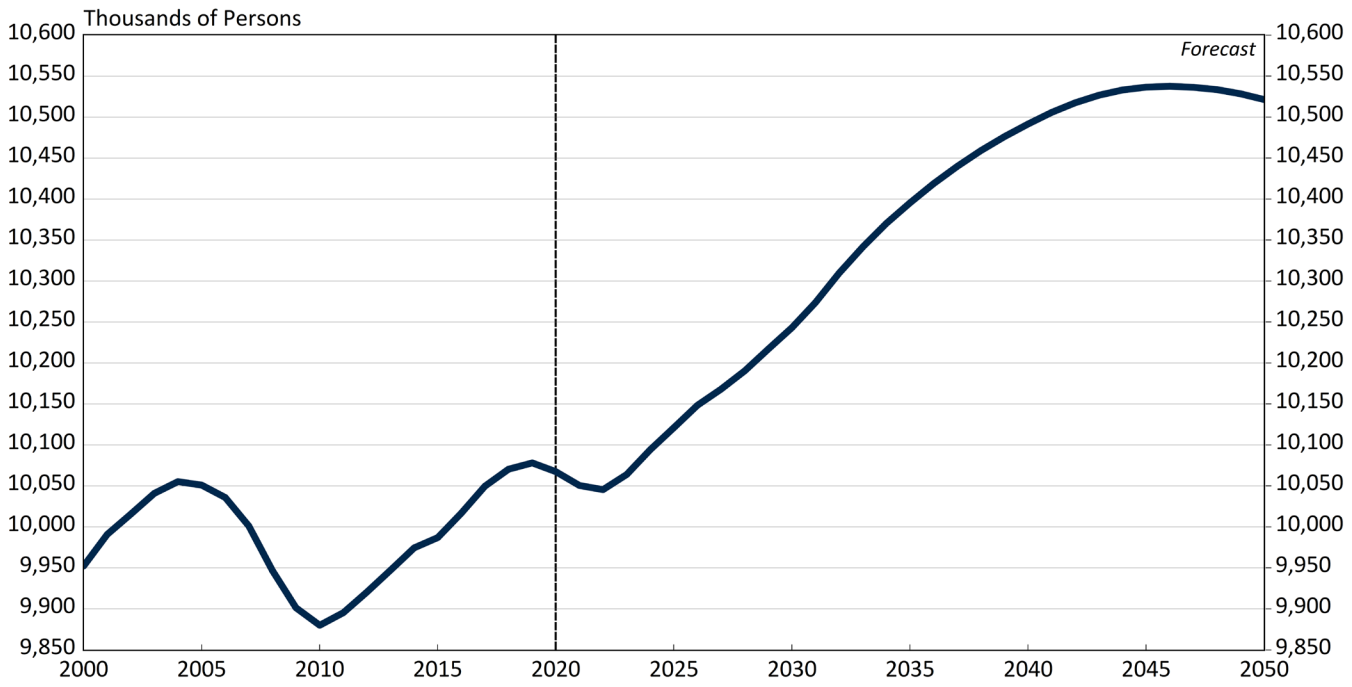
We consider first our forecast of the state's total population trajectory, which will impose a speed limit on Michigan's employment growth in the long run. Figure 8 shows history and our forecast for the

path of total state population in Michigan from 2000 to 2050. Data from 2000 to 2021 come from the U.S. Census Bureau, and the extension through 2050 is our forecast.[4]

The state's population declined at an average rate of 0.3 percent per year between 2004 and 2010. The population resumed growing in 2011, peaking at 10.078 million in 2019. In 2020 and 2021, the state's population declined as the COVID-19 pandemic reduced births and international migration and increased deaths. We expect that Michigan's population will decline by an additional 5,000 people in 2022, after which the population will begin growing again in 2023.

We are forecasting that Michigan's population will peak at 10.538 million in 2046 and then will decline through 2050. Between 2020 and 2050, we are forecasting that Michigan's population will grow at an average rate of 0.15 percent per year, compared to growth of 0.44 percent per year in the United States.

Figure 8
Michigan Population

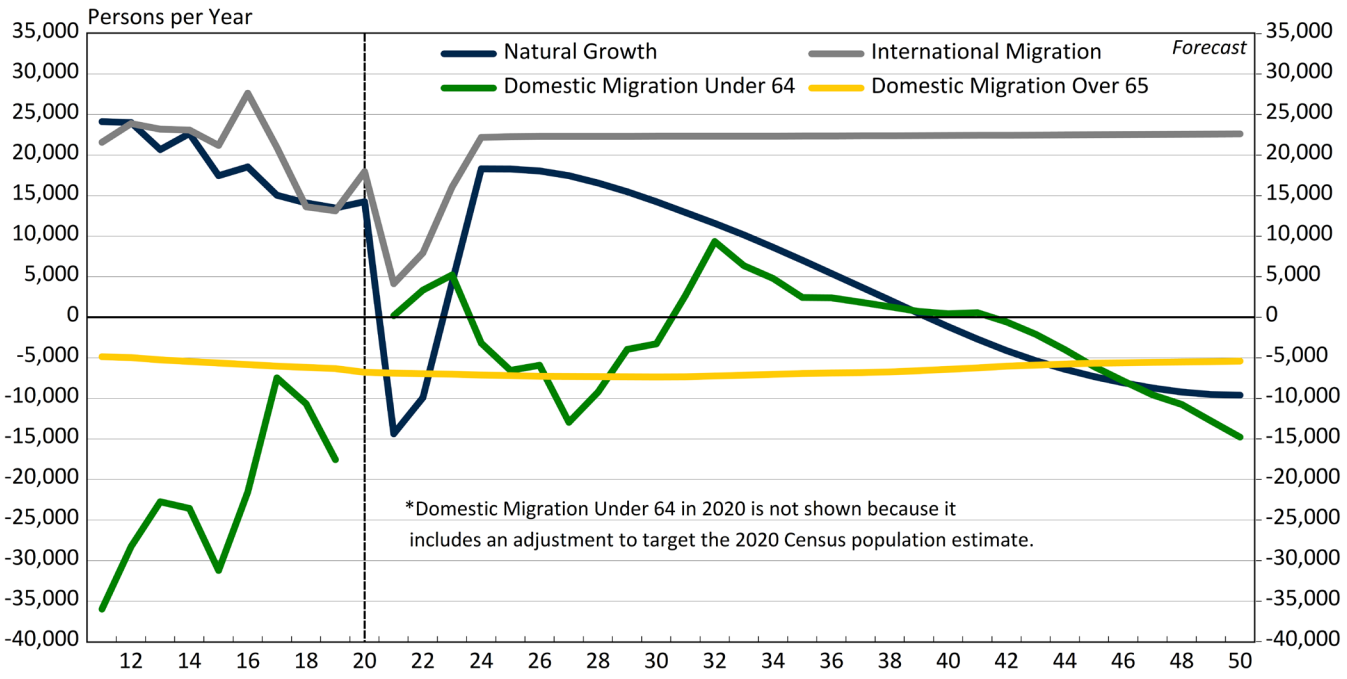


So, what underlies the slow growth in Michigan's population in the decades to come? Figure 9 breaks out the annual change in total population into its primary components: natural change (births

[4] See, for example, U.S. Census Bureau (2021).

minus deaths) and net migration (the number of in-migrants minus the number of out-migrants). Total net migration consists of domestic migration (movements to or from locations in the United States outside of Michigan for persons aged 65 or older and for persons aged 64 or less) and international migration (movements to or from foreign countries). Note that Figure 9 does not show domestic migration of those aged 64 or less in the year 2020 because these values include the adjustment necessary to hit the 2020 population estimates.

Figure 9
Components of Michigan Population Growth



Between 2010 and 2019, Michigan gained an average of 12,150 people per year, which is the sum of the average natural increase (18,918 per year), international migration (20,939 per year), outmigration of the existing population aged 65 or more (-5,603 per year), and outmigration of the existing population aged 64 or younger (-22,105 per year). Over this period, the population gain due to natural growth and international migration tended to decline, while the population loss from the immigration of those aged 65 or older slowly increased. The migration of the population 64 and younger is sensitive to economic conditions, and as Michigan's economy improved through the decade, the net out-migration of this

population group fell sharply. Still, without international migration, Michigan's population would have been declining in every year except 2017.[5]

The 2021 components of population change data for both Michigan and its component counties incorporates the newly released Census Bureau estimates. This data shows that international immigration to Michigan fell dramatically, to only 4,167, and natural population change shifted from growth to a decline of 14,353 as the number of deaths exceeded the number of births in the state. Michigan also continued to suffer out-migration of existing residents (-6,667), but at a slower rate than in prior years. We estimate that all of the domestic out-migration occurred in the 65 and older population.

The COVID-19 pandemic is also expected to reduce Michigan's population in 2022, as deaths continue to exceed births (-9,890), international immigration remains weak (7,957), and we lose a relatively small number of people through domestic out-migration (-3,569). Michigan returns to population growth in 2023 as the number of births exceeds the number of deaths (4,299), international migration picks up to 16,085, and domestic out-migration falls to only -1,778.

Population growth then returns to more normal patterns in 2024. The statewide number of births (115,267) exceeds the number of deaths (96,948) by 18,319 that year. The number of births in Michigan is forecast to slowly increase between 2024 and 2029, but the number of deaths increases even more quickly, so that by 2029, the natural population increase in the state is only 15,498. The number of births in Michigan is then forecast to slowly decline from 116,602 in 2029 to 108,771 in 2050. The number of deaths in Michigan is forecast to grow rapidly between 2029 (101,103) and 2050 (118,367). The number of deaths is forecast to exceed the number of births starting in 2040, so that natural population growth once again becomes natural population decline (reaching -9,596 in 2050). Unlike during the COVID-19 pandemic period, however, this time the change will be durable.

Net international migration to Michigan in 2024 is forecast to total 22,210. This amounts to 2.0 percent of expected US international migration. This share is constant from 2024 to 2050 in our forecast. Migration of the population aged 65 and older is concentrated in the younger members of this cohort.

[5] That assessment may change when the Census Bureau revises the components of population change data for this decade.

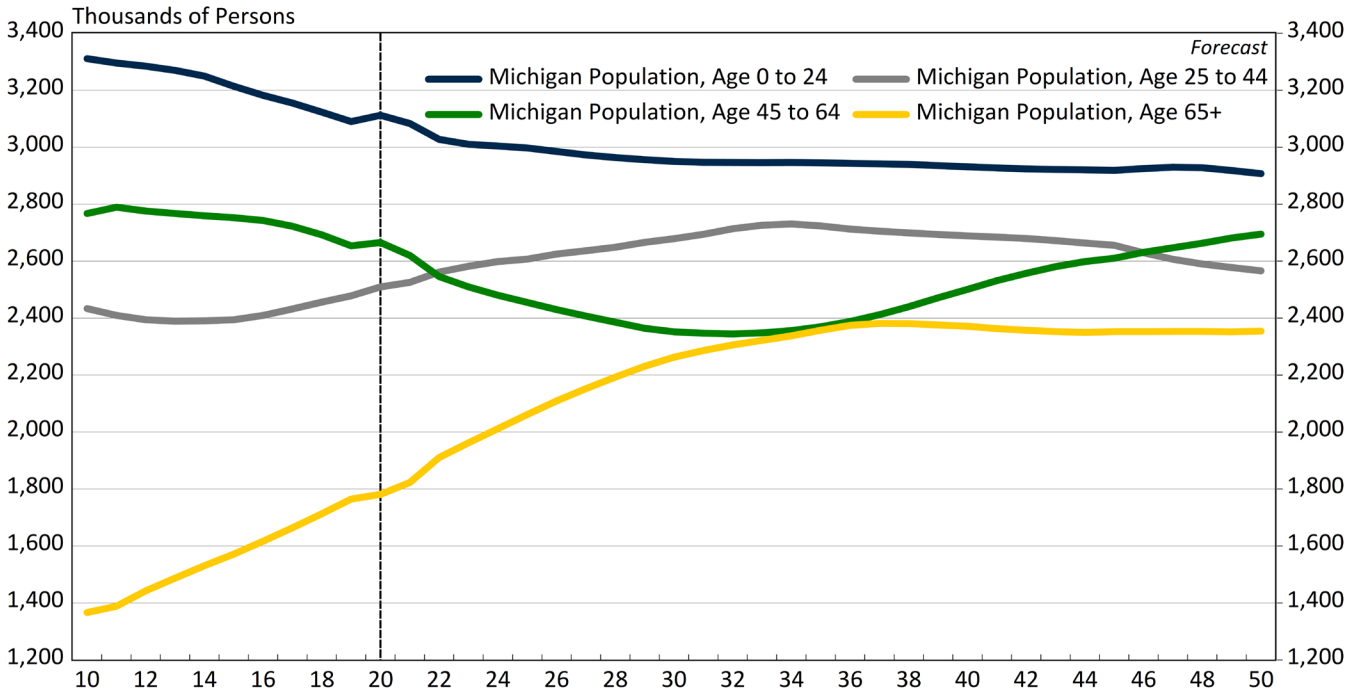
Thus, the net out-migration of this population group slowly increases from -7,107 in 2024 to -7,344 in 2030 as the last of the Baby Boomers turn 65. The out-migration of this population cohort then slows to -5,392 in 2050.

The migration of the population 64 and younger tends to ebb and flow with the health of Michigan's labor market and the relative differences in wage rates between the state and nation. Between 2024 and 2030, Michigan's domestic outmigration of the population aged 64 or less is forecast to average -6,419 persons per year. That forecast is a low number of domestic out-migrants compared to Michigan's recent history. Between 2031 and 2041, Michigan is forecast to see positive domestic migration of the population aged 64 or less, as the state economy enjoys a period of tight labor markets and high relative wages. The state is forecast to start losing domestic migrants aged 64 or less once again starting in 2042.

Both international migration and domestic migration are projected to be much stronger in the post-2023 period than the state has seen in the past couple of decades. The cause of the weak population growth in the state over the next 30 years will be the downshift in natural population growth, which reverses from contributing an increase of 18,319 in 2024 to a decrease of 9,596 in 2050.

These population trends result in a dramatic aging of Michigan's population over the next 30 years, which will be even starker than the national trend. Figure 10 shows that the number of Michigan residents aged 24 and younger declined sharply between 2010 and 2020 (-198,798) and is expected to continue to decline over the next 30 years (-205,023), albeit at a slower rate. The share of Michigan's population that is aged 24 or younger declined from 33.5 percent in 2010 to 30.9 percent in 2020 and is forecast to fall to only 27.6 percent in 2050. Michigan's K-12 schools and its colleges and universities have faced declining enrollments for the past decade, and they will continue to face this challenge for the foreseeable future.

Figure 10
Michigan Population by Age Category



Michigan's population aged 25 to 44 grew by 76,131 between 2010 and 2020 and is forecast to continue growing until 2034 (by 220,804), when it reaches its peak. The population aged 25 to 44 then steadily declines through 2050. As a share of Michigan's total population, the 25- to 44-year-old group increases from 24.9 percent in 2020 to 26.3 percent in 2034, before falling back to 24.4 percent in 2050.

The 45- to 64-year-old group's population moves in a mirror image of the 25-to-44 group. The population aged 45 to 64 declined by 101,896 between 2010 and 2020. It continues to decline through 2032, resulting in the cumulative loss of 320,930 people in only 12 years. This cohort then adds population through 2050. As a share of Michigan's total population, the 45- to 64-year-old group declines from 26.4 percent in 2020 to 22.7 percent in 2032, before rebounding to 25.6 percent in 2050.

Michigan's population aged 65 or more grew by 414,716 between 2010 and 2020. The number of people aged 65 or older in Michigan is expected to continue to grow by an additional 600,557 people through 2037. After 2037, however, Michigan's population aged 65 or older is forecast to start to decline slowly, as outmigration and deaths exceed aging into this cohort. This cohort's share of Michigan's total population grows from 17.7 percent in 2020 to 22.8 percent in 2037, before slipping to 22.4 percent in

2050. In Florida in 2021, the population aged 65 and older accounted for 21.1 percent of the population; Michigan's senior share of the population will pass this share in 2027.

Between 2020 and 2050, we are forecasting that Michigan's total population will grow by 4.5 percent; during the same period, we are forecasting that the population in the US will grow by 14.5 percent. The strain on the supply of labor in Michigan will be particularly acute between 2020 and 2029, when the state's population aged 25 to 64 declines by 144,612, making it increasingly difficult for employers to find workers. By 2050, only 24.4 percent of Michigan's population will be young, working-aged adults (those aged 25 to 44) compared with 25.2 percent nationally. These demographic trends have an important influence on economic trends.

Michigan Employment

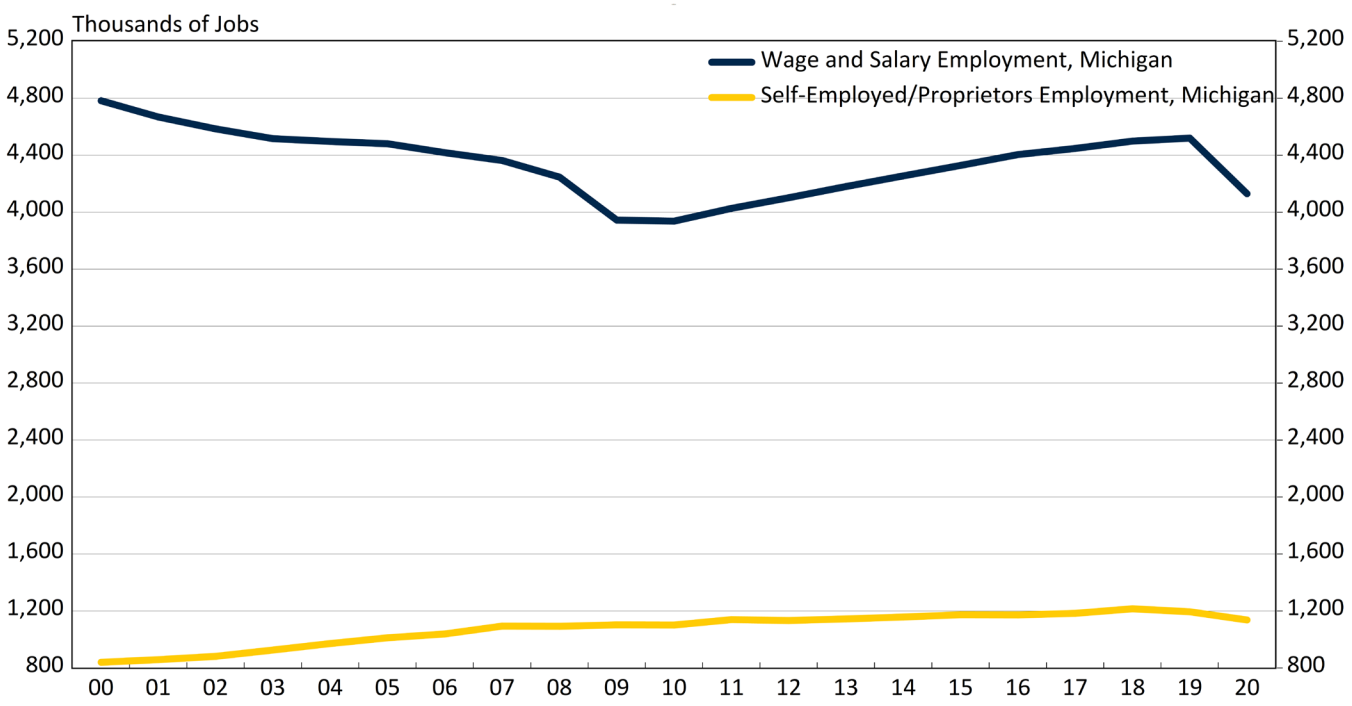
Between 2000 and 2010, Michigan lost 583,300 jobs under the BEA's employment measure, but between 2010 and 2019, the state gained 675,257 jobs, leaving it 91,957 jobs (1.6 percent) above 2000 levels.[6] Michigan added 336,007 self-employed/proprietor's jobs between 2000 and 2019. Measured by wage and salary employment, in 2019 Michigan was still 148,757 jobs short of its year-2000 employment level.

The average wage and salary job tends to pay much better than the average self-employment job. In 2019, the average wage and salary job paid $54,648 plus an additional $12,803 in employer-paid benefits, including the employer's share of social security taxes. Thus, the total compensation for an average wage and salary worker was $67,451 in 2019. In contrast, the average earnings for a proprietor in 2019 were only $26,806. As workers in Michigan have shifted from wage and salary jobs to self-employment, they have suffered a substantial drop in their incomes.[7]

[6] Throughout this report, the employment data are the measure published by the U.S. Bureau of Economic Analysis (U.S. Bureau of Economic Analysis, 2018), and as such, include the self-employed/proprietors, farm workers, and military personnel. The BEA count of proprietors is from the IRS count of individuals filing business tax returns.

[7] Some example occupations that include a large share of self-employed workers include real estate agents, barbers, truck drivers, and farmers, as well as taxi and ride-sharing drivers. After deduction of expenses, some of these jobs report negative income on their business tax return, which lowers the overall average.

Figure 11
Michigan Employment by Employment Type



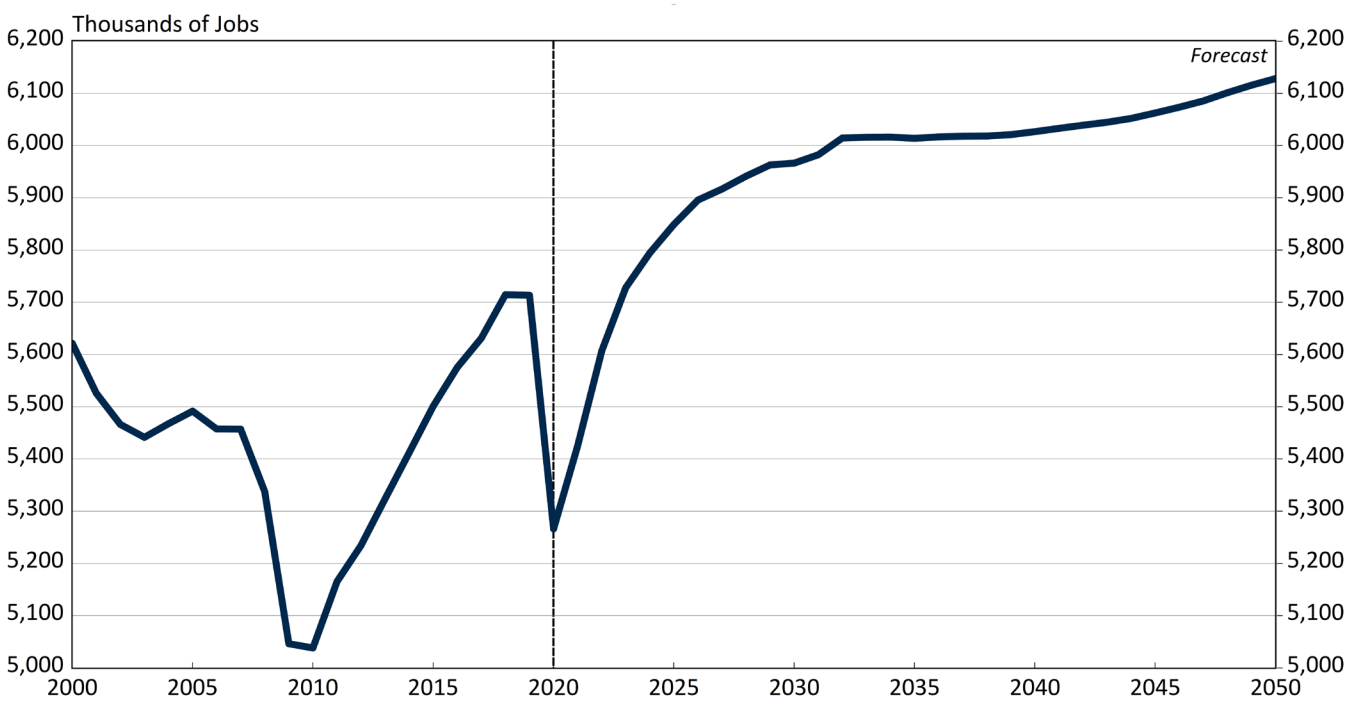
Unfortunately, the pandemic recession reversed the state's employment gains from the previous decade, at least temporarily. Michigan lost 447,117 jobs in 2020, including 389,972 wage and salary jobs and 57,145 self-employed/proprietors. Although the BEA has not published data for 2021 and 2022, we know from other data sources, including the Bureau of Labor Statistics' monthly employment statistics, that Michigan is well on its way to recovering these lost jobs. We estimate that the state regained 156,182 jobs in 2021, and we forecast that the state will add an additional 181,657 jobs in 2022.

Figure 12 shows history and our forecast for Michigan's total employment as measured by the BEA. We project that Michigan will add an additional 120,756 jobs in 2023 and 66,673 in 2024, putting employment 1.4 percent above 2019 levels. We anticipate that the state will add another 54,742 jobs in 2025 and 46,842 jobs in 2026.[8] We project job gains to slow drastically after 2026. From 2026 to 2050, we forecast that Michigan will grow by an average of 9,692 jobs per year. Our forecast implies that total

[8] Recall that these jobs include self-employed/proprietors and that these types of jobs have tended to grow much faster than wage and salary jobs.

employment in Michigan will increase by 355,826, or 6.2 percent, from 2019 to 2050. Over the same period, we project that national employment will grow by 14.9 percent.

Figure 12
Michigan Employment (BEA Measure)

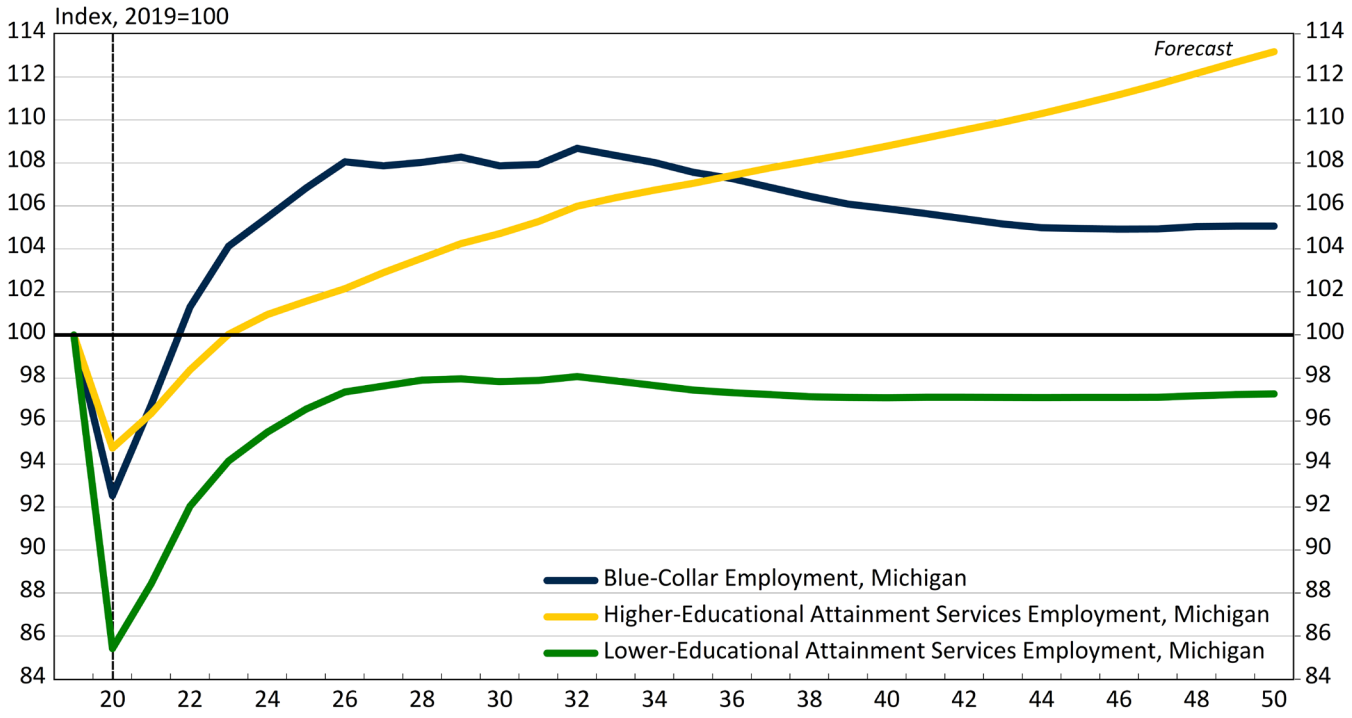


We expect economic performance to be uneven across industries. In Figure 13, we show industry employment in three industry categories: blue-collar industries, lower-educational attainment services industries, and higher-educational attainment services industries.[9] Each of these industry groups is indexed so that the level of employment in 2019 is set equal to 100.

The blue-collar industries recover the most quickly from the COVID-19 recession, exceeding 2019 employment levels by 1.3 percent in 2022. Employment in blue-collar industries is expected to continue growing through 2032, when employment is forecast to exceed 2019 levels by 8.7 percent. Employment in blue-collar industries then slowly declines through 2050, to a level 5.1 percent (73,328) higher than in 2019.

[9] Blue-collar industries include farming, forestry and fishing, mining, construction, manufacturing, and transportation, trade and utilities except for retail trade; lower-educational attainment services industries include retail trade, administrative support services, leisure services, and other private services industries; higher-educational attainment services industries include information; financial activities, professional and technical services; corporate headquarters, education and health services, and government.

Figure 13
Employment in Michigan
Blue-Collar, Higher-Education Services, and Lower-Education Services Industries



Employment in higher-educational attainment services industries is expected to recover to 2019 levels in 2023. Employment in these industries grows steadily at an average annual rate of 0.4 percent through 2050, cumulating to a job gain of 331,845 (13.2 percent) compared to 2019 levels.

Lower-educational attainment services industries suffered the most severe job loss in 2020, with employment falling by 15 percent. Job growth in this group of industries is relatively rapid in 2021 and 2022, but the hole they are digging out of is so deep that their employment will remain 8 percent down in 2022 compared to 2019 levels. Job gains moderate after 2022, and post-pandemic employment in these industries peaks in 2032, 2 percent (or 34,784 jobs) below 2019 levels. Employment in these industries declines slowly thereafter.

Table 3 shows the average annual employment change between 2019 and 2050 in more industry detail. Total employment in Michigan is forecast to grow 0.19 percent per year between 2019 and 2050. The fastest-growing major industry is expected to be private education and health care services, which

we think will grow by 0.62 percent per year. A major explanation for growth in this industry is the rapid projected growth in the older population, who tend to consume high levels of health care services.[10]

Table 3
Michigan Employment Growth by Selected Industry Groups

Employment by Selected Industry Groups	Average Annual Percent Change, 2019–2050
Private Education and Health	0.62%
Construction	0.57%
Transportation, Warehousing, Wholesale Trade, and Utilities	0.57%
Information, Financial Activities, Professional Services, and Management of Companies	0.42%
Administrative Support and Waste Management	0.42%
Leisure and Hospitality	0.20%
Government	0.05%
Other Private Services	0.04%
Natural Resources, Mining, and Agriculture	-0.13%
Other (non-Transportation Equipment) Manufacturing	-0.17%
Motor Vehicle Manufacturing	-0.64%
Retail Trade	-0.92%
Addenda:	
Total Jobs	0.19%

Employment in the construction industry is forecast to grow by 0.57 percent per year, as the state catches up on needed infrastructure investment and expands the electric power grid to support electric vehicles. The construction industry also has notoriously slow productivity growth, so that growth in real activity comes disproportionately from higher labor input rather than from greater labor efficiency. If productivity growth picks up in the construction industry, then employment growth would be smaller. Employment in transportation, wholesale trade, utilities, and warehousing is also expected to grow by 0.57 percent per year. Much of that growth reflects the expansion in e-commerce. Within this major industry category, employment in couriers and package delivery services is forecast to grow by 1.6 percent per year, and employment in warehouses by 2.3 percent per year between 2019 and 2050. Conversely, the growth of e-commerce leads to job losses in retail trade, in which employment is forecast to decline by 0.92 percent per year between 2019 and 2050.

Motor vehicle manufacturing is also expected to see a relatively large loss of jobs, with employment declining by 0.64 percent per year between 2019 and 2050. Those losses are likely to be even larger if

[10] Education services accounts for only about 13 percent of all jobs in this larger industry group in Michigan.

EV adoption occurs more quickly than we anticipate. Manufacturing outside of motor vehicle manufacturing is also forecast to lose jobs over this period, but at a slower pace than auto manufacturing (-0.17 percent per year). Note that even though the manufacturing sector is forecast to lose jobs, the high rate of productivity growth in manufacturing industries means that output in these industries will be growing. Real GDP in manufacturing in Michigan is forecast to grow from $96 billion in 2019 to $143 billion in 2050 (both measured in 2012 dollars). Furthermore, the value of output/shipments in manufacturing is forecast to grow from $331 billion in 2019 to $489 billion in 2050 (again both measured in 2012 dollars).[11]

The large industry group that includes information, financial activities, professional and technical services and corporate headquarters is the heart of the knowledge economy. We are forecasting that employment in this group of industries will grow more than twice as quickly as total employment in Michigan between 2019 and 2050 (0.42 percent per year vs 0.19 percent per year). Nationally, however, this group of industries will be growing even more rapidly, 0.65 percent per year. Consequently, Michigan's share of national employment in this industry group is expected to fall from 2.65 percent in 2019 to 2.47 percent in 2050.

Government employment is forecast to grow by only 0.05 percent per year. Maintaining government services will be a challenge for all parts of the public sector in the decades to come.

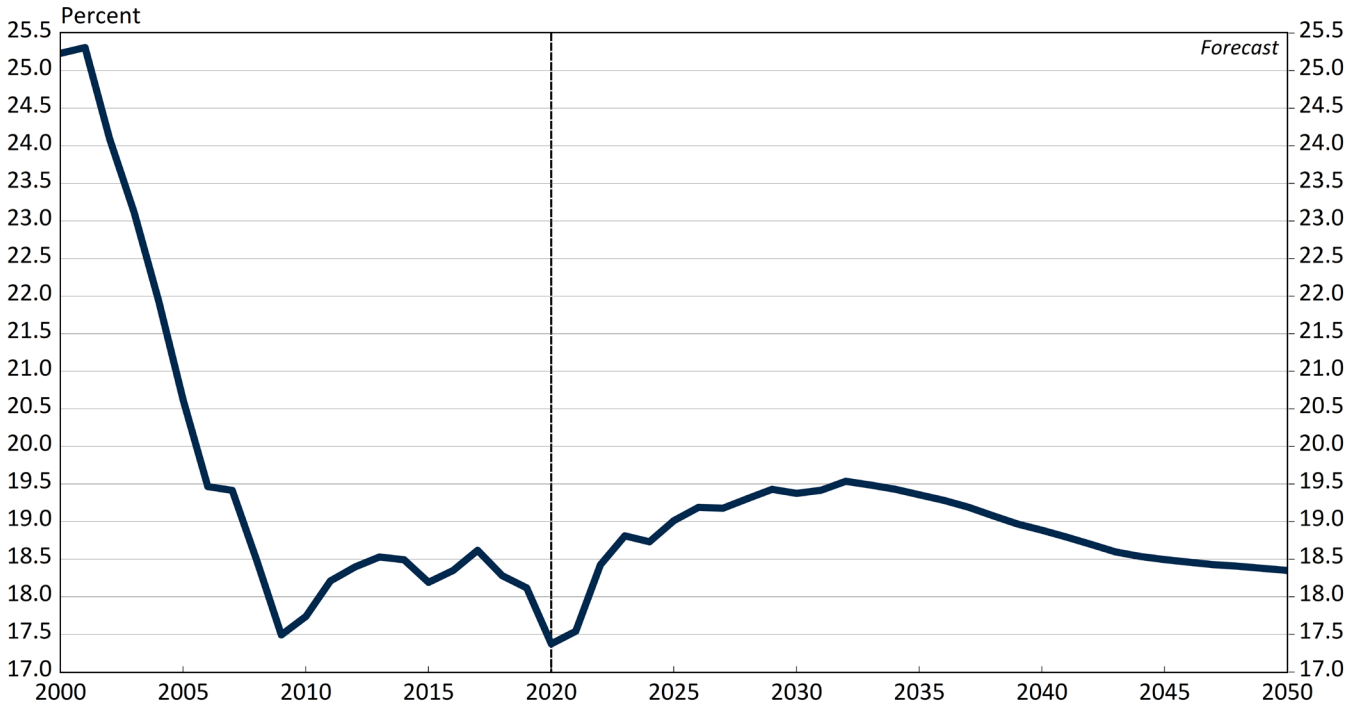
Given its importance to Michigan's economy, we now take a deeper dive into the motor vehicle and parts manufacturing industry.[12] In the year 2000, employment in motor vehicle and parts manufacturing in Michigan was 330,973. Figure 14 shows that Michigan's employment level accounted for 25.2 percent of all motor vehicle and parts manufacturing employment in the United States at the time. During the first decade of this century, employment in motor vehicle and parts manufacturing declined both nationally

[11] The value of output/shipments includes the value of purchased materials and services used in manufacturing the product, in addition to the GDP or value added needed to produce the product.

[12] The manufacturing industry only includes jobs at production facilities. White-collar jobs in pre-production, including research, development, design, and other engineering functions, are classified as professional services in our data from the federal government. Likewise, workers at corporate headquarters are designated as headquarters employees, even if the employer is a manufacturing firm such as General Motors or Ford.

and in Michigan. The decline was much more severe in Michigan, as employment fell to 117,148 in 2009, or 17.5 percent of national industry employment.

Figure 14
Michigan's Share of U.S. Employment in Motor Vehicle, Bodies, and Parts Manufacturing



As the Detroit Three's market share stabilized, Michigan's share of national employment in motor vehicle manufacturing also settled at about 18.4 percent. Motor vehicle manufacturing employment in Michigan fell from 181,496 in 2019 to 154,518 in 2020, but we estimate that employment picked up to 165,392 in 2021. We project it will rebound further to 176,338 in 2022 and will return to 2019 employment levels in 2023 (181,542). The job gains in motor vehicle manufacturing are a bit stronger in Michigan than in the country as a whole, so that by 2023, Michigan accounts for 18.8 percent of U.S. employment. Employment in Michigan stabilizes at around 182,000 between 2023 and 2027. It then grows modestly as electric vehicle production increases while traditional internal combustion engine vehicles continue to account for the vast majority of sales. Michigan's employment in motor vehicle manufacturing peaks at 186,353 in 2032, when the state's share of national industry employment also peaks at 19.5 percent.

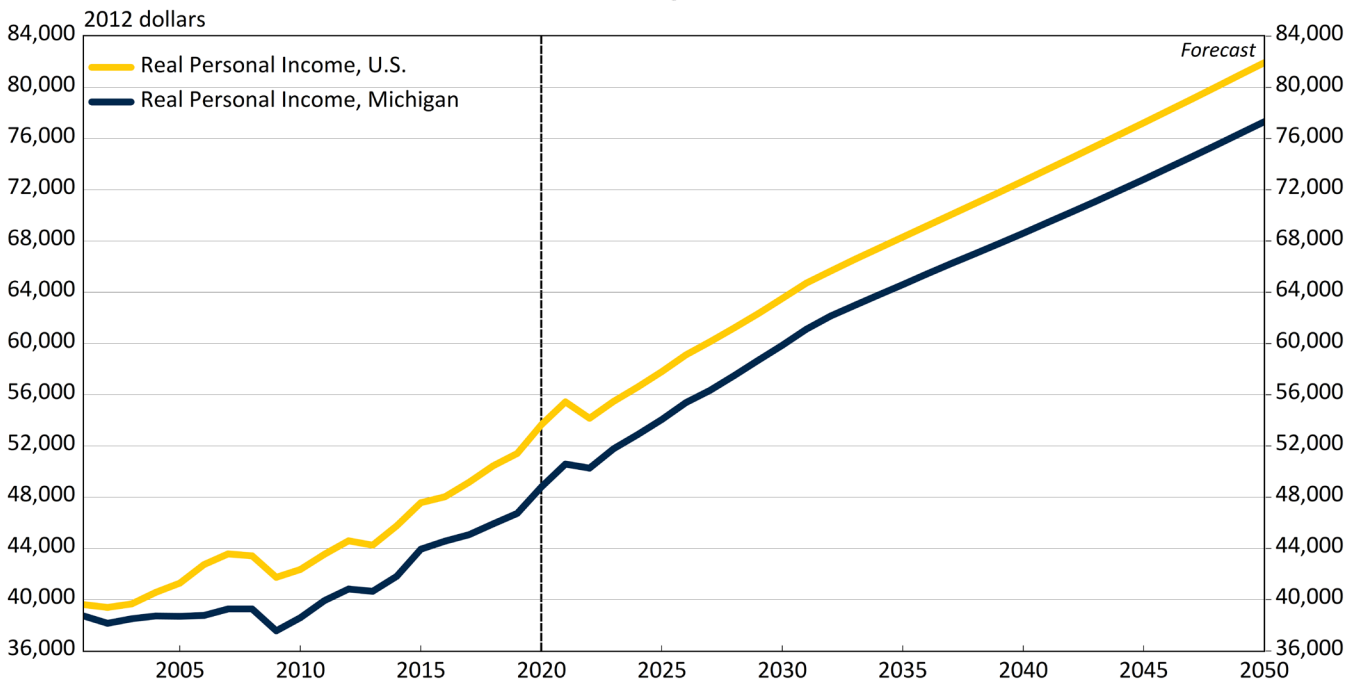
The increasingly rapid shift from ICE vehicle sales to EV sales after 2032 causes Michigan's employment to decline to 148,952 in 2050. Michigan's share of national employment falls to 18.4 percent

in 2050, in line with the average between 2011 and 2019. We have assumed a relatively slow shift to EVs and that the Detroit Three will have about the same market share in 2050 as they are expected to have in 2026. A more rapid shift toward electric vehicles would have an adverse effect on motor vehicle manufacturing employment in Michigan, as would any loss of market share by the Detroit Three. On the other hand, if the Detroit Three gain market share, then Michigan's loss of motor vehicle manufacturing jobs after 2032 could slow.

Michigan Personal Income

Personal income is another important dimension of Michigan's economic profile. Inflation-adjusted (real) personal income per capita is generally regarded as the best single measure of economic well-being for a region. The standard of living for a region can rise even with sluggish employment growth if residents' incomes are rising sufficiently. Figure 15 displays real personal income per capita (measured in 2012 dollars) for Michigan and the United States. Michigan's income data has been adjusted for Michigan's lower cost of living than the national average.

Figure 15
Real Personal Income per Capita, United States and Michigan



Between 2001 and 2007, national real personal income per capita increased by a cumulative 10.0 percent, while in Michigan it rose by only 1.4 percent.[13] In 2001, Michigan's income per capita was 2.2 percent below the U.S. level, but by 2007 Michigan had fallen 9.9 percent behind the national level. Real income per capita declined both nationally and locally during the Great Recession before resuming growth in 2010. Between 2009 and 2019, real personal income per capita grew by 2.1 percent per year in the U.S. and by 2.2 percent per year in Michigan. In 2019, Michigan's real personal income per capita stood 9.1 percent below the U.S. level.

Real personal income per capita increased by 4.3 percent in the U.S. and by 4.4 percent in Michigan in 2020. That growth reflected large Federal government transfer payments, including stimulus checks and expanded unemployment insurance benefits. With further stimulus in 2021, real income grew by 3.3 percent in the U.S. and by 3.7 percent in Michigan. We are forecasting a decline in real personal income per capita in 2022 as stimulus recedes and inflation picks up.[14]

We project that real personal income per capita will start growing again in 2023 in both Michigan and the United States. Over the entire 2019 to 2050 period, we are forecasting that real personal income per capita will grow by 1.5 percent per year nationally and by 1.6 percent per year in Michigan. Michigan's relatively rapid income growth is expected to occur in the first 13 years of the forecast period. By 2032, Michigan's real personal income per capita is forecast to reach a level 5.3 percent below the U.S. average. Thereafter, Michigan's position slips a bit relative to the nation. By 2050, real personal income per capita in Michigan is expected to stand 5.6 percent below the U.S. level.

Michigan Households

Another dimension of Michigan's demographic and economic profile is the future growth and composition of the number of households in the state. Although total population in Michigan is forecast to increase by 4.5 percent between 2020 and 2050, the population residing in group quarters expands by a more robust 11.6 percent over this period, as shown in the following table. This trend stems largely

[13] The measure is adjusted for inflation using the Personal Consumption Expenditure Deflator for the United States and the local version of this measure for states and counties, which is embodied in the REMI model (REMI, 2021).
[14] In fact, inflation is currently running much hotter than we had forecast. Consequently, the decline in real personal income per capita this year will undoubtedly be larger than we had projected.

from an aging population entering assisted-living facilities, including nursing homes. The rest of the population—those living in households—grows by 4.3 percent between 2020 and 2050. The number of households grows more than twice as quickly as the household population, by a vigorous 10.9 percent. The reason for the different growth trends is that the average household size declines over the period, as shown in Table 4.

Table 4
Number of Households in Michigan

	2020	2050	Change, 2020–2050	Change (%), 2020–2050
Total Population	10,067,637	10,521,365	453,728	4.5%
Group Quarters Population	234,768	262,109	27,341	11.6%
Population in Households	9,832,869	10,259,256	426,387	4.3%
Households	3,976,130	4,408,945	432,815	10.9%
Average Household Size	2.47	2.33	-0.14	-5.7%

The share of one-person households is anticipated to increase over the next thirty years. The share for most categories of larger-size households (three, four, and five-plus residents) declines, while the share of two-person households is about the same. These trends are driven by population aging in our forecast. We have not made any assumptions about household size preferences except as they relate to the age of the head of household. If the trend of the past fifty years continues toward smaller households conditional on householder age, the growth in the number of households in Michigan will be even faster than we are forecasting.

One of the key questions for Michigan, especially with respect to the roads and highways in the state, is how many vehicles will be driving on them. We estimate that Michigan households will own 7,838,478 vehicles in 2050, an increase of around 650,000, or 9.2 percent, compared with 2020. This estimate is based on the number of households in the state containing 0, 1, 2, or 3+ vehicles, as shown in Table 5.[15] This forecast is based solely on changes in the age distribution of Michigan's population

[15] These estimates do not include commercial vehicles.

between 2020 and 2050 (and the number of people living in the state). If, as is likely, most households choose to own more vehicles per household than they did in 2020, controlling for the age of the head of household, the number of vehicles on Michigan roads will increase even more than we have forecast.

Table 5
Number of Vehicles in Michigan Households

Number of Vehicles	Number of Households		Estimated Number of Vehicles			
	2020	2050	2020	2050	Change, 2020–2050	Change (%), 2020–2050
0 Vehicles	320,352	393,351	0	0	0	na
1 Vehicle	1,390,775	1,609,167	1,390,775	1,609,167	218,392	15.7%
2 Vehicles	1,553,238	1,686,729	3,106,476	3,373,458	266,982	8.6%
3+ Vehicles	765,466	815,958	2,679,131	2,855,853	176,722	6.6%
Total Vehicles			7,176,382	7,838,478	662,096	9.2%

Forecast for Michigan Counties through 2050

We now turn to our county-level forecasts through 2050. Table 6, located at the end of this section, shows our forecast of total population growth, employment growth, and the projected share of population age 65 and older for each county in Michigan; the table also provides projections for the city of Detroit, the rest of Wayne County, and the State of Michigan.

County Population

The map in Figure 16 summarizes the population outlook for Michigan's eighty-three counties. The map shows the forecast change in population from 2020 to 2050 for each county, where change is subdivided into four categories: growth greater than 4 percent, growth up to 4 percent, population decline up to -4 percent, and population decline greater than -4 percent. Much of the variation shown in the map reflects the differing age structures of the local population, as well as disparate economic trends.

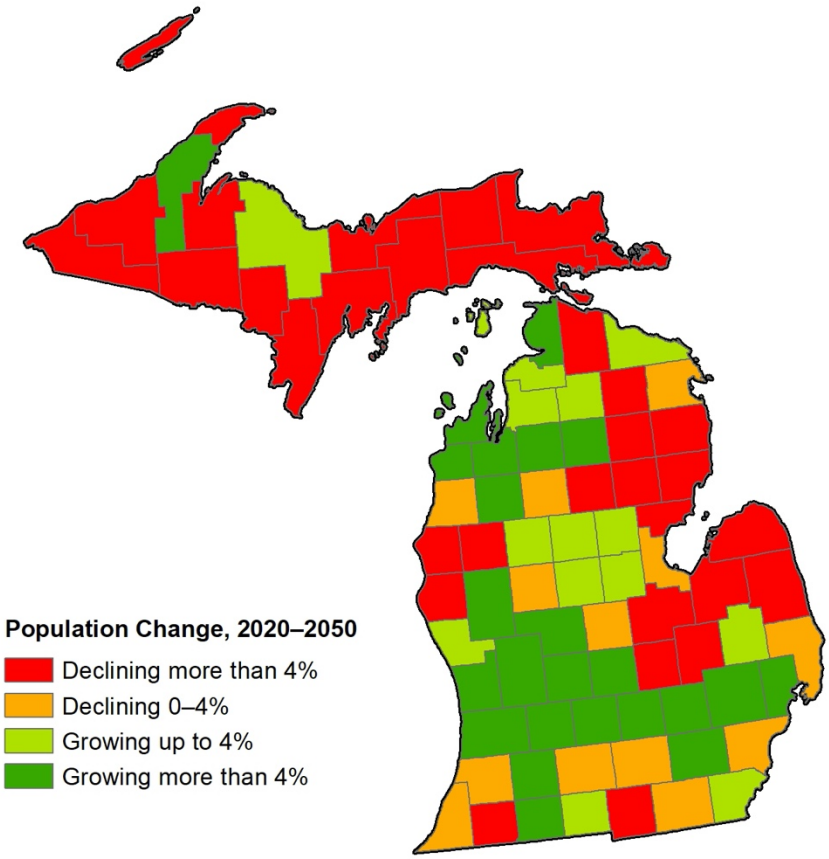
To provide a frame of reference, Michigan's total population is forecast to grow by 4.5 percent between 2020 and 2050. Despite the state's overall growth, 45 of Michigan's counties are forecast to lose population between 2020 and 2050, while only 38 are expected to gain population.

Counties losing population tend to be located along the shore of Lake Huron on the eastern side of the state, or just to its interior, as well as in the Upper Peninsula, where only 2 counties (Houghton and Marquette) are expected to have a growing population. The counties with the greatest declines also tend to have high shares of residents aged 65 and older at present.

The fastest-growing counties in Michigan are in the suburban Detroit region, a band stretching across the middle of the state through Kent and Ottawa County to Lake Michigan, as well as in the tourist-oriented and retiree-friendly northwestern region of the Lower Peninsula.

The five counties with the greatest expected population gains are Livingston (21.9 percent), Clinton (15.7 percent), Benzie (15.5 percent), Ottawa (14.1 percent), and Washtenaw (13.4 percent).

Figure 16
County-Level Total Population Change in Michigan, 2020–2050



County Employment

The map in Figure 17 shows the forecast change in employment from 2019 to 2050 for each of Michigan's counties. The forecast changes are subdivided into five categories: growth greater than 7.5 percent; growth between 5 percent and 7.5 percent; growth between 2.5 percent and 5 percent; growth up to 2.5 percent; and employment decline of any magnitude. Although the scale is different from the map showing the change in population, the two maps look quite similar.

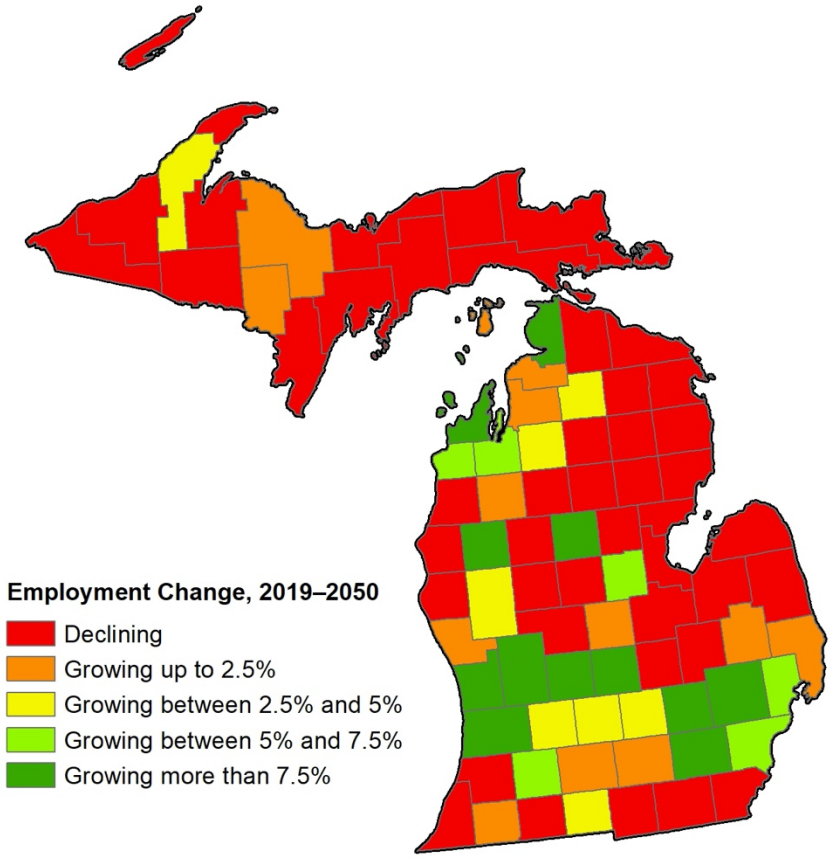
Statewide employment in Michigan is forecast to grow 6.2 percent cumulatively from 2019 to 2050, but there is wide variation among the counties. More counties are expected to lose employment than to gain it over the forecast horizon, by a count of 45 to 38, the same tally as for total population.

In general, the county population and employment outlooks tend to move in tandem, but differences do exist. While employment forecasts are certainly influenced by changes in local demographics, the existing and expected employment trends by industry are also important. The most favorable outlooks are generally for counties with large shares of employment in industries with strong growth prospects as well as with supporting growth in their working-age populations.

We expect twelve counties in Michigan to see employment gains of more than 7.5 percent by 2050. That group includes Livingston, Washtenaw, and Oakland counties in southeast Michigan; Clinton, Ionia, Kent, Allegan, and Ottawa counties in Western and Central Michigan; and Clare, Lake, Leelanau, and Emmet counties in northwestern Michigan. Among those counties, the top five are expected to be Livingston (14.4 percent), Ionia (14.0 percent), Washtenaw (13.7 percent), Emmet (13.1 percent), and Oakland (11.9 percent).

As shown in Figure 17, counties that are forecast to lose employment are concentrated in the Northeast Lower Peninsula, the thumb, across the Upper Peninsula, and along the southern border with Ohio and Indiana. Of the 45 counties with decreasing employment, those with the greatest declines tend to be in rural areas and have a higher current share of people aged 65 and older.

Figure 17
County-Level Total Employment Change in Michigan, 2019–2050



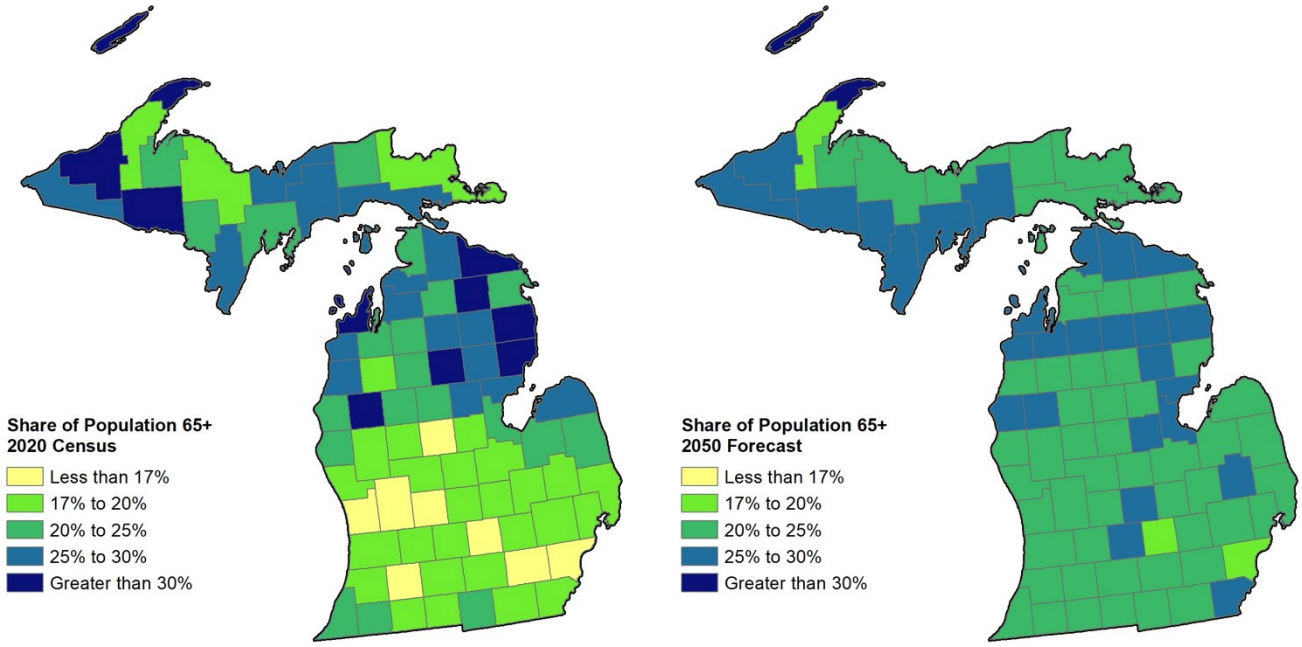
Share of Population Aged 65 and Older

The shifting demographics and the overall aging of the population in Michigan have been a consistent theme in our outlook for the state. Measured using data from the recently released 2020 Census population estimates (U.S. Census Bureau, 2022a), 17.7 percent of the state's population in 2020 was 65 years old or older. By 2050, we expect that number to rise dramatically, to 22.4 percent. At the county level, the age distribution of the population is one of the primary factors for forecasting both overall population and employment.

Figure 18 summarizes our forecast of county-level changes in the senior segment of the population using two maps. The first map shows the share of population aged 65 and older in 2020, and the second map shows our forecast of the same share in 2050. Each map uses the same legend, with the population share of residents aged 65 and older subdivided into five categories: shares greater than 30 percent;

shares between 25 percent and 30 percent; shares between 20 percent and 25 percent; shares between 17 percent and 20 percent; and shares less than 17 percent.

Figure 18
Share of Population Age 65 and Older by County, 2020 and 2050



In 2020, there was a wide variance in the share of the age 65 and older population across Michigan. The senior population share was less than 20 percent in 37 counties, including eight counties where the share was less than 17 percent. The senior population share was between 20 and 30 percent in 36 counties, and it was more than 30 percent in ten counties.

By 2050, we expect the distribution of the share of population aged 65 and older to compress towards the middle. We forecast only three counties to have a senior population share of less than 20 percent and no county to have a share less than 17 percent. On the other side of the distribution, we project only 1 county to have a share higher than 30 percent. In fact, we forecast that in 79 counties, the share of the population aged 65 and older will be between 20 and 30 percent, with 52 of those counties having a share between 20 and 25 percent.

There are two reasons for the compressed variance of the senior population share. First, the decline in natural population growth across the state, combined with steady international migration and the reduction in net domestic migration, means that counties that are currently younger will tend to get older

by 2050. Second, the oldest counties in Michigan will tend to get younger over the next several decades as their older residents pass away. The combination of these two forces leads to a compressed distribution of the senior population shares, with many more counties having shares in the 20–30 percent range by 2050.

Table 6
County-Level Forecasts of Population Growth, Employment Growth, and the Share of Population Age 65 and Older

Region/County	Population Change 2020–2050	Employment Change 2019–2050	Share of Population Age 65+ 2020 Census	Share of Population Age 65+ 2050 Forecast
Michigan	4.5%	6.2%	17.7%	22.4%
Alcona	-11.7%	-3.2%	35.7%	25.6%
Alger	-5.2%	-1.4%	26.1%	20.3%
Allegan	10.9%	7.8%	17.1%	23.5%
Alpena	-2.7%	-0.2%	24.1%	24.8%
Antrim	1.8%	1.4%	27.8%	20.2%
Arenac	-18.3%	-4.6%	25.8%	26.6%
Baraga	-18.2%	-12.4%	23.3%	21.9%
Barry	7.7%	2.8%	18.8%	23.8%
Bay	-3.9%	-1.3%	20.9%	25.2%
Benzie	15.5%	7.5%	26.8%	26.0%
Berrien	-0.9%	-3.3%	20.2%	23.0%
Branch	1.7%	3.8%	18.5%	20.7%
Calhoun	-1.3%	1.6%	18.1%	21.9%
Cass	-4.6%	1.0%	21.7%	24.8%
Charlevoix	1.8%	1.5%	25.3%	23.9%
Cheboygan	-4.5%	-6.8%	28.0%	26.9%
Chippewa	-7.1%	-5.8%	18.7%	20.7%
Clare	3.2%	7.7%	24.3%	22.2%
Clinton	15.7%	11.1%	17.7%	27.3%
Crawford	5.0%	-0.7%	26.1%	26.8%
Delta	-7.1%	-3.5%	24.9%	28.6%
Dickinson	-6.1%	1.2%	23.2%	27.8%
Eaton	5.0%	3.8%	19.0%	28.5%
Emmet	12.1%	13.1%	23.4%	26.9%
Genesee	-6.0%	-2.1%	17.8%	22.9%
Gladwin	2.1%	-1.8%	27.0%	21.3%
Gogebic	-15.4%	-7.0%	28.5%	25.6%
Grand Traverse	9.3%	6.7%	20.7%	27.2%
Gratiot	-1.8%	2.2%	17.5%	22.2%
Hillsdale	-6.2%	-4.3%	20.2%	23.8%
Houghton	5.2%	3.5%	18.0%	17.4%
Huron	-5.5%	-1.3%	26.1%	22.6%
Ingham	6.1%	4.4%	14.1%	17.6%
Ionia	10.2%	14.0%	15.2%	20.7%
Iosco	-5.0%	-2.9%	30.1%	22.8%
Iron	-10.0%	-5.9%	30.6%	26.4%
Isabella	0.4%	-5.1%	13.4%	20.3%
Jackson	0.0%	1.8%	18.2%	20.6%
Kalamazoo	5.9%	5.6%	15.4%	21.5%
Kalkaska	7.9%	4.3%	20.5%	26.4%
Kent	11.2%	9.5%	14.1%	22.0%
Keweenaw	-18.4%	-1.2%	36.4%	30.6%

Table 6 Continued
County-Level Forecasts of Population Growth, Employment Growth, and the Share of Population Age 65 and Older

Region/County	Population Change 2020–2050	Employment Change 2019–2050	Share of Population Age 65+ 2020 Census	Share of Population Age 65+ 2050 Forecast
Lake	-4.3%	10.0%	30.4%	26.4%
Lapeer	0.0%	2.0%	18.9%	26.0%
Leelanau	9.5%	8.9%	32.5%	29.5%
Lenawee	-2.3%	-0.2%	19.3%	24.6%
Livingston	21.9%	14.4%	18.2%	24.4%
Luce	-8.5%	-0.8%	21.6%	21.5%
Mackinac	-5.0%	-2.6%	29.1%	21.5%
Macomb	10.4%	6.7%	17.4%	24.1%
Manistee	-0.1%	-4.5%	26.6%	23.3%
Marquette	0.6%	0.7%	19.9%	22.6%
Mason	-4.1%	-0.9%	24.9%	27.3%
Mecosta	-1.8%	-17.5%	18.8%	23.8%
Menominee	-12.6%	-8.0%	25.6%	29.1%
Midland	3.0%	6.4%	19.0%	27.6%
Missaukee	-1.9%	-5.1%	21.0%	20.1%
Monroe	2.5%	-0.4%	18.8%	25.6%
Montcalm	6.7%	-0.6%	18.1%	21.5%
Montmorency	-9.7%	-0.9%	32.7%	23.1%
Muskegon	1.2%	0.4%	17.6%	21.1%
Newaygo	6.0%	2.7%	19.8%	24.1%
Oakland	10.9%	11.9%	17.4%	22.4%
Oceana	-8.5%	-6.0%	21.3%	21.4%
Ogemaw	-8.3%	-0.3%	26.3%	27.3%
Ontonagon	-20.0%	-6.2%	37.5%	28.0%
Osceola	0.6%	-1.5%	21.3%	21.9%
Oscoda	-13.0%	-16.7%	28.1%	27.8%
Otsego	2.9%	3.9%	21.6%	24.7%
Ottawa	14.1%	8.4%	15.5%	24.4%
Presque Isle	2.3%	-2.4%	32.6%	25.8%
Roscommon	-8.9%	-6.8%	33.3%	24.2%
Saginaw	-5.5%	-1.5%	19.6%	23.8%
Sanilac	-8.8%	-3.9%	22.3%	23.3%
Schoolcraft	-6.4%	-4.2%	27.4%	26.1%
Shiawassee	-4.6%	-0.5%	19.0%	23.4%
St. Clair	-0.9%	1.3%	19.4%	24.6%
St. Joseph	7.4%	-1.5%	18.2%	21.2%
Tuscola	-5.3%	-2.1%	21.0%	21.8%
Van Buren	-0.3%	-2.3%	18.7%	21.7%
Washtenaw	13.4%	13.7%	14.6%	21.3%
Wayne	-0.6%	6.1%	15.8%	19.0%
City of Detroit	-3.6%	4.6%	-	19.1%
Rest of Wayne County	1.1%	7.0%	-	19.0%
Wexford	6.7%	0.6%	19.6%	24.3%

Conclusion

Over the past two-plus years, Michigan's economy has weathered the COVID-19 pandemic, an event that none of us could have predicted when we conducted our last long-run outlook for MDOT in 2017. Our short-run expectations for the state economy have shifted significantly during the rollercoaster ride that has been the economic recovery. In the near term, the major risk to the state economy has shifted from the pandemic itself to high inflation and the possibility of a new recession as the Federal Reserve tries to cool off the economy. Looking at the longer term, though, Michigan faces challenges of a different nature.

As we have shown in this report, demographic trends will severely limit Michigan's population and employment growth over the next 30 years. With natural growth expected to decline and eventually turn negative, and domestic outmigration expected generally to continue, albeit at a slower rate, what growth we can achieve will be sustained by the number of international migrants we attract. We project statewide employment to increase through 2050, but Michigan's share of total U.S. employment will continue to fall due to demographic limits. On the bright side, we project Michigan's real personal income per capita to increase by 1.6 percent per year despite these limited employment gains.

Thankfully, Michigan's storied history in the auto industry is likely to help maintain our share of U.S. employment in motor vehicle manufacturing. Still, in level terms, we forecast Michigan's employment in motor vehicle manufacturing to decline by 2050—how soon and how much will be determined by how quickly the industry shifts to electric vehicles.

Labor shortages will continue to pose a challenge. Michigan's population aged 25 to 64 is expected to decline by 145,000 between 2020 and 2029. That means that employers are likely to face a difficult time finding workers over the remaining part of the decade. Conversely, Michigan's population aged 65 or older has been increasing rapidly recently, and it will continue to do so through 2037. By that time, we project that people aged 65 and older will account for 22.8 percent of Michigan's total population. To put that in perspective, people 65 and older currently account for 21.1 percent of the population in Florida. The rapid aging of Michigan's population means that by 2027, Michigan will look as old as Florida does today, and by the middle of the next decade, Michigan will look even older.

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