Monthly Labor Review

October 2019

Projections overview and highlights, 2018–28

Employment growth is projected to slow during the 2018 to 2028 decade because of slowing population growth and changing demographics. As the population ages, the labor force participation rate is projected to decline. The demand for healthcare from the aging baby-boomer generation will drive employment growth in healthcare and related industries and occupations.

The U.S. Bureau of Labor Statistics (BLS) projects that overall employment growth will be 5.2 percent from 2018 to 2028, slower than during the prior projections decade (2016 to 2026). Growth of the labor force is projected to continue to slow because of changing demographics and a slowdown in population growth. In addition, since the base year of the projections (2018) follows a long economic expansion, projected economic growth is muted because BLS assumes a full employment economy in the target year (2028). From 2018 to 2028, many new jobs and rapid employment growth are projected in healthcare and related industries and occupations, because of increasing demand from the aging population and those with chronic conditions.

This article presents an overview of the 2018–28 projections. Highlights include the following:

- The labor force is projected to increase by 8.9 million people, to 171.0 million in 2028, for a compound annual rate of 0.5 percent. The labor force participation rate is projected to decline from 62.9 percent in 2018 to 61.2 percent in 2028.
- Gross domestic production (GDP) is projected to grow 1.8 percent annually over the projections period, the same rate as during the prior decade (2008–18), but lower than earlier decades.

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- Real output is projected to increase by $6.8 trillion, to over $40.0 trillion in 2028. This amount is larger than the increase of $4.3 trillion from 2008 to 2018.
- Healthcare occupations and those related to healthcare are projected to account for 18 of the 30 fastest growing occupations. Other occupations projected to grow rapidly include computer and math occupations and those involved in alternative energy production.

Over the next 10 years, the population and the labor force will grow slower than they have historically. The labor force participation rate will continue to decline, although more slowly than in the prior decade. In some subgroups, labor force participation is projected to increase. The labor force participation rate for people ages 65 and older is projected to grow. Women in the prime-age working group, ages 25 to 54, are projected to increase their participation rate slightly. All of these projections are based on the current structural trends within the economy.

The total real output of the service-providing sectors is projected to grow slightly faster than that of the overall economy from 2018 to 2028. Although employment in the goods-producing sectors is projected to grow by an annual rate of 0.1 percent from 2018 to 2028, real output in those sectors is projected to grow 1.6 percent annually over the decade.

By 2028, the service-providing sectors are projected to account for more than 85 percent of all wage and salary jobs in the economy and for most of the job growth. The healthcare and social assistance sector will account for more than 40 percent of the jobs added over the projections period.

Employment is projected to grow 5.2 percent overall from 2018 to 2028, slower than the 7.4-percent growth rate projected for the 2016–26 decade. Employment growth from 2018 to 2028 is projected to be largest in occupational groups that provide healthcare and related services and in the food preparation and serving occupations and computer and mathematical occupations groups. Three occupational groups are projected to lose jobs—production occupations, office and administrative support occupations, and sales and related occupations.

Preparing the projections—methodology overview

BLS prepares projections in four areas: population and labor force, aggregate demand, industry output and employment, and occupational employment. Each step in the projections process affects those that follow. The expectations for the population affect those for the labor force, which in turn affect the projections of productivity and GDP growth. These projections further affect output and employment at the industry level, which then limit occupational employment projections.

BLS makes labor force projections by applying U.S. Census Bureau population projections to BLS projections of the labor force participation rate. In the BLS labor force model, population growth and changes in participation rates are the main factors in labor force growth. However, most of the changes in labor force growth are because of changes in the population. The current BLS labor force projection to 2028 is based on the 2017

national population projections made by the U.S. Census Bureau and includes assumptions about future fertility and mortality rates of the U.S. population. Also included are assumptions about immigration, an important but uncertain factor affecting the size of the future labor force (immigration data are from the Census Bureau).

Because labor force growth is one of the major determinants of long-term economic growth, labor force projections describe the future path of the economy and its capacity to create goods and services. The long-term gradual slowdown in the labor force growth continues to be key in determining the growth of the economy and of employment.

BLS develops macroeconomic projections with a model licensed from Macroeconomic Advisers (MA) by IHS Markit.[1] Energy prices come from the Energy Information Agency (EIA), and BLS determines other critical variables and supplies them to the MA model exogenously.[2] The MA model then projects economic aggregates, including total employment, output, productivity, prices, interest rates, and many other variables for the U.S. economy. These variables, most importantly nonfarm payroll employment, labor productivity, and GDP, serve as constraints for the industry output and employment projections. These critical variables set the parameters for the nation's economic growth and set the trend that GDP will follow and the number of jobs needed to support that trend.

BLS produces model-based projections for hundreds of detailed industries that are then summed to subsectors and sectors. Macroeconomic factors, such as the labor force, GDP and its components, and labor productivity, affect the growth in total employment. These factors, as well as the projections models for the individual industries, determine the final projections of industry employment and output.

BLS produces occupational employment projections by analyzing current and projected future staffing patterns (the distribution of occupations within an industry) in an industry−occupation matrix. Changes in the staffing pattern for each industry are projected and applied to the final industry projections, yielding detailed occupational projections by industry. This projected employment matrix includes estimates for 809 occupations across 295 industries.[3]

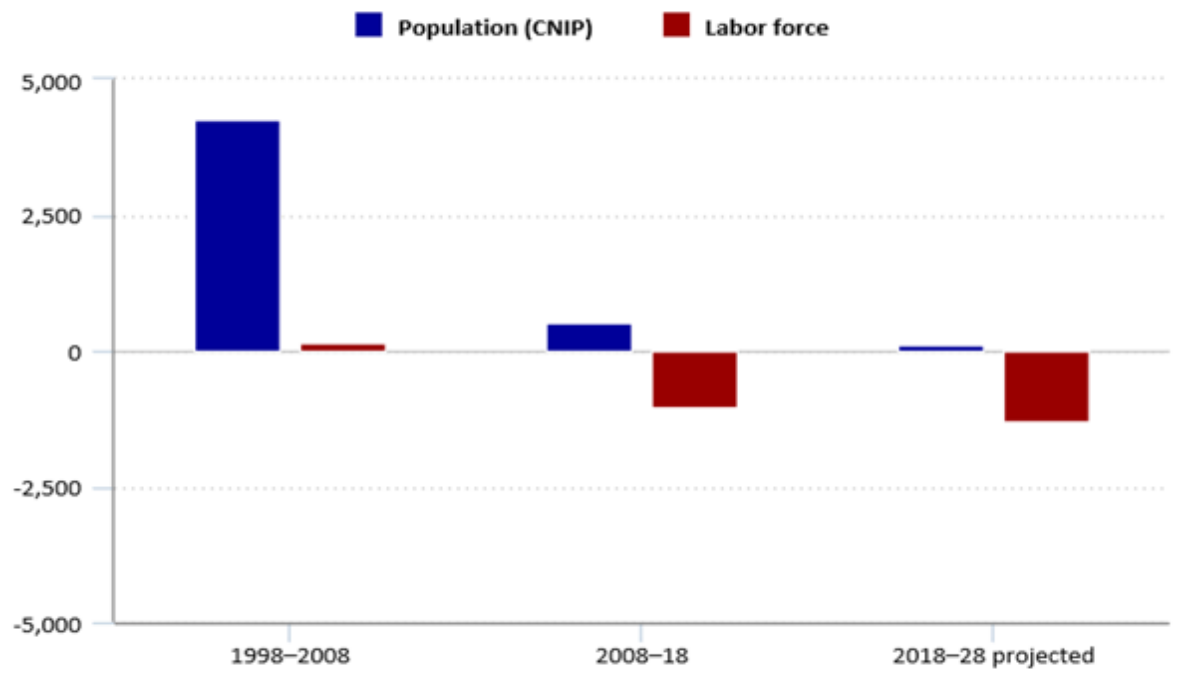
The current projections, for 2018 to 2028, are the last set released biennially. Future projections will be released annually beginning with the publication of the 2019-to-2029 projections in 2020.

Population and labor force

The labor force is the driving factor behind the U.S. economy, growing since the United States began tracking it. The growth slowed over the past 10 years, however. This slowdown is attributable to a population growth slowdown and demographic changes. These structural changes are expected to continue, resulting in relatively muted labor force growth over the 2018–28 BLS projections period, compared with prior history. The labor force is projected to increase by 8.9 million people, 0.5 percent annually, to 171.0 million in 2028.

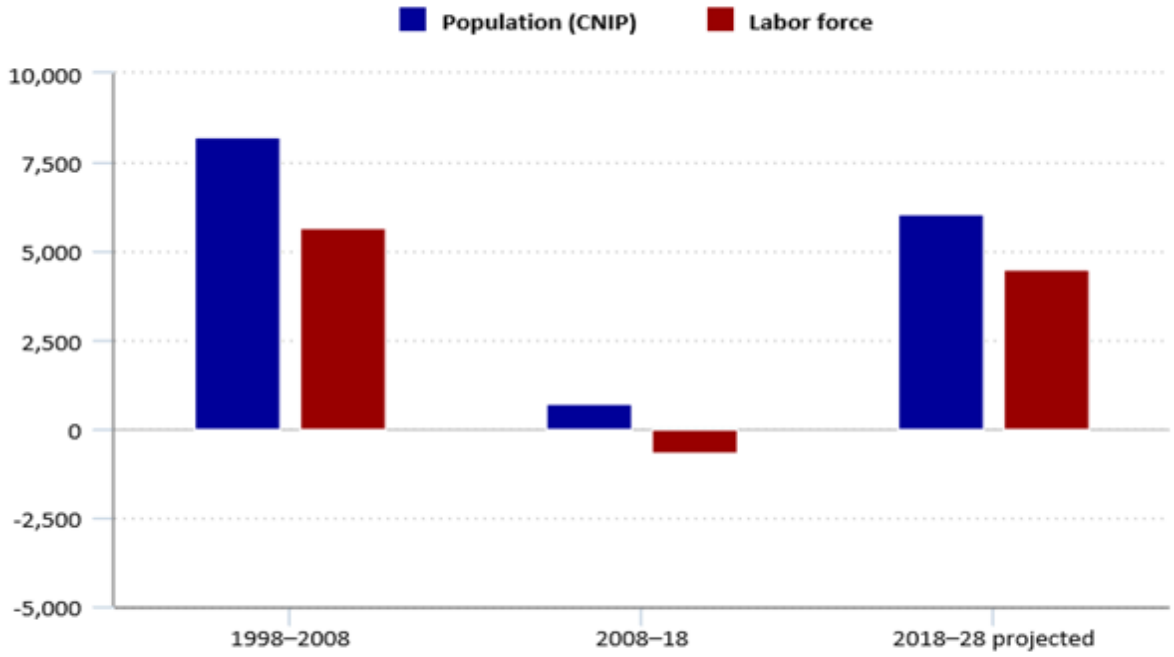
The labor force growth rate of 0.5 percent annually over the oncoming decade is low historically. This growth reflects structural and demographic shifts. Overall population growth has slowed, and the share of the portion of the population most likely to work, those ages 25 to 54, has declined. Growth in the labor force has been driven entirely by those ages 55 and older over the past 10 years. The rest of the labor force actually declined over that time span. (See figure 1a−c.)

Figure 1a. Change in population and labor force (in thousands), ages 16–24

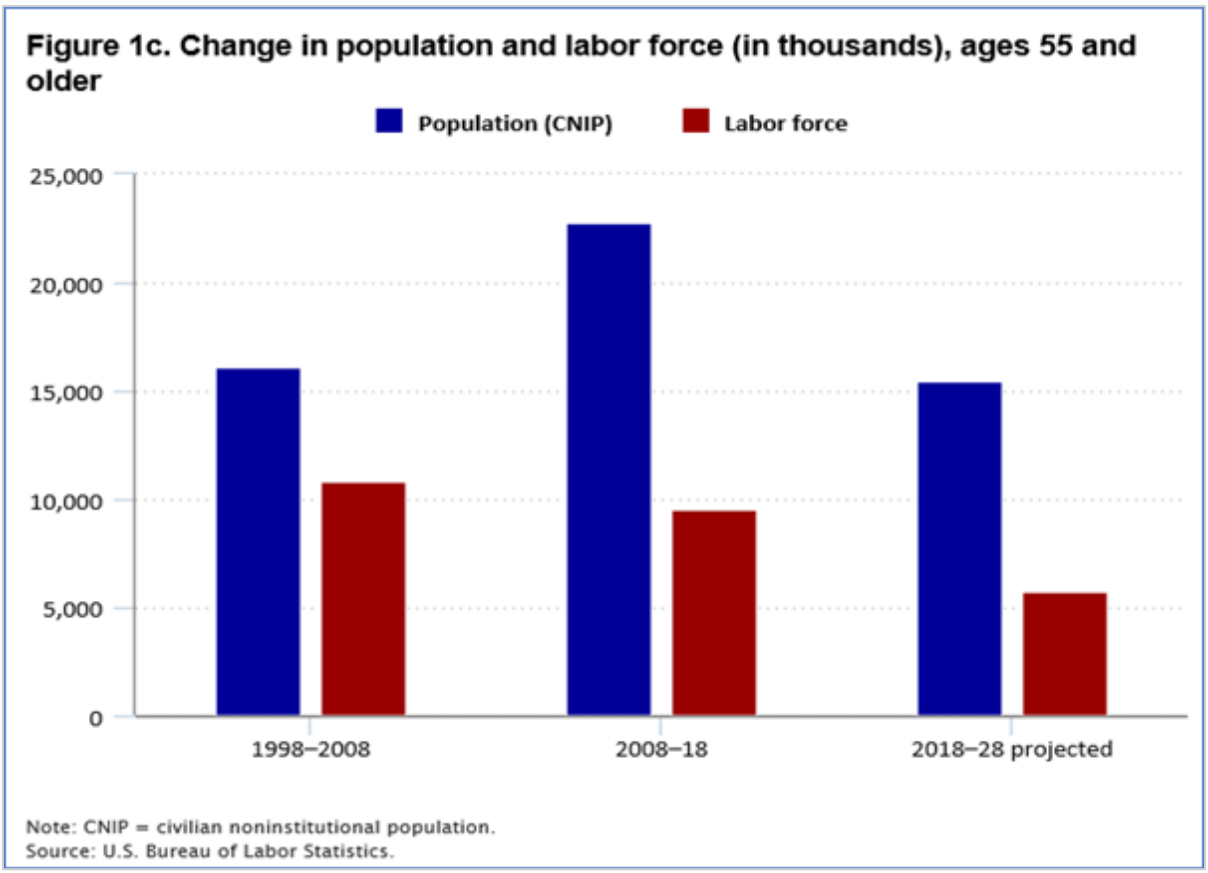


Note: CNIP = civilian noninstitutional population.
Source: U.S. Bureau of Labor Statistics.

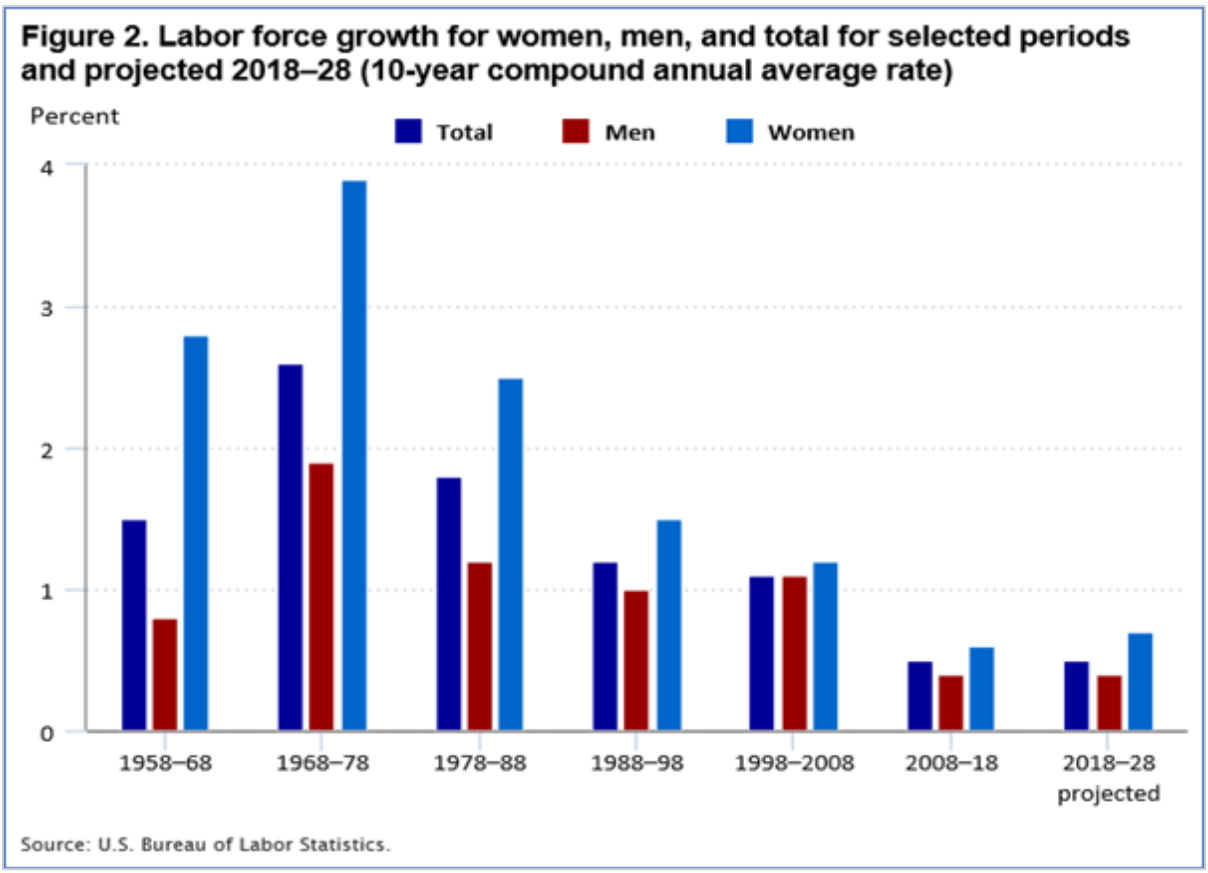
Figure 1b. Change in population and labor force (in thousands), ages 25–54



Note: CNIP = civilian noninstitutional population.
Source: U.S. Bureau of Labor Statistics.



In addition, women are no longer contributing to as much growth in the labor force as they have in the past. Over the second half of the 20th century, women were entering the labor force at greater rates than men, contributing to historic increases in overall labor force growth. Had women not been entering the workforce, the overall growth rate would not have been notable. (See figure 2.) Women's labor force growth began to slow down in the end of the century. The women's labor force growth has been a little higher than the men's in the last two decades. Women no longer entering the workforce at a higher rate and slower population growth are the main drivers of lackluster labor force growth.



Population growth and demographic shifts

BLS relies on overall population projections from the U.S. Census Bureau, including birth rates and net migration. These population projections are converted to civilian noninstitutional population projections.[4] This conversion ensures consistency with the labor force concept and definition. The civilian noninstitutional population will hereafter be referred to as “the population.”

Population growth has slowed recently. The slow growth is driven primarily by lower birth rates and flat net migration.[5] People joining the labor force through 2028 are at least 6 years old in the base year of 2018. Their impacts on the population and the labor force are already determined. Net migration, on the other hand, is a more uncertain projection component. Net migration has been declining since the late 1990s.[6] It is expected to remain flat, at approximately 1 million incoming migrants a year over the projection period.[7] Together, birth rates and the net migration result in a projected population growth of 0.8 percent annually over the upcoming decade—to 279.5 million. This percentage is slightly slower than the 2008–18 decade rate, when the population grew 1.0 percent.

Population growth is not uniform among age groups. For the youngest age group, ages 16 to 24, annual growth is projected to be flat. The prime-working-age population, those ages 25 to 54, is projected to grow 0.5 percent a year. In contrast, the population older than age 55 is projected to grow at a relatively high 1.5-percent annual growth as the baby boomers age into this group. (See figure 1.) Most of the population growth and labor force growth over the past 20 years have come from the 55-years-and-older group, and this group is projected to

continue growing the fastest among the age groups over the next 10 years. An outcome of these growth patterns is a declining overall labor force participation rate.

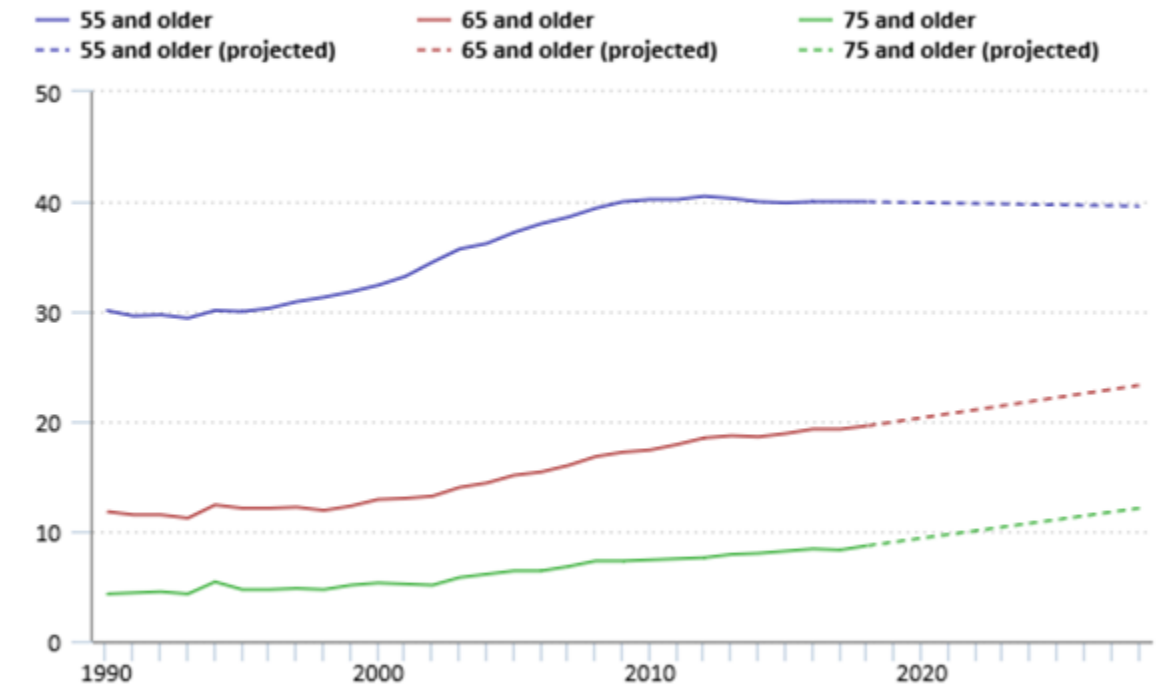
Aging of the population and its effect on the participation rate

The labor force participation rate is driven by many underlying structural effects. The overall participation rate peaked at 67.1 percent in 2000, as the surge from women entering the workforce ebbed (the women's participation rate peaked at 60.0 percent in 1999). While one effect waned, another—the aging of the population—has accelerated. As a larger proportion of the population is exiting the primary working age range (ages 25–54), the effect is to drive down the participation rate, because people ages 55 and older are less likely to work. From its peak of 67.1 percent in 2000, the total participation rate declined to 62.9 percent in 2018. This decline is expected to continue—though at a slower rate—and should reach 61.2 percent in 2028.

The participation rate of older people

Older people, particularly those 65 to 74 and those 75 and older, are increasingly participating in the labor force more than they have historically. (See figure 3.) This increase in participation is made possible, in part, by U.S. job growth being in service sector jobs rather than in more physically taxing "blue collar" jobs, such as manufacturing and construction.[8] Lack of sufficient retirement savings and employer-provided health insurance may be further reasons for some older workers to stay in the labor force. Another reason may be an employer's increased willingness to hire and retain older workers who may have institutional knowledge that is not easily replaceable.[9]

Figure 3. Labor force participation rates, historic and projected, by age, 1990 to projected 2028

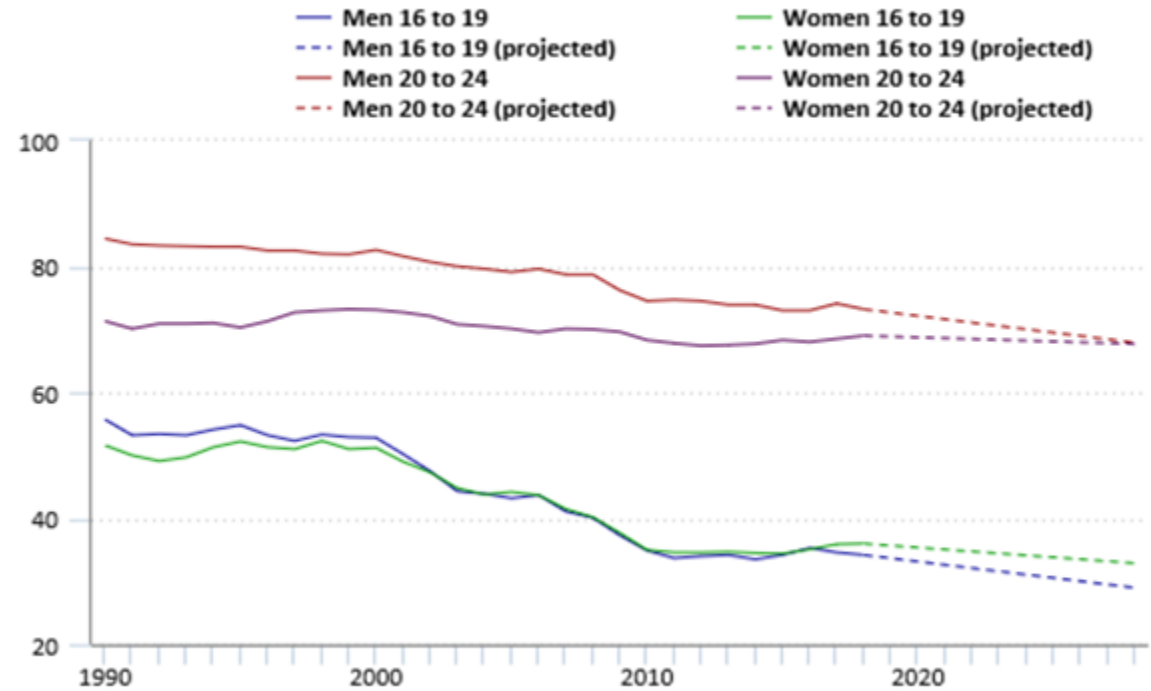


Source: U.S. Bureau of Labor Statistics.

The participation rate of younger people

The younger group, those 16 to 24, saw large declines in participation rates over the last 10 years. This younger group can be split out further into those 16 to 19 and those 20 to 24. While both groups have seen substantially lower participation rates, for those ages 20 to 24, this decline in participation has been driven by men. (See figure 4.) The women's participation rate for 20-to-24-year-olds fell minimally, on net, over the past decade. Both the women's and men's participation rates for the 16-to-19-year-old groups declined during the last 10 years. These differences suggest that structural effects for the 16-to-19-year-olds are different than those for people ages 20 to 24.

Figure 4. Labor force participation rates, historic and projected, by gender and age, 1990 to projected 2028



Source: U.S. Bureau of Labor Statistics.

Part of this decrease, especially for those ages 16 to 19, is likely due to reduced opportunities to work combined with increased time spent in school. Many jobs that were traditionally considered "after-school" or "summer" jobs available to teens are increasingly being held by older workers.[10] The percentage of the population completing college continues to increase as well.[11] Many of those attending college forgo entering the labor force during this time to concentrate on studies. This decision also contributes to the lower participation rates for young people. Another factor likely contributing to lower participation rates, particularly for young men, is increased leisure time (often more time being spent playing video games and using the computer recreationally).[12] The extent to which each of these factors may be affecting the youth participation rate is unclear, and there is no indication the factors will change. Therefore, the overall declining trend is projected to continue. Participation rates for those ages 16 to 24 are projected to continue declining over the next decade, similar to their behavior over the past 10 years.

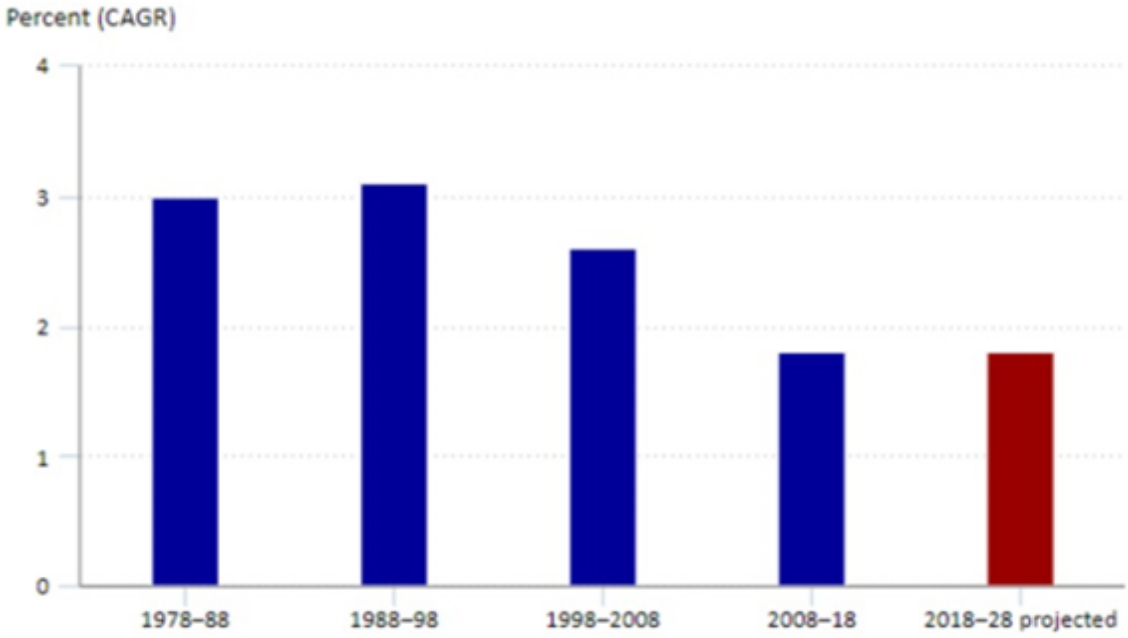
Aggregate demand

The labor force projections are crucial for the next step—projecting the nation's overall economic growth, commonly referred to as "GDP." In addition to the labor force, other critical macroeconomic variables set the parameters for economic growth. These variables and GDP will be discussed further in this article.

To remove cyclicality from the projections, BLS uses a full employment assumption in the target year (2028). This assumption essentially states that the economy is toward the top of an expansion or business cycle peak. More technically, the full employment assumption asserts that the economy is operating at a high rate of resource utilization while output growth is sustainable.[13]

While the full employment assumption eliminates cyclicality in projected levels, some cyclicality can remain in the growth rates. If the base year of the projections is during a recession, one would expect growth rates to be somewhat higher in the projected year, because there is more room to grow. If the base year occurs after a long economic expansion (the current economic environment), growth rates can be expected to be somewhat lower over the projection period. This result is one of the main drivers behind the seemingly low economic growth projected over the next 10 years, relative to history (for both GDP and other macroeconomic variables explained further). In addition, the changing demographics and lower participation rate are important contributors to lower growth rates. GDP is projected to grow 1.8 percent annually over the next decade. (See figure 5.)

Figure 5. Gross domestic product, 10-year CAGR, 1978–2018 and projected 2018–28



Note: CAGR = compound annual growth rate.
Source: U.S. Bureau of Labor Statistics.

Nonaccelerating inflation rate of unemployment

While the labor force is critical to economic growth, not everyone in the labor force is working. There are always individuals in the labor force not working (frictional unemployment) as they transition from one job to another. Also, other people may be unemployed for economic reasons for longer periods (structural unemployment). However, when the economy is at full employment, this type of unemployment is minimal to nonexistent. Unemployment associated with an economy at full employment is referred to as the “nonaccelerating inflation rate of unemployment” or NAIRU. If even fewer people are unemployed then the NAIRU suggests, the inflation rate tends to accelerate, hence the name. The unemployment rate has recently gone below NAIRU: in 2018, the unemployment rate was 3.9 percent. Current estimates of NAIRU are at 4.6 percent, which is what BLS projects the unemployment rate to rise to in 2028.[14]

Productivity and its components

Productivity, calculated as GDP divided by the total hours worked in the economy, affects total output. The higher the productivity, the more goods and services are produced by each worker. Productivity can increase in numerous ways. Increased investment in capital is the most notable source of productivity gains. Technological advances, education or quality of the workforce, improvements in management practices, and economies of scale can also increase productivity. Capital stocks can be quantified—increases in capital relative to labor throughout the economy are referred to as “capital deepening.” The other sources are much harder to measure and are generally lumped together in a term referred to as “total factor productivity” or TFP.

Over the past 10 years, capital deepening resulted in a substantial proportion of productivity increases—0.8 percentage point of the total 1.3-percent growth rate. This percentage stems from the anemic TFP growth (0.4 percentage point) rather than inordinate growth in capital deepening. Over the next 10 years, BLS projects TFP growth to pick up some, though not to levels experienced prior to the most recent decade. Capital deepening growth is expected to rise slightly. Overall, productivity is expected to grow 1.6 percent annually. (See figure 6.)

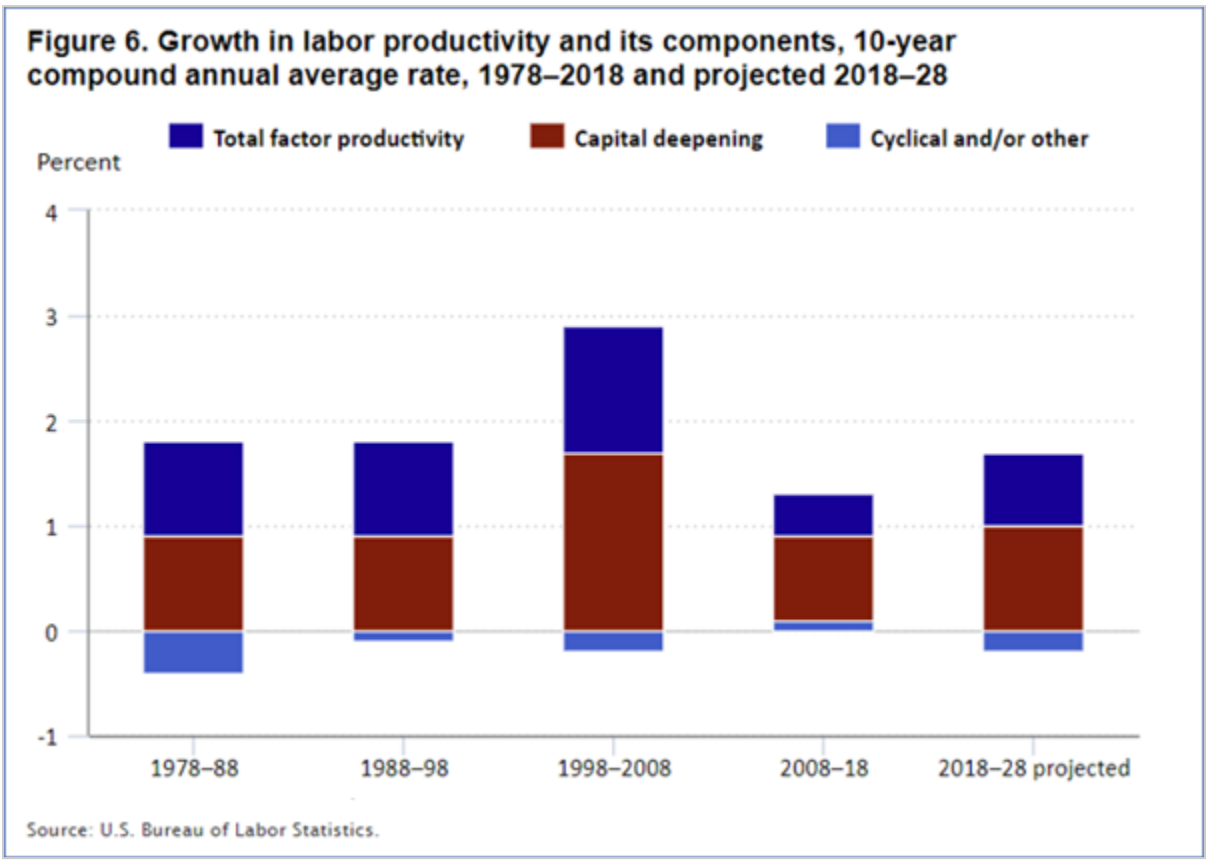
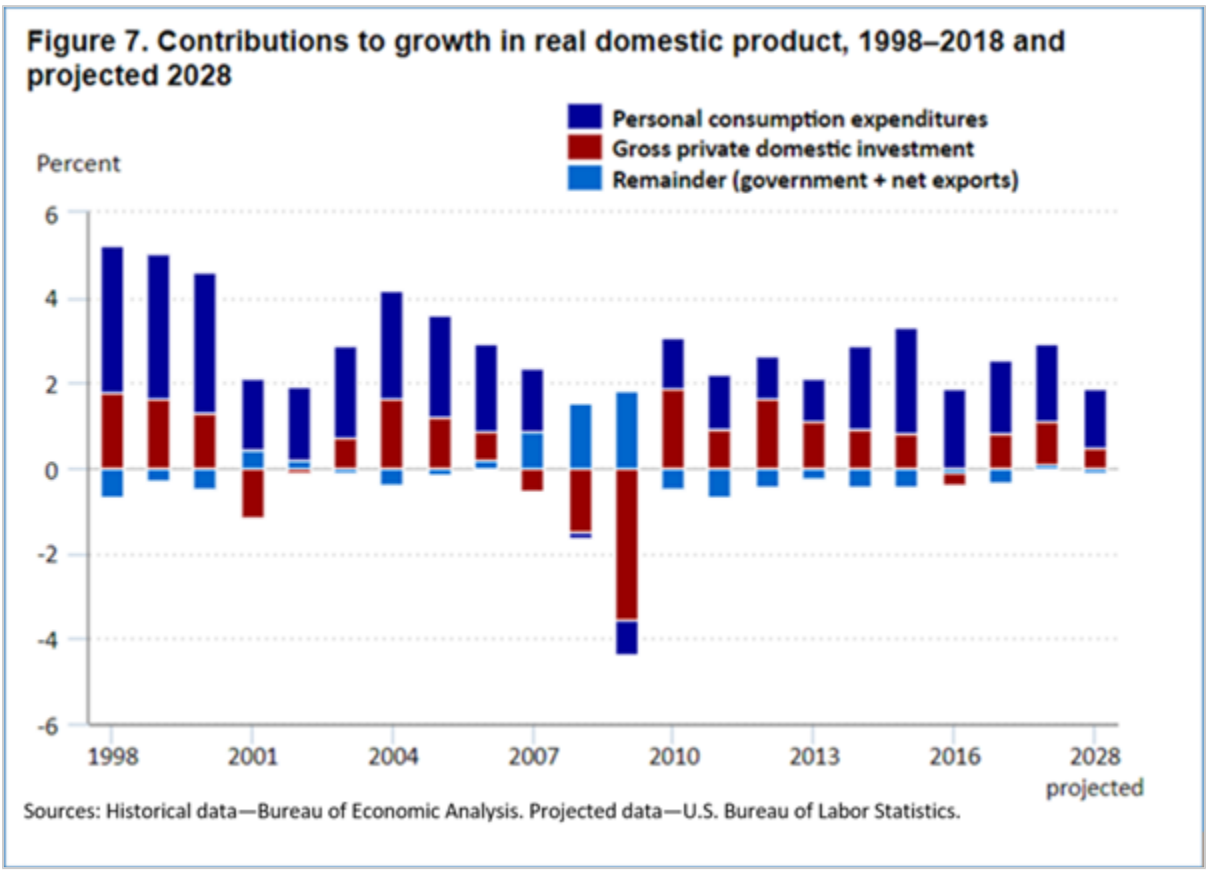


Figure 6. Growth in labor productivity and its components, 10-year compound annual average rate, 1978–2018 and projected 2018–28

GDP components: private investment, consumption, government spending, and exports

The deferred or slowing of investment during the recent recession followed by a rebound immediately after can be seen in figure 7. From 2007 through 2009, gross private investment declined, pulling down GDP. In those years, high government spending and net exports growth offset some of this decline. Personal consumption expenditures (PCE) also fell, but not nearly to the extent that private investment did. Immediately after the 2007–09 recession, investment bounced back and accounted for most of GDP growth in 2010. This result is unusual since PCE growth is generally larger than investment. The usual dynamic occurred in most years following the recent recession. Private investment and PCE growth were both positive; PCE accounted for most of the GDP growth while government and net export growth made a minimal impact. This is the relationship BLS projects going forward, with investment growth being responsible for 0.5 percentage point of overall annual GDP growth and PCE responsible for 1.4 percentage points.



Fiscal and monetary policy

As the economic expansion has continued, the Federal Reserve (referred to as “the Fed” or “Fed” hereafter) started raising the federal funds rate, although these increases have recently been halted, and the rate was lowered in late July 2019. As these projections were being developed, the yield on the 10-year Treasury Constant Maturity Index was declining.[15] The 10-year Treasury yield fell from over 3.0 percent in November 2018 to slightly above 1.6 percent in August 2019. There has been a yield inversion because short-term Treasury notes have been less responsive to Fed actions.[16]

While longer term U.S. rates have declined, they are still high relative to other countries. (The United Kingdom 10-year government bonds yielded 0.8 percent while Germany and Japan 10-year yields were negative at the time of publication of this article.) These low yields indicate low growth expectations among these countries and entice foreigners to purchase more U.S. Treasury securities, which further reduces U.S. yields. These reasons may be more responsible for low interest rates and the inverted yield curve than Fed actions.[17]

BLS projects the yield curve to normalize and rates to generally rise higher. In 2028, the 90-day Treasury bill rate is projected to be 2.8 percent and the 10-year Treasury note to yield 3.5 percent. The federal funds rate is projected to be 2.6 percent.

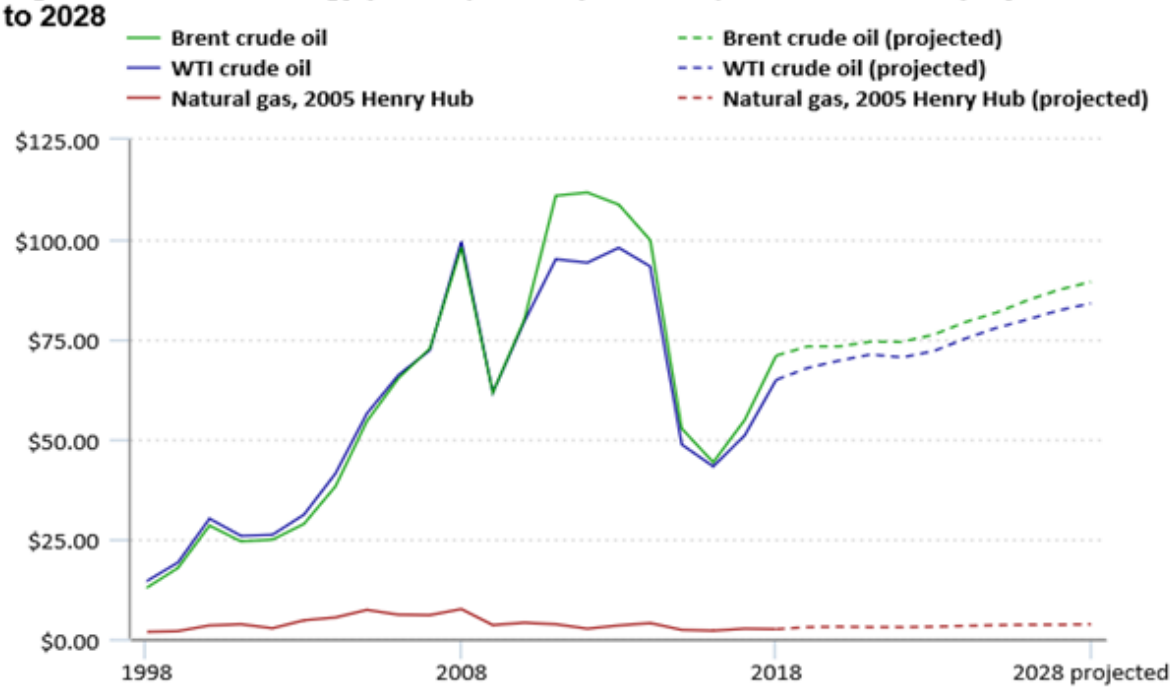
Assumptions about fiscal policy, including tax policies and government spending, substantially affect expectations for government revenue, national debt, and economic growth. BLS generally assumes no major

changes to current tax laws over the projections decade. Effective marginal tax rates are also held constant at their current levels.

Energy prices

Energy prices, notably oil, are an additional factor affecting GDP. Generally, increases in energy prices are associated with less economic growth, particularly in the PCE component of GDP.[18] A surge in oil prices occurred in 2011 when oil topped $100 per barrel (Brent crude). It stayed above $100 through 2014 before dramatically falling to under $50 per barrel in 2016. It has since risen modestly to $71 per barrel in 2018. Brent oil is projected to rise modestly, to $89 per barrel in 2028. (See figure 8.) As mentioned earlier, energy projections come from the EIA long-term energy projections[19] and are overwritten into the MA/U.S. model.[20]

Figure 8. Nominal energy prices (dollars per barrel), 1998–2018 and projected to 2028



Note: WTI = West Texas Intermediate.
Source: U.S. Energy Information Administration.

Output and employment projections

BLS projects that output will increase more during the 2018–28 decade than it did during the previous decade, while employment growth will be slower. Industry output and employment projections were prepared with the use of the North American Industry Classification System (NAICS). Major sectors—hereafter referred to as “sectors”—are aggregations of NAICS industries. Occupational employment projections use the 2010 Standard Occupational Classification System (SOC).

Industry output

BLS projects that real output will increase from just over $33.2 trillion in 2018 to over $40.0 trillion in 2028.[21] The more than $6.8 trillion increase is larger than the 2008–18 increase of $4.3 trillion. Most of the increase in real output is projected to come from nonagricultural sectors, specifically service-providing sectors.

Sector output

Real output in the service-providing sectors is projected to grow at an annual rate of 2.0 percent from 2018 to 2028, which is faster than the 1.7-percent growth rate experienced from 2008 to 2018.[22] Over the 2018–28 decade, this 2.0-percent projected growth in output is about the same as the 1.9-percent projected growth for the entire economy. All service-providing sectors are projected to experience real output growth over the projections decade, except the federal government sector—it is projected to decline slightly, at 0.1 percent annually. The healthcare and social assistance sector is expected to have the fastest growth among service-providing sectors, increasing at a 2.9-percent annual rate.

Real output in the nonagricultural goods-producing sectors is projected to grow 1.6 percent a year from 2018 to 2028, which is lower than the expected growth rate for the overall economy. However, the expected growth is much faster than the 0.5-percent increase experienced by nonagricultural goods-producing sectors from 2008 to 2018. The mining sector is expected to have the fastest growth in real output, increasing annually at 3.4 percent.

The agricultural sectors (which include forestry, fishing, and hunting, and crop and animal production) are projected to grow 1.9 percent annually during the 2018–28 decade. This increase is faster than the 1.3-percent annual increase in the agricultural sectors from 2008 to 2018.

Fastest growing output

The information sector is projected to have 4 of the 20 fastest growing real output industries, which includes the fastest growing real output industry in the economy—the software publishers industry. The increased needs for Internet of Things devices, network security, cloud computing, and Web publishing are driving the rise in the projected real output of the sector.

The healthcare and social assistance sector includes 8 of the 20 industries with the fastest growing real output. The offices of other health practitioners industry, the offices of physicians industry, and the individual and family services industry are 3 of the 8 fastest growing industries. The aging of the population and an expected rise in chronic conditions, such as diabetes, will increase demand of all types of healthcare services and social services geared toward older people.

Most rapidly declining output

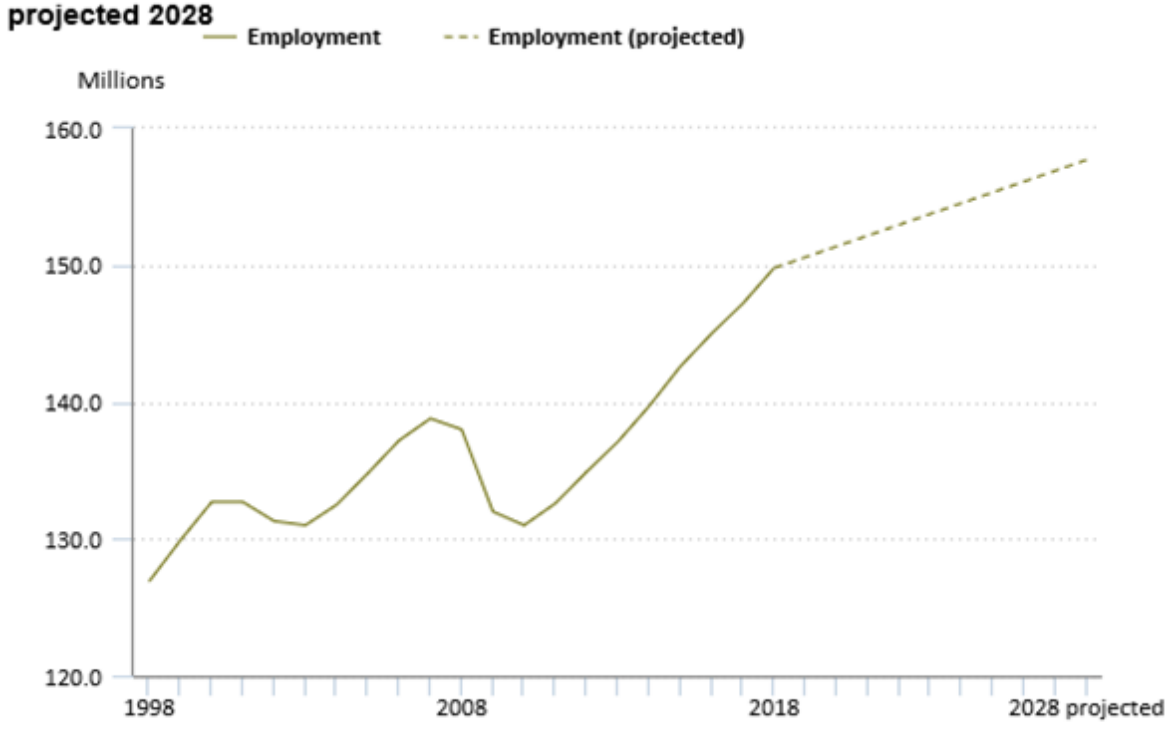
The manufacturing sector has 2 of the 9 industries expected to have a decline in real output. The tobacco manufacturing industry is projected to have the largest decline in output of all industries, falling 3.6 percent annually over the projections decade. The continued decline in the rate of people who use tobacco products is one of the reasons for the industry's drop in output. The hardware manufacturing industry is the third fastest declining industry.

The federal government sector has 6 of the 9 industries that are expected to decline in real output, largely because of pressure to reduce government spending to lower the budget deficit. The Postal Service industry is projected to have the second largest decline in output of all industries, falling 1.7 percent annually over the projections decade. The increased use of the internet for communication—such as social media and email, along with online bill payment and digital subscriptions—are factors affecting this decline.

Industry and occupational employment projections

BLS projects that total employment in 2028 will reach over 169.4 million, an increase from 2018 of about 8.4 million.[23] This increase represents a 0.5-percent annual rate of growth, which is slower than the 0.8-percent annual rate of growth experienced from 2008 to 2018. Most of the increase in employment, about 94 percent, is for nonagricultural wage and salary workers. Their employment is projected to rise from just over 149.8 million in 2018 to about 157.7 million in 2028, an increase of almost 7.9 million jobs.[24] (See figure 9.) This increase is less than the 11.8 million jobs that were added from 2008 to 2018.

Figure 9. Total nonagricultural wage and salary employment, 1998–2018 and projected 2028



Source: U.S. Bureau of Labor Statistics.

The labor force and changing demographics in the population affect employment growth, just as they affect GDP and other macroeconomic measures. Since the base year (2018) occurs after a long economic expansion, growth rates can be expected to be somewhat lower than in the previous projections cycles. In addition, an aging population leads to a declining participation rate, limiting the number of workers available for employment.

Industry sector employment

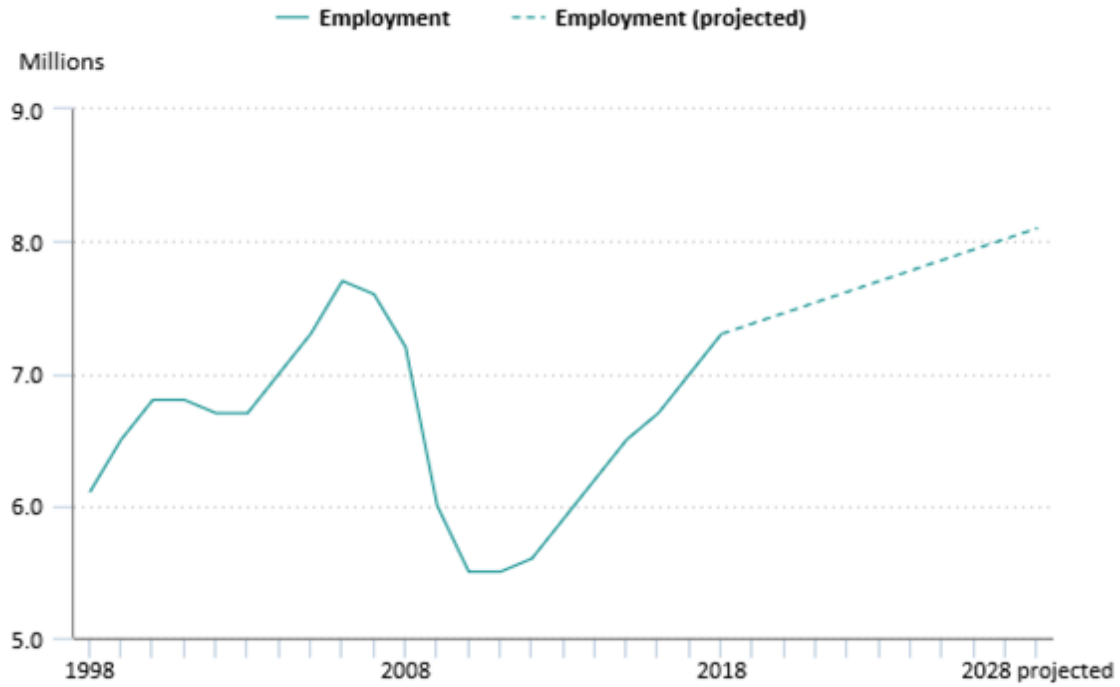
The service-providing sectors are projected to add more than 7.6 million jobs, to reach about 136.8 million jobs by 2028. This increase represents just over 91 percent of all jobs added from 2018 to 2028. Employment in the service-providing sectors is projected to grow 0.6 percent annually from 2018 to 2028, which is slightly faster than the 0.5-percent growth rate in jobs for the entire economy. (See table 1.) However, this growth rate is slower than the 1.0-percent annual growth that the sectors experienced from 2008 to 2018.

As with the last four sets of projections, the healthcare and social assistance sector is projected to have the most employment growth. The sector is projected to increase by almost 3.4 million jobs and to reach over 23.3 million jobs in 2028. Employment in the healthcare and social assistance sector is projected to grow at a 1.6-percent annual rate, which is more than 3 times as fast as the overall annual growth of jobs in the entire economy. Still, this growth rate is below the 2.1-percent annual growth rate that occurred during the 2008–18 decade for the healthcare and social assistance sector.

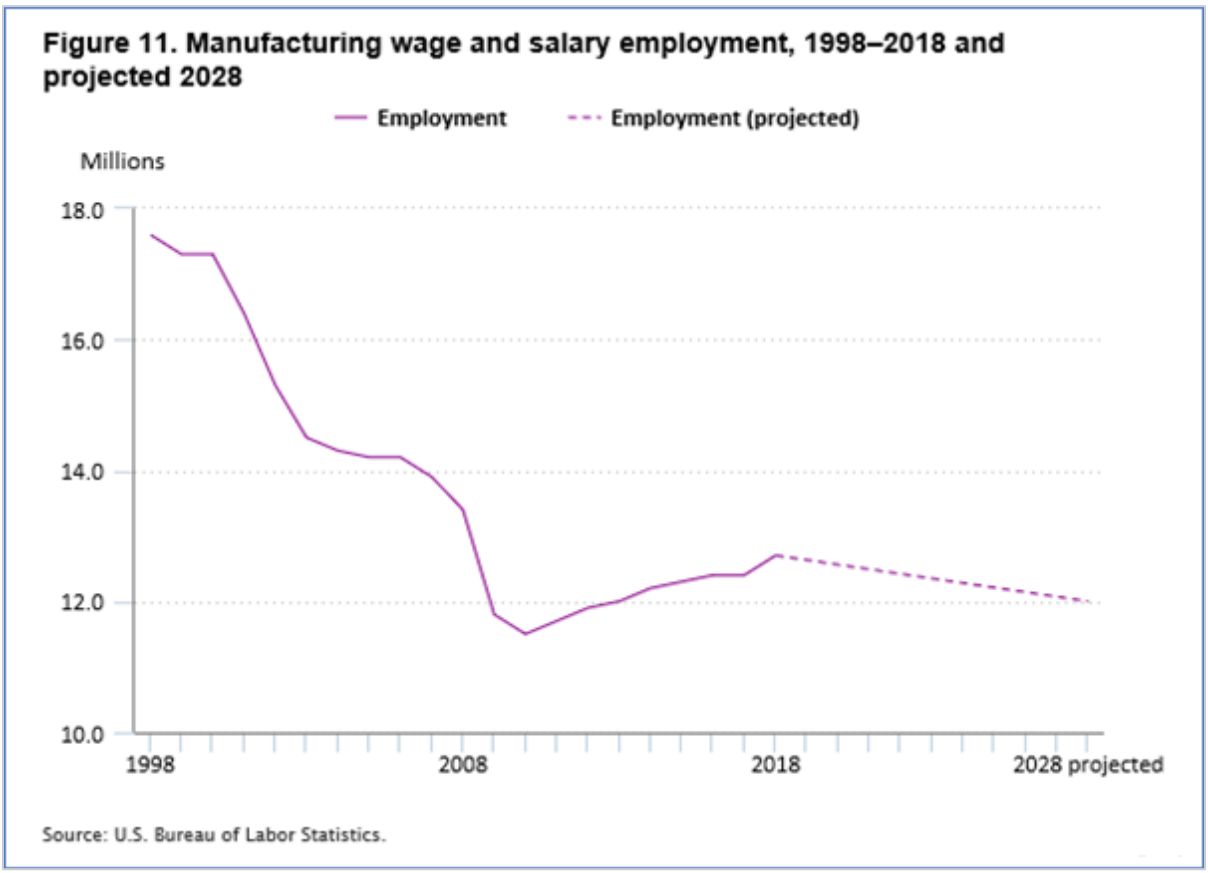
The retail trade sector is projected to have the greatest employment decline of the service-providing sectors, down 153,700 jobs over the 2018–28 decade. This decrease contrasts with the increase of 544,000 jobs over the previous decade. A shift in retail to e-commerce, which is driving up employment in the transportation and warehousing sector, contributes to the employment drop in retail trade.[25]

Employment in the goods-producing sectors excluding agriculture is projected to increase by 211,400 over the 2018–28 decade. This growth compares favorably with the loss of 616,600 jobs over the previous decade. Employment in the construction sector is expected to increase substantially, adding 807,500 jobs. This increase will bring the construction sector above its 2006 level, which was the height of construction employment, just prior to the 2007–09 recession. (See figure 10.) Manufacturing, the largest sector in this group, is projected to have the largest decrease in jobs over the 2018–28 projections decade, declining by 640,700 jobs. Although large, the loss is less than that experienced from 2008 to 2018, which was a decrease of 716,800 jobs. (See figure 11.)

Figure 10. Construction wage and salary employment, 1998–2018 and projected 2028



Source: U.S. Bureau of Labor Statistics.

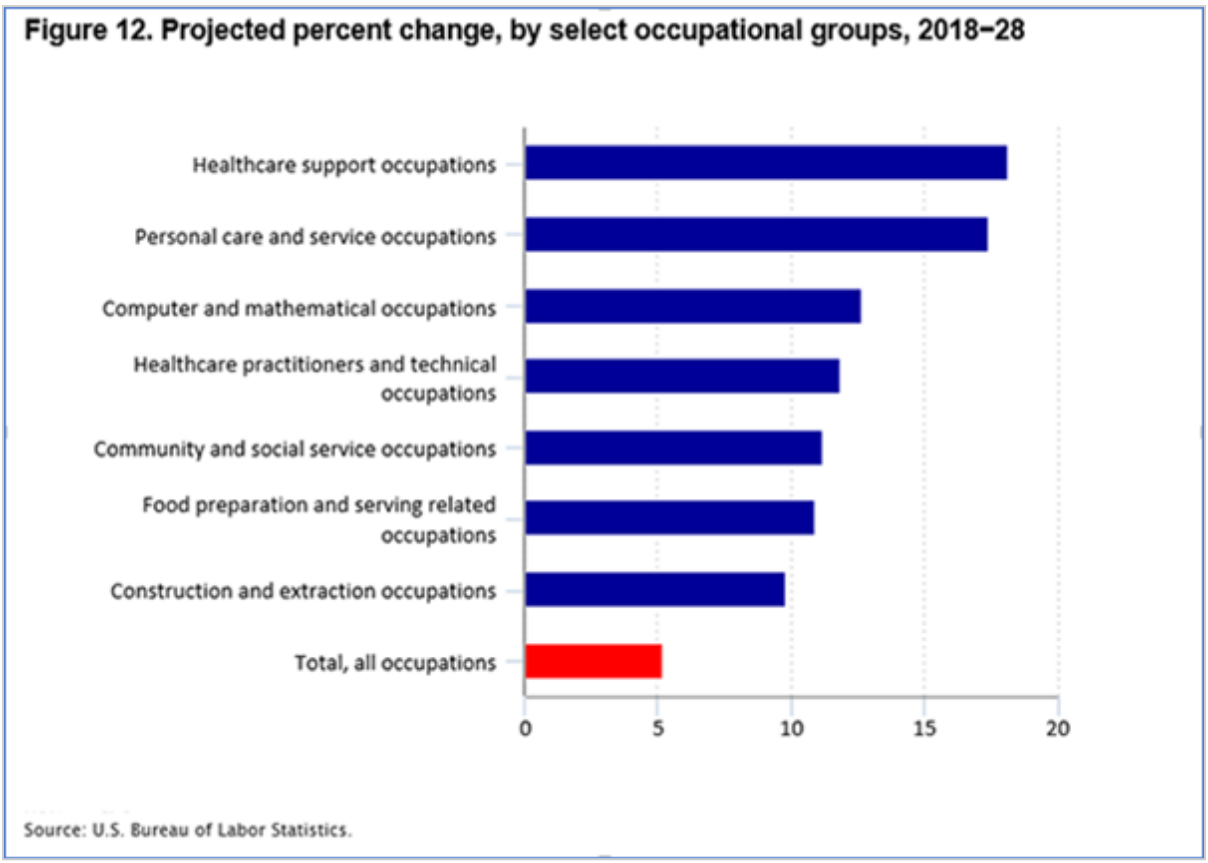


Total employment in the agriculture, forestry, fishing, and hunting sector is expected to increase by 10,600 jobs from 2018 to 2028. This increase is much smaller than the 238,600 increase experienced from 2008 to 2018. The expected lower growth is largely a result of slow employment growth in the crop production industry mainly due to increased productivity. The crop production industry is projected to add 28,900 jobs over the 2018–28 projections decade, whereas 268,900 jobs were added to crop production over the 2008–18 decade.

Occupational projections of major groups

BLS uses the 2010 SOC system to categorize occupations in 22 major groups. Occupations are classified in the SOC on the basis of the type of work performed, their tasks, and their duties; for example, statisticians, mathematicians, computer programmers, and web developers are all in the computer and mathematical occupational group. Table 2 shows the projected employment change, in terms of both numeric and percent change, for all 22 major groups.

Healthcare support is the fastest-growing occupational group, at 18.2 percent. (See figure 12.) Increased demand for healthcare and related employment is also reflected in the high projected growth rates for healthcare practitioners and technical occupations, personal care and service occupations, and community and social service occupations. Personal care and service occupations include personal care aides, the detailed occupation projected to add the most new jobs from 2018 to 2028.



Other occupational groups in which employment is projected to grow markedly faster than the average for all occupations (5.2 percent) include computer and mathematical occupations, food preparation and serving related occupations, and construction and extraction occupations. Computer occupations are expected to see job growth as various technologies expand and are adopted by more and more users. Rising incomes and a higher share of expenditures on food away from home are expected to drive growth for food preparation workers.[26] The recovery of the construction industry to near prerecession levels and the expected increase in energy prices will drive employment growth for associated occupations in construction and extraction.

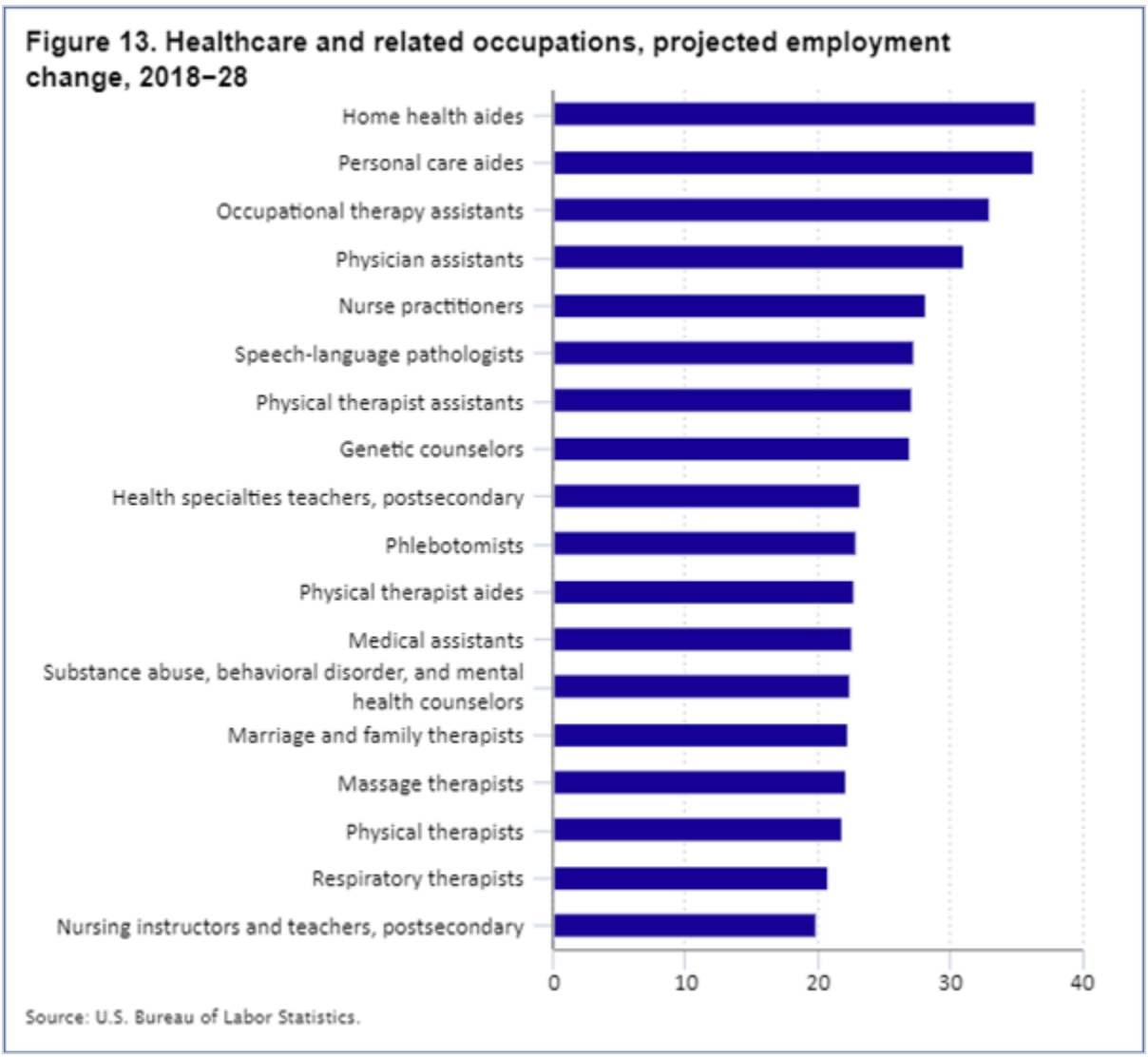
Three major occupational groups are expected to lose employment: production occupations, with a projected decline of 4.5 percent over the decade; office and administrative support occupations, with a projected decline of 2.6 percent; and sales and related occupations, with a projected decline of 0.5 percent. These employment declines will be largely because of productivity growth in the manufacturing sector, automation of clerical and administrative work, and increasing competition from e-commerce, respectively.

Fastest growing employment

Employment in the healthcare and social assistance sector is projected to grow the fastest among all sectors. It also has 7 of the 20 fastest growing industries. Factors that contribute to the large increase in the number of these jobs (and fast growth) are the needs of an aging baby-boom population, longer life expectancies, and growing rates of chronic conditions.[27] Employment in the home healthcare services industry is projected to grow the fastest over the 2018–28 projections decade, increasing annually at 4.0 percent. This rapid growth is

due to patient preferences for in-home care and shifts in federal funding toward in-home or community-based care.[28]

The projected fast growth in healthcare and social assistance sector employment is expected to increase employment substantially in many healthcare occupations from 2018 to 2028. (See figure 13.) Healthcare occupations and those associated with healthcare (including mental health) account for 18 of the 30 fastest growing occupations from 2018 to 2028. Increased demand for healthcare services by aging baby boomers and people with chronic conditions will drive the projected employment growth. Several of the fastest growing healthcare occupations—including physician assistants, nurse practitioners, medical assistants, and respiratory therapists—are projected to be in greater demand as team-based healthcare models are increasingly used to deliver healthcare services.[29] Employment in two counseling occupations also is projected to grow rapidly. Substance abuse, behavioral disorder, and mental health counselors and marriage and family therapists are projected to have fast employment growth because of increased demand for treatment of mental and behavioral issues, including opioid addiction. Two education occupations associated with healthcare—postsecondary health specialties teachers and postsecondary nursing instructors and teachers—are also among the fastest growing occupations.

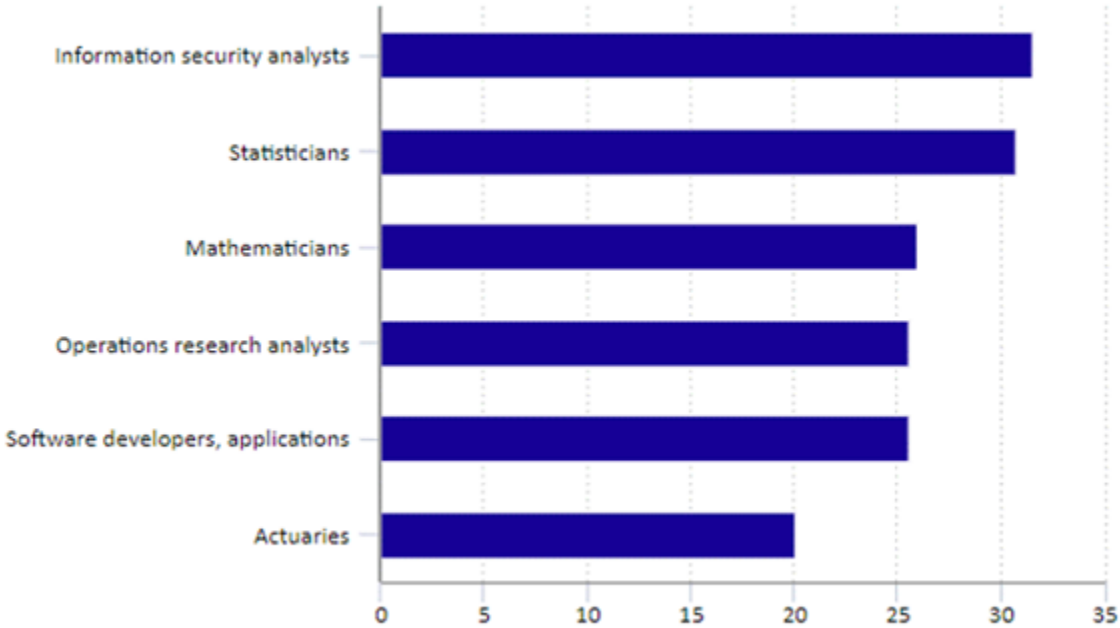


The information sector includes 3 of the 20 fastest growing industries over the projections decade. Within this sector, the other information services industry, which includes internet publishing and broadcasting and web search portals, is the fourth fastest growing industry, growing annually at 2.5 percent over the 2018–28 period. An increase in internet entertainment sites and video broadcast sites, including audio and video-streaming services, contribute to the fast employment growth.

Growth in information and related computer industries is expected to drive employment growth for several occupations in the computer and mathematical group. The computer and mathematical group contains 6 of the 30 fastest growing occupations. As more devices are connected to the internet, the need to combat cybersecurity threats will increase. The risk of cyberattacks is expected to create demand for information security analysts, who will be needed to prevent the theft of critical information and service attacks on computer networks. Employment of these analysts is projected to increase 31.6 percent from 2018 to 2028. The expected increased use of mobile devices and software to operate or manage everything from home appliances to medical devices will create demand for application software developers. Employment of this occupation is projected to grow 25.6 percent over the decade.

Employment is projected to grow for statisticians, mathematicians, operations research analysts, and actuaries as a result of the increasing widespread use of statistical analysis to make informed business, healthcare, and policy decisions. (See figure 14.) In addition, the growing amount of data available online ("big data") will open new areas for analysis for these occupations.

Figure 14. Computer and mathematical occupations, projected employment change, 2018–28



Source: U.S. Bureau of Labor Statistics.

The two projected fastest growing occupations—solar photovoltaic (PV) installers and wind turbine service technicians—are involved in alternative energy production. Employment for solar photovoltaic (PV) installers is expected to grow extremely fast (63.3 percent) from 2018 to 2028 as the expansion and adoption of solar panels and their installation create new jobs. However, because this is a relatively small occupation, with a 2018 employment level of 9,700, this growth will account for only about 6,100 new jobs over the next 10 years. In addition, developments in wind energy generation have made this energy option increasingly competitive with traditional forms of power generation, such as coal and natural gas, and are expected to drive employment growth for wind turbine service technicians. Employment of these workers is projected to grow 56.9 percent over the next 10 years. As with solar PV installers, this occupation is small, and its rapid growth will account for only about 3,800 new jobs.

Most rapidly declining employment

The manufacturing sector is projected to lose the most jobs and have the most rapid employment decline of any sector over the projections decade. The large manufacturing sector contains 10 of the 20 industries projected to have the most rapid employment declines. Some factors contributing to the loss of jobs in the manufacturing

sector are international competition and the adoption of new productivity-enhancing technologies, such as robotics.[30] The tobacco manufacturing industry is projected to have the most rapid declines in industry employment, falling 4.6 percent annually.

The decline in employment in the manufacturing sector is expected to decrease employment over the projections decade in a number of occupations concentrated in manufacturing. Production occupations are projected to experience the strongest employment decline of any occupational group, because of a combination of automation and offshoring. Of the 30 occupations with the fastest employment declines, 13 are in the production occupational group and include various machine and tool setters, assemblers, and operators. Although their employment is projected to decline rapidly, they are relatively small occupations and are projected to lose only about 56,200 jobs in total.

Although the information sector has 3 of the 20 fastest growing industries over the projections decade, it also contains 4 of the 20 most rapidly declining industries. Contributing to these industry declines are technological changes that lead to fewer job opportunities. The newspaper, periodical, book, and directory publishers industry is projected to be among the most rapidly declining industries, with employment falling 2.7 percent annually. A shift toward digital from print publication contributes to the decline in this industry, as well as to the increase in the other information services industry.[31]

Technological changes are expected to continue to negatively affect the employment of several office and administrative support occupations. For example, software tools can facilitate the scheduling of meetings and appointments (replacing secretaries and administrative assistants), and digital data collection and handwriting recognition software can perform work previously done by data entry keyers. Of the 30 occupations with the fastest declining employment, 10 are from office and administrative support occupations; collectively, these 10 occupations are projected to lose about 356,200 jobs from 2018 to 2028.

Sales and related occupations are also expected to decline in employment over the next decade, largely because of competition from e-commerce activity. Cashiers, retail salespersons, and first-line supervisors of retail sales workers are each projected to decline from 2018 to 2028, for a combined total loss of 270,800 jobs, as online shopping displaces brick-and-mortar retail employment.[32]

Conclusions

An aging population and slower population growth will result in slower growth in the labor force from 2018 to 2028 than in prior decades. Older people participate in the labor force less than younger people, so that means fewer people are available to be employed. As a result, the projected growth for wage and salary jobs, at 5.2 percent, is lower than it was during the prior projections decade. In addition, since the base year of the projections (2018) is after a long economic expansion, economic growth rates are expected to be lower than in previous projection cycles.

Over 90 percent of employment growth from 2018 to 2028 is projected to be in the service-providing sectors. Occupations that provide healthcare or services related to healthcare are projected to make up most of the fastest growing occupations. An aging population is projected to demand more healthcare and related services. In addition, the number of people with chronic conditions is projected to continue to grow, adding to the demand

for health-related occupations. Other occupations projected to grow rapidly include those involved with computers and math and with alternative energy.

SUGGESTED CITATION

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NOTES

1 BLS develops macroeconomic projections with the Macroeconomic Advisers (MA) model, a structural econometric model of the U.S. economy. The model, licensed from MA by IHS Markit, comprises more than 1,000 variables, behavioral equations, and identities. Central characteristics of MA are a life-cycle model of consumption, a neoclassical view of investment, and a vector autoregression for the monetary policy sector of the economy. The full-employment foundation of the model is the most critical characteristic for the BLS outlook. Within MA, a submodel calculates an estimate of potential output from the nonfarm business sector; the calculation is based on full-employment estimates of the sector's hours worked and output per hour. Error correction models are embedded into MA so that the model's solution is aligned with the full-employment submodel. MA does not forecast sharp cyclical movements in the economy over the 10-year projection horizon. "Add-factors" are either left unchanged after the first couple of years of the solution or returned to historical norms. Add-factors represent changes made to the base result of a forecast or projection equation; see "Glossary of statistical terms" (Paris: Organisation for Economic Co-operation and Development, March 28, 2014), https://stats.oecd.org/glossary/detail.asp?ID=44. The structure of the model, exogenous assumptions, and MA's view of the Federal Reserve's long-term policy objective largely determine the characteristics of the model's long-term outlook for the economy. For more information, see http://www.macroadvisers.com/.

2 EIA estimates include prices for West Texas Intermediate crude oil, Brent crude oil, and natural gas and assume current energy regulations will remain unchanged. For more information, see *Annual energy outlook 2015* (U.S. Energy Information Administration, April 2015), https://www.eia.gov/outlooks/archive/aeo15/.

3 Visit our "Projections Methodology" page for a detailed description of the projections process at https://www.bls.gov/emp/documentation/projections-methods.htm.

4 The resident population projections of the U.S. Census Bureau have to be converted to a civilian noninstitutional population concept to be used in the BLS labor force projections. The U.S. Census Bureau uses a cohort-component method and assumptions regarding demographic components of change to project the resident population, which includes members of the Armed Forces residing in the United States and individuals residing in institutional group quarters. Methods and data are available at https://www.census.gov/programs-surveys/popproj.html. The conversion from the resident population concept of the Census Bureau to the civilian noninstitutional population concept of the BLS Current Population Survey (CPS) occurs in three steps. First, the population of children under 16 years is taken from the total resident population. Then, the population of the Armed Forces, broken down into different age, gender, race, and ethnic categories, is subtracted. Finally, the institutional population is subtracted from the civilian population for all the different categories. Thus, the civilian noninstitutional population comprises all nonmilitary people (those not on active duty in the U.S. Armed Forces) 16 years and older who are not inmates of penal or mental institutions or are not residents of sanitariums or homes for the aged.

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6 For data on the net migration, see the relevant chart from the World Bank, https://data.worldbank.org/indicator/SM.POP.NETM?locations=US.

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13 For more information on the full employment assumption and how it is incorporated into BLS projections, see Kevin S. Dubina, "Full employment: an assumption within BLS projections," *Monthly Labor Review*, November 2017, https://www.bls.gov/opub/mlr/2017/article/full-employment-an-assumption-within-bls-projections.htm.

14 For more information, see "Potential GDP and underlying inputs supplemental," Table 2 (Congressional Budget Office [CBO], March 7, 2019), https://www.cbo.gov/system/files/2019-03/51137-2019-01-potentialgdp.xlsx. Note, CBO refers to the natural rate of unemployment rather than nonaccelerating inflation rate of unemployment, or NAIRU. The concept of the rate of unemployment that prevails at full employment is the same. However, CBO downplays the link between inflation and unemployment.

15 See https://www.treasury.gov/resource-center/data-chart-center/interest-rates/Pages/yieldmethod.aspx for a discussion of the methodology for the Treasury's yield curves.

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19 As noted in an earlier note, EIA estimates include prices for West Texas Intermediate crude oil, Brent crude oil, and natural gas and assume current energy regulations will remain unchanged. For more information, see *Annual energy outlook 2015*, https://www.eia.gov/outlooks/archive/aeo15/.

20 Additional macroeconomic variables and assumptions that go into the projections can be found in tables 4.1 to 4.11 in the aggregate economy section of the Employment Projection's public website at https://www.bls.gov/emp/tables.htm.

21 Throughout this article, the word “output” refers to “real output” in chain-weighted 2012 dollars.

22 Rates of growth statements refer to “compound annual growth rates,” unless otherwise specified.

23 Total employment is the summation of the employment figures for nonagricultural wage and salary workers; agricultural, forestry, fishing, and hunting workers; and self-employed workers. Nonagricultural wage and salary employment data are from the BLS Current Employment Survey (CES), except for private household employment data, which are provided by the CPS. The CPS also provides the data for self-employed and for agricultural, forestry, fishing, and hunting workers.

24 Nonagricultural wage and salary employment data are from CES, except for private household employment data, which are from the CPS. Logging workers are excluded.

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